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Relationship between Working Capital Management, Strategies, and Performance of Nigerian Manufacturing Firms

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This is to certify that the doctoral dissertation by

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Abstract

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MPhil, Walden University, 2019

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Dissertation Submitted in Partial Fulfillment

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Abstract

Many Nigerian manufacturing firms have faced working capital management anomalies due to concerns of balancing profitability and liquidity that led to most business failures. To remain competitive corporate managers and business leaders of manufacturing firms need to operate optimally in working capital by understanding the association between working capital management (WCM), working capital strategy (WCS), and performance. Using the cash conversion cycle theory as the linchpin, the purpose of this quantitative correlational study was to examine the relationship between WCM, WCS, and performance. The study utilized secondary financial data spanning 2014 to 2018 from a random sample of 54 publicly traded Nigerian manufacturing firms. The regression results consisting of three models were statistically significant in predicting performance as it relates to economic value added (EVA), return on capital employed (ROCE), and Tobin's Q (TQ). The regression results revealed that WCM and WCS were significant predictors of EVA, ($F(5, 48) = 2.672$, $p < .05$, $R^2 = .218$; ROCE, ($F(5, 48) = 7.143$, $p < .001$, $R^2 = .427$; and TQ, ($F(5, 48) = 25.920$, $p < .001$, $R^2 = .730$. Overall, the findings showed that WCM and WCS significantly predicted performance ($p < .05$). Corporate managers and business leaders may integrate findings to enhance employee knowledge in working capital efficiency in the overall corporate strategy for the firm's profitability and sustainability. Profitable businesses may prepare dedicated corporate social responsibility budgets to cater to community-based infrastructures. These include roads, schools, and hospitals, amongst others, to improve the populace's living conditions, thereby maintaining peace and order in society.

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Dedication

This wonderful piece of academic work is dedicated to my late parents. I am grateful to my immediate family for their love, resilience, and support throughout this program's duration. To my wife, Comfort thank you for the love and support. To my children Ebitimi, Wanaemi, Ebinabo, Tonye, and Tarinabo thank you for being there for me when needed.

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All thanks, praises, and adoration to God. For Him alone be all the Glory. Without His continuous breath of life, it would not have been possible to reach this stage of my learning. The doctoral journey was characterized by interesting and challenging times. From the depth of my heart, I sincerely thank my committee members Dr. Craig Barton, Dr. Steven Tippins, and Dr. Robert Haussmann for providing valuable guidance and support to complete my dissertation. I am forever grateful to everyone that acted as a ladder in achieving this major milestone.

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Chapter 1: Introduction to the Study

Introduction

After the global financial crisis from 2007 to 2009 manufacturing firms learned to improve their daily internal operational management processes. In the Nigerian economy, 97.2% of all manufacturing activities are small firms that generate 50% of employment opportunities and 50% of industrial output (Agwu & Emeti, 2014). Daily operational activities of manufacturing firms include transforming purchased inventory to finished product, as well as the sale and receipt of payment arising from the interactions between customers and suppliers (Ajayi et al., 2017). These activities impact the firm's current assets and current liabilities, relationship, and significance to the manufacturing firm's daily routines. Mun and Jang (2015) stated that current assets comprise a firm's inventory and accounts receivables, while current liabilities constitute accounts payable which together embody a firm's working capital structure.

Abiodun and Samuel (2014) described working capital (WC) as funds required to run daily firm operations, which are related to liquidity, solvency, and performance (Kasiran et al., 2016). Working capital is an embodiment of the short-term state and inefficient management of working capital can worsen the robustness of the firm's growth (Singhania & Mehta, 2017). As a result, all firms, both small and large, spanning different sectors and social contexts require investment in working capital for routine operational activities (Shrivastava et al., 2017) and manage uncertain cash flows (Singh et al., 2017). For instance, in a working capital management survey in 2016 of U.S. and European, and other seven regional outstanding companies, Ernst and Young Global

Limited (EY) (2016) noted idle working capital of about US$1.2 trillion above the optimal value. EY further noted that this figure approximates to an aggregate value of about 7% of sales and that for each amount of US$ 1 billion in sales, there exists on the average an opportunity of US $70 million in working capital enhancement. Aktas et al. (2015) demonstrated that working capital consists of 24% of sales and 18% of manufacturing firms' assets.

Working capital management is a managerial accounting strategy that involves optimizing the firms' current assets and current liabilities and the interrelationships amongst the components (Tran et al., 2017). According to Nobanee and Abraham (2015), working capital management improves current assets and current liabilities' effectiveness to maintain sufficient cash flow to meet short-term goals. Baños-Caballero et al. (2016) emphasized that both working capital investment strategy (WCIS) and working capital financing strategy (WCFS) are critical inputs of the firm's management in understanding the relationship between working capital management (WCM) and performance. Therefore, sound working capital management attributes are desirable for business entities' management to remain sustainable and is reflected in financial performance (Aktas et al., 2015).

The sound financial performance of manufacturing firms requires metrics that cut across the interests of different stakeholders by management (Al-Matari et al., 2014). Investors require adequate criteria to probe management performance and hence deploy it as a yardstick for management compensation activities, improve motivation, identify optimal performance, and be abreast of the firm's challenges and use as a template to

design the right strategies to mitigate the concerns. As Nabavand and Rezaei (2015) discussed, inappropriate indicators for monitoring performance and lack of value creation for shareholders could result in a disparity between the true value and stock prices of firms, which could lead to losses of purchasers and profits for others. Similarly, the use of tailored value performance indicators for measurement has remained a challenge for most managers (Hall, 2018), leading from the interaction between working capital management and working capital strategies.

In this chapter, I narrated the study's background, a broad elucidation of the problem, and the objective of the study. The research question and hypotheses are designed to underpin the objective of the study. I gave a concise assessment of the theoretical framework, nature of the study, definitions, and assumptions. Afterward, I put forward an explanation of the scope and delimitations as well as the possible limitations of the study. I brought the chapter to a close with the study's significance concerning positive social change, summary, and transition to Chapter 2.

Background of the Study

Oburota and Ifere (2017) reiterated that the manufacturing sector contributes to both developing and developed economies' economic growth. From a Nigerian context, the 2016 Global Manufacturing Competitive Index ranked the country with a value of 23.1%, while the projection for 2020 is 25.4% (Deloitte, 2016). The manufacturing value added per capita is less than the 2.5% threshold which is 3.5 times the African average manufacturing value added per capita growth of 0.7% (Ukaegbu, 2014). PriceWaterHouseCoopers (2018) asserted that two-thirds of global manufacturing firms

experienced a downward trend in working capital performance and return on capital employed.

One of the firm's management's critical objectives in a competitive environment is the maintenance of sustainability (Alarussi & Alhaderi, 2018). The measurement and evaluation of modern firms' performance have become very significant and critical in this era of complexity and uncertainty in the marketplace. Corporate managers and business leaders could take advantage of and implement ways to improve performance by probing the internal and external variables that may affect profitability (Alarussi & Alhaderi, 2018). Investors make decisions based on the choice of alternatives which is a function of the level and timeliness of expected cash flows resulting from the firm’s operational activities (Alsoboa, 2017). Effective performance measurement practices prepare the stage for sound financial management decisions to maximize shareholder wealth as stakeholders use financial information to assess the firm's current and future performance (Babatunde & Evuebie, 2017).

The firm’s corporate managers and business leader’s financial success not only involves the management of long-term decisions and assets but requires the careful optimization of short-term assets and liabilities. Working capital management is a factor for financial performance and risk (Smith, 1980). Working capital management decisions are adjudged as one of the most important managerial functions in manufacturing firms because manufacturing firms carry out daily operations concerning the usage of large volumes of inventory, conversion to finished product, and subsequent sales (Tran et al., 2017). These processes require receivables from customers and payables from

suppliers (Altaf & Shah, 2017). Sound working capital management by firm's managers can meet operating expenses and act as a source of payment for short-term obligations when due (Ukaegbu, 2014; Yunos et al., 2015).

Working capital management is a short-term measure for the management of current assets and current liabilities necessary for ensuring the firm's unhindered smooth daily operational activities and taking advantage of available opportunities as the need arises (Shrivastava et al., 2017). Practitioners consider effective working capital practices as an avenue for closing the gap between working capital management inconsistencies that cause most business failures (Tran et al., 2017). Sound working capital management activities mean corporate managers and business leaders can initiate the right strategies that create a balance between short-term and long-term decisions (Singh et al., 2017). Working capital strategies (WCS) ensures that there is no strain on liquid resources, and at the same time, there is no cash tied-up in current assets (Cumbie & Donnellan, 2017).

There are two approaches of WCS, namely working WCIS and WCFS made up of aggressive, conservative, and moderate strategies. These constructs enable corporate managers and business leaders to manage current assets and current liabilities, giving information about the firm's risk and return dynamics (Abiodun & Samuel, 2014). WCIS entails the amount of total current assets possessed by the firm while WCFS are various connections amongst current assets and how these assets are financed (Abiodun & Samuel, 2014). The type of strategy the management of a firm chooses determines the relationship expected between WCM and financial performance (Tauringana & Afrifa, 2013). The aggressive strategy promotes high profit relative to liquidity while the

conservative approach generates higher profitability concerning liquidity (Qurashi, 2017). A challenge that corporate managers and business leaders face in the business arena is maintaining a balance between profitability and liquidity. A ready avenue to achieve this goal is the efficient management of working capital (Sathyamoorthi et al., 2018).

The alignment between WCM and WCS requires performance from multiple approaches of accounting, market, and economic measures (Arachchi et al., 2017; Jakub et al., 2015). This will potentially give corporate managers and business leaders the sense of monitoring the relationship between WCM and working capital strategies (WCS) and its performance outcomes from a historical, present and future context for improved WC decision-making for enhancing the financial prosperity of the firm's stakeholders. Investigating WCM practices and their alignment with WCS amongst Nigerian manufacturing firms could add to the literature and practice of improved performance management in organizations that may impact positive social change dimensions.

Problem Statement

During the past 10 years, many Nigerian manufacturing firms have faced WCM anomalies (Lawal et al., 2015; Oyedele et al., 2017), as situations that caused business failures (Eya, 2016; Tran et al., 2017). PriceWaterHouseCoopers (2018) emphasized that global manufacturing working capital levels deteriorated over 5 years, leading to lower performance, investments, and return on capital employed by 1.36%, 2.4%, and 5% respectively and $205.8 billion tied up in idle funds. Corporate managers and business leaders are continually confronted with the choice of investment and financing WCS that deliver optimum performance for the firm (Alarussi & Alhaderi, 2018; Baños-Caballero

et al., 2016). The Frankfurt Business Media, 2012 reports that 1000 companies globally lose about $2 billion annually due to poor working capital management (Hassan et al., 2017). Despite growing working capital knowledge (Adam et al., 2017; Altaf & Shah, 2017; Enqvist et al., 2014), there remains a seeming gap in the literature on empirical research on how corporate managers and business leaders examine performance from multiple approaches of market and accounting (Arachchi et al., 2017) and economic measures (Jakub et al., 2015) in the relationship with working capital management and working capital strategies**.**

The general problem is that corporate managers and business leaders may not have access to the relationships between performance, WCM, and WCS (Aktas et al., 2015; Baños-Caballero et al., 2016; & Shah et al., 2015). The specific problem is that corporate managers and business leaders of manufacturing firms need to integrate accounting, market, and economic measures (Abiodun & Samuel, 2014; Alsoboa, 2017; & Ukaegbu, 2014), in the relationship between performance, WCM, and WCS to garner knowledge to limit the deterioration of working capital levels and to reduce business failures for the Nigerian economic conditions (Eya, 2016; Tran et al., 2017). Ribeiro de Almeida and Eid (2014) and Enqvist et al. (2014) reiterated that inefficient management of working capital by corporate managers and business leaders poses a threat to liquidity, financial distress, sales opportunities, and debt repayment, which could negatively affect performance, shareholder wealth, and positive social change activities.

Purpose of the Study

The purpose of this quantitative research study was to examine the relationship between WCM, WCS, and performance for corporate managers and business leaders at publicly traded manufacturing firms in Nigeria. I used a nonexperimental and correlational design for this study. I collected and deployed secondary data from the Nigeria Stock Exchange (NSE) fact book to assist in analyzing results. The dependent variable was performance, while the independent variables were WCM and WCS. The components of the performance of this study were economic value added (EVA), Tobin's Q (TQ), and return on capital employed (ROCE). The measures of WCM were cash conversion cycle (CCC), accounts payable period (APP), accounts receivable period (ARP), and inventory conversion period (ICP). WCS parameters comprised WCIS and WCFS. WCIS was made up of aggressive, conservative, and moderate working capital investment strategies. WCFS constituted aggressive, conservative, and moderate working capital financing strategies. From a positive social change context, the study's findings may assist corporate managers and business leaders to strive for the sustainability of firms (Alarussi & Alhaderi, 2018) in the relationship between WCM and WCS. Financially successful firms (a) pay taxes which is potentially used for employment generation and poverty alleviation, (b) improve social corporate responsibility activities in host communities such as educational infrastructure (Rodriguez-Fernandez, 2016), (c) provide training programs, improved payment packages, better working environment, WCM information for investors, and (d) create more awareness to the academia on the association between WCM, WCS and performance (Wasiuzzaman, 2015).

Research Question and Hypotheses

Research question (RQ): What is the relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms considering secondary financial data from 2003 to 2017?

Null hypothesis (H_0): There is no statistically significant relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms.

The alternative hypothesis (H_1): There is a statistically significant relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms.

For this study, I developed three models using the dependent and independent variables. I tested the hypotheses by running the following three multiple regression equations.

$$EVA = ß_0 + ß_1CCC + ß_2APP + ß_3ARP + ß_4ICP + ß_5WCIS + ß_6WCFS + Ɛ \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$ROCE = ß_0 + ß_1CCC + ß_2APP + ß_3ARP + ß_4ICP + ß_5WCIS + ß_6WCFS + Ɛ \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$Tobin's\ q = ß_0 + ß_1CCC + ß_2APP + ß_3ARP + ß_4ICP + ß_5WCIS + ß_6WCFS + Ɛ \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

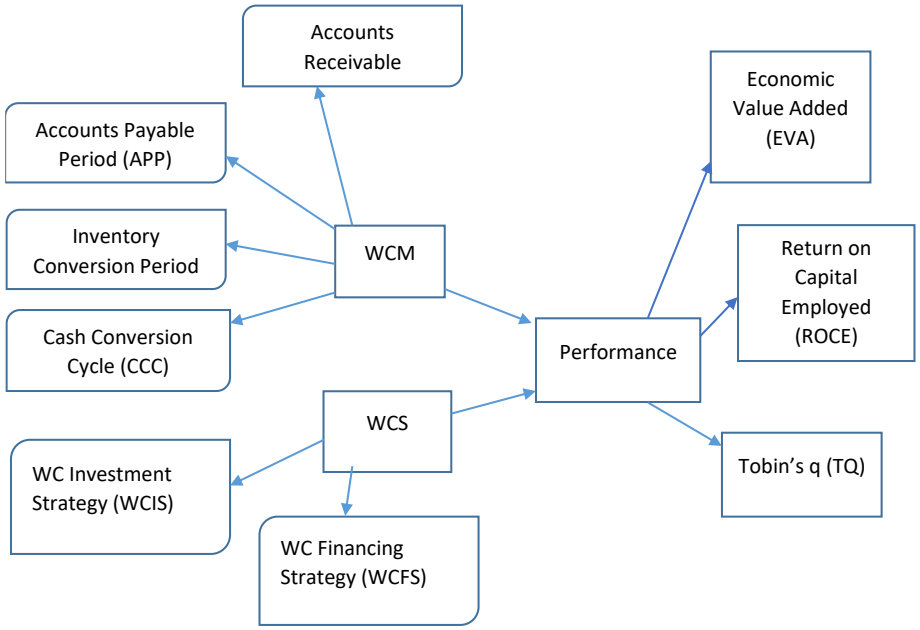
Figure 1 shows the variables for the study that relates the association between WCM, WCS and performance. These relationship between these variables will be able to address the research question and hypotheses of the study.

Design of Variables

I used a correlational design in this research. Additionally, I deployed the data of publicly listed manufacturing firms on the Nigerian Stock Exchange (NSE) considering secondary financial data from 2003 to 2017.

Figure 1.

The Research Variables.



Statistical Model

For this quantitative research study, I determined any possible relationship between CCC, APP, ARP, ICP, WCIS, WCFS, and EVA, ROCE, and TQ. I employed a correlational design to investigate the potential relationship between the dependent and independent variables using multiple regression statistical methods as a possible source of explaining the association and to verify whether the hypotheses will exist.

Table 1.

Dependent and Independent Variables Measurements

Variable Type	Concept	Symbol	Measure
Dependent	Economic Value Added	EVA	Payment in a year for investors risk
Dependent	Return on Capital Employed	ROCE	Links business and capital efficiency
Dependent	Tobin's q	TQ	Market value and to replacement cost
Independent	Cash Conversion Cycle	CCC	Change assets and liabilities to cash
Independent	Accounts Payable Period	APP	Average time taken to pay suppliers
Independent	Accounts Receivable Period	ARP	Average time for customers to pay
Independent	Inventory Conversion Period	ICP	Average to convert inventory to sales
Independent	Working Capital Investment Strategy	WCIS	Approach to optimize current assets
Independent	Working Capital Financing Strategy	WCFS	Approach to manage current liabilities

Dependent and Independent Variables

I organized the hypotheses and research question to investigate if any relationship exists between WCM, WCS, and performance. The dependent variables were EVA, ROCE and TQ. The independent variables were CCC, APP, ARP, ICP, WCIS, and WCFS.

To calculate CCC, I used the sum of ARP and ICP less APP (Richards & Laughlin, 1980). For APP, the ratio of average accounts payable in a year per the costs of goods sold multiplied by the number of days in a year (Cumbie & Donnellan, 2017). For ICP, I employed the average inventory ratio per the cost of goods sold during a year

multiplied by the number of days in a year. I found the value of ARP by the ratio of the average account receivables per sales multiplied by the number of days in a year (Cumbie & Donnellan, 2017). I calculated WCIS by dividing total current assets by total assets (Adam et al., 2017), and WCFS by dividing total current liabilities by total assets (Thakur & Muktadir-Al-Mukit, 2017).

I calculated the dependent variables as follows: To calculate EVA, I found the difference between the product of total capital employed and the weighted average cost of capital with the net operating profit after tax (Gupta & Sikarwar, 2016). For ROCE, I used the net profit before tax over the total assets minus total current liabilities (Qurashi, 2017). To calculate TQ, I used the ratio of market value divided by the replacement cost of assets (Fu et al., 2016).

Theoretical Foundation

The theoretical framework provides guidance and direction to the study and underpins the connection among various research constructs (Adom et al., 2018). Gitman's seminal work (1974) heralded the cash cycle concept as a channel of optimizing a firm's working capital concerning liquidity. However, Richards and Laughlin (1980) ultimately operationalized the cash cycle paradigm into the cash conversion cycle theory for analyzing firms' working capital management efficiency. The cash conversion cycle (Richards & Laughlin, 1980) was the theoretical framework for this study. Corporate managers and business leaders use the cash conversion cycle as a comprehensive measure of working capital management to assess how well a firm's working capital is managed relative to performance. Corporate managers and business

leaders understand that the transformations of investments to useable cash flow of liquidity do not have the same delivery rate (Richards & Laughlin, 1980).

The cash conversion cycle is the sum of the accounts receivable period and inventory conversion period minus the accounts payable period in days. A more efficient working capital management by corporate managers and business leaders may result in a shorter cash conversion cycle, generating higher performance (Richards & Laughlin, 1980). Weinraub and Visscher (1998) highlighted the concept of working capital strategy to measure the variability with firm performance. Adam et al. (2017) implied that the adoption of the appropriate working capital strategy by corporate managers and business leaders of manufacturing firms might shorten the cash conversion cycle thereby, improving performance. Researchers have used this theory as a foundation in different contexts to articulate the variations between working capital management and performance (Altaf & Shah, 2017; Chauhan & Banerjee, 2018; Cumbie & Donnellan, 2017; Oseifuah & Gyekye, 2017). Concerning the proposed study, the cash conversion cycle systematically explained the relationship between the variables of working capital management, working capital strategies, and performance in manufacturing firms.

Nature of the Study

The nature of this proposed study was a nonexperimental correlational design using the quantitative multiple regressions statistical method. The quantitative research methodology was able to answer the research question using a correlational design. The dependent variable was performance while the independent variables were working capital management and working capital strategies. The target population constituted

publicly traded manufacturing firms from the Nigerian Stock Exchange. Small manufacturing firms in Nigeria make-up about 97.2% of manufacturing activities generating 50% of employment and 50% of industrial output (Agwu & Emeti, 2014). The researcher of the study used secondary data from annual reports and financial statements of firms.

The quantitative research method has a positivist philosophical foundation that centers on objectivity, deductive processes. It allows counting, empirical measurement, formulation and testing of hypotheses using statistical analysis of data thereby, facilitating the description accuracy of study variables and coefficients (Kivunja & Kuyini, 2017). The quantitative research method was consistent with understanding the relationship between working capital management, working capital strategies, and performance. The multiple regression statistical method was suitable for analyzing data because it could be deployed to estimate the relationship between the dependent and independent variables and the predictability of the dependent variable from the independent variable (Uyanik & Güler, 2013). Qualitative and mixed-methodological approaches were not suitable for this study. Qualitative research processes unable the deductive testing of a theory (Brooks & Normore, 2015). Additionally, the relationships between study variables do not involve combining both inductive exploratory and deductive explanatory processes (Molina-Azorín & López-Gamero, 2016).

The non-experimental correlational research design was most favorable compared to experimental and quasi-experimental research designs in this study as it entailed the investigation of the extent of relationship instead of the causal relationship between

working capital management, working capital strategies, and performance (Turner et al., 2013). Experimental and quasi-experimental research designs were not chosen because the present study did not involve treating variables (Kraus et al., 2016) and the application of interventionist activities (Holmberg et al., 2016).

Definitions

Accounts payable period: The average time in days taken for the firm's management to pay its creditors (Cumbie & Donnellan, 2017).

Accounts receivable period: The average time in days between the issuance of credit to when payment is realized (Cumbie & Donnellan, 2017).

Cash conversion cycle: The cash conversion cycle is the sum of the accounts receivable period and inventory conversion period minus the accounts payable period in days (Richards & Laughlin, 1980). It is a composite measure of WCM which is used by the firm's management to understand how WC is optimized as a function of performance. The cash conversion cycle typifies the length of time taken to translate accounts receivable, inventories, and accounts payable into cash (Mun & Jang, 2015).

Current assets: Resources that are easily convertible to cash within one year (Nobanee & Abraham, 2015). Current assets such as inventory and accounts receivables provide a significant source of cash-inflows for the firm's management (Abiodun & Samuel, 2014).

Current liabilities: These are debts accounts that are to be defrayed within one year which comprises short-term debt obligations, accounts payable, accrued liabilities, and other financial obligations (Abiodun & Samuel, 2014).

Economic value added: Economic value added is an economic performance measure defined as the difference between the dollar value of net operating profit after tax and the product of total capital employed and the weighted average cost of capital (Gupta & Sikarwar, 2016). Economic value added captures the dollar return in a given year ahead of the smallest rate needed to compensate investors for risks on capital investments.

Financial firm performance: A construct of organizational effectiveness that gauges the financial well-being of the firm through the level of profitability (Selvam et al., 2016).

GWC: Gross working capital is defined as the total current assets which depict the size and the efficiency of utilization of current assets (Boopathi & Leeson, 2016).

Net trade cycle: The net trade cycle is a variant of the cash conversion cycle which is the ratio of the cash conversion cycle over net sales rated to the average number of days in a year (Prasad et al., 2019)

Net working capital (NWC): Net working capital is the difference between current assets and current liabilities (Afrifa, 2016). NWC can be positive, negative, or neutral. Positive NWC results when current assets are more than current liabilities, negative when current assets are less than current liabilities, and neutral when current assets and current liabilities are equal (Çelik et al., 2016).

Operating cycle: The operating cycle is the time duration between the availability of cash to purchase input materials and the time cash is received from the sale of inputs (Richards & Laughlin, 1980).

Working capital management: A managerial accounting strategy that underpins the magnitude and productiveness of WC to enhance the levels of current assets and current liabilities sustaining cash flow and enhancing the unhindered running of operational activities for short-term goals (Tran et al., 2017).

Inventory conversion period: The average length of time in days taken to convert inventory to sales (Cumbie & Donnellan, 2017).

Return on capital employed: This is an accounting performance measure of business and capital efficiency that explains the connections between invested capital in operating assets and the resultant profitability before expense deductions (Qurashi, 2017).

Tobin's q: A market performance measure that evaluates the market value of each dollar of the replacement cost of assets (Fu et al., 2016).

Working capital (WC): Shrivastava et al. (2017) described WC as the difference between current assets and current liabilities, which has an association with liquidity, solvency, and performance**.**

Working capital strategy (WCS): Working capital strategies are the various investment and financing approaches used in managing current assets and current liabilities concerning total assets (Ukaegbu, 2014) for optimum performance of the firm. Working capital strategies are made up of three mutually exclusive forms of aggressive, conservative and moderate, and firms select one relative to the other based on specific gains (Adam et al., 2017). WCS promotes efficiency and timeliness in firms (Abiodun & Samuel, 2014)

Working capital investment strategy: Management decisions and actions geared towards optimal use of current assets to generate value for the firm and shareholders (Adam et al., 2017).

Working capital financing strategy: Management of internal processes of funding current assets for optimum firm performance (Thakur & Muktadir-Al-Mukit, 2017). Trade credit is a veritable avenue of financing for most firms (Tran et al., 2017).

Assumptions

Assumptions are necessary postulations in social science management research, underpinning the researcher's view of relating detail information without corresponding corroboration (Foss & Hallberg, 2013). To carry out this study, I put together the following assumptions (a) quantitative methodology was appropriate for examining the relationship between working capital management, strategies and performance of publicly traded manufacturing firms in Nigeria, (b) the theoretical framework was adequate in explaining the linkages amongst study variables, (c) cross-sectional secondary data from annual reports and financial statements of firms were precise and exhaustive, (d) the information from the Nigerian Stock Exchange factbook and that of home pages of participating manufacturing firms were reliable, unambiguous and timely instead of personalized management reports of chosen manufacturing firms, and (e) the financial data of firms were correct and replete.

Scope and Delimitations

Delimitations are delineations the researcher adduces to operate within a particular scope constrained by the study's limitations. Delimitations enable the

researcher to incorporate or remove certain research constructs (Simon & Goes, 2013). Tabachnick and Fidell (2013) emphasized that a concise explanation of delimitations is capable of imposing boundaries regarding the interpretations or generalizations of the study results. The delimitations in this study comprised (a) the study was limited to publicly traded manufacturing firms listed in NSE with correct and complete data from 2003 to 2017, (b) the study examined the association between WCM. WCS and performance rather than the cause-and-effect relationship amongst study dependent and independent variables, (c) the use of historical financial data which did not necessarily reflect future economic conditions and (d) the selection and use of several manufacturing sectors as regards managerial decisions in WCM and WCS.

Limitations

Limitations are unavoidable hindrances to a study that reflect probable shortcomings due to geographical inclinations and related to data, sample size, and availability which could affect the research findings (Coffie, 2013; Leedy & Ormrod, 2013). The limitations in this study were (a) the results of the study were generalizable to all publicly quoted manufacturing sectors of firms as specific firm sizes, the location might affect performance, (b) relating performance to WCM and WCS solely hid other performance dimensions, (c) the use of numeric secondary data only undermined the role of unmeasurable nonfinancial measures and, (d) the findings were not applicable to other countries.

Significance of the Study

This study might add to the literature on working capital management by examining corporate managers' financial behavior and business leaders' decisions regarding working capital management, working capital strategies, and performance. Effective working capital management helps corporate managers and business leaders create value for the firm and avoid potential financial distress (Ribeiro de Almeida & Eid Jr, 2014).

Significance to Theory

The study's findings might avail the scholars of the academic community with an additional source of working capital management information concerning performance and working capital strategies in an era of perceived lack of attention to working capital management by the academia (Ramiah et al., 2014; Wasiuzzaman, 2015). Research scholars might also use the results as a template to further explore and exploit avenues of establishing different approaches and efficient ways of understanding the constructs of WCM, WCS, and performance (Karadag, 2015). The study's outcome might contribute to the theory on the factors that promote efficient WCM in alignment with WCS to enhance firm performance.

Significance to Practice

Security analysts, investment managers, stockbrokers, and retail investors might benefit from the findings of optimization knowledge of working capital to enhance performance to improve technical know-how, aid investment and portfolio construction (John, 2015). Working capital management measures might help financial analysts

improve forecast efficiency when choosing target firms during the design of forecast models (Gao & Wang, 2017). The study results might help entrepreneurs manage the cash conversion cycle concerning market data in making adjustments to working capital components, thereby reducing the need for external financing (Singhania & Mehta, 2017). Corporate managers and business leaders of other firms might use the findings to create effective supplier and creditors relationships to generate suitable trade credits and affordable financing (Karadag, 2015). The findings might be useful for corporate managers, small business leaders and owners to deploy WCM attributes that generate a balance between current assets and current liabilities thereby, optimizing liquidity (Nobanee & Abraham, 2015).

Significance to Social Change

Corporate managers and business leaders might gain from the insights of the interrelationship between working capital management and working capital strategies to improve financial performance to enhance the firm's sustainability (Aktas et al., 2015; Alarussi & Alhaderi, 2018). Managers of profitable firms are likely to pay taxes that government officials might use to formulate welfare programs to generate employment opportunities, alleviate poverty, and the sustenance of law and order in society (Edame & Okoi, 2014). As a competitive strategy, firm managers might prepare dedicated corporate social responsibility budgets to provide people-oriented projects in operational communities (Rodriguez-Fernandez, 2016). Corporate managers and business leaders might use part of profits to organize training programs for employees to enhance

knowledge acquisition, attitudinal change and build a culture of shared organizational performance and responsibility.

Summary and Transition

In this chapter, I introduced constructs relating to the association between WCM, WCS, and performance concerning publicly listed manufacturing firms in Nigeria. Additionally, I presented the background, problem statement, purpose, research question, hypotheses and the theoretical foundation of the study. Furthermore, I also espoused the study's nature, definitions, assumptions, scope and delimitations, limitations, the significance of study, and summary and transition to Chapter 2. Chapter 2 reviewed the inconsistencies of past theoretical and empirical studies involving the relationship between WCM, WCS, and performance in the context of Nigerian manufacturing firms using secondary data spanning 2003 to 2017.

Chapter 2: Literature Review

Introduction

The purpose of this quantitative research study was to examine the relationship between WCM, WCS, and performance for corporate managers and business leaders at publicly traded manufacturing firms in Nigeria. Manufacturing firms' unique processes involve the conversion of purchased inventory to finished product, sales and the receipt of payment from customers, and payment to suppliers (Ajayi et al., 2017). Compared to financial and service companies, manufacturing firms need enormous investment in inventory, accounts receivables, and accounts payables (Kroes & Manikas, 2014). Aktas et al. (2015) argued that working capital constitutes 24% of total manufacturing sales and 18% of total assets, which require effective strategies to deliver efficiency and timeliness (Abiodun & Samuel, 2014).

Working capital management is strategic to the firm's investment, financing, and capital allocation, impacting liquidity and performance (Olarewaju et al., 2017). Nevertheless, the use of tailored value performance metrics for measurement has remained a challenge for most managers (Hall, 2018), leading from the interaction between working capital management and working capital strategies. According to Hassan et al. (2017), the Frankfurt Business Media in 2012 reports that 1000 companies lose $2 billion globally due to poor working capital management. Working capital inconsistencies have led to most business failures (Tran et al., 2017), which Simon et al. (2017) attributed to the nonlinearity of the association between working capital management and performance.

The remainder of this chapter comprised the processes required to search for past and current topics, discussion on the linkages between cash conversion cycle theory, and how the theory might give another explanation on why corporate managers and business leaders require the understanding and alignment between working capital management, working capital strategies, and performance of manufacturing firms. This was followed by an evaluation of recent articles on working capital management constructs relevant to the firm's performance. The chapter ended with a summary and conclusion and a transition to Chapter 3.

Literature Search Strategy

Literature search strategies are critical for a successful research process. Literature search strategies are the researcher's immediate plans and actions to investigating prospective answers to present research problems when carrying out a particular area of scrutiny (Wang et al., 2017). These mechanisms for devising avenues for reaching valuable materials for research studies are predicated on research questions, which form the basis for developing search strategies (Eriksen & Frandsen, 2018). Eriksen and Frandsen (2018) argued that the quality of search strategies depends on the researcher's knowledge. As Savolainen (2016) demonstrated, literature search strategies are information-seeking attributes that create the road map to shape how researchers identify, choose alternatives, and access information items. Savolainen (2016) argued that plans and patterns are two crucial actionable aspects of strategy which form a comprehensive sequence of how the plan or expected results of the researcher are realized and whether the plans were met. However, selecting the appropriate keywords,

terms, search techniques, and use of different databases is imperative for generating very relevant articles for a quality review (Cleary et al., 2009).

Comparatively, literature search strategies leading to valuable findings and their attendant social impact to the wider society are reminiscent of the search strategies resulting in new product development in the industry. Efficient search strategies result in industry practitioners' innovativeness resulting in new products (Ruiz-Pava & Forero-Pineda, 2018). Similarly, the use of search strategies in the academic world provides valuable results that positively impact society (Sampath-Kumar & Kumar, 2013). In contrast, lack of quality searches or mistakes in search strategies may impact the quality of information retrieved (Salvador-Oliván et al., 2019). Nevertheless, quality review means the study area requires articulation and alignment with research questions. Studies on working capital management and related constructs have evolved over the years. So, it is necessary to link articles in more than five years with very recent studies, to give clearer insights into how studies on the subject have transformed over the years. This is to enable the researcher to decipher the theory underpinning the study and appreciate potential gaps and possibly make improvements from a comprehensive literature search. A case in point is the seminal works of Gitman (1974), Richards and Laughlin (1980), and Weinraub and Visscher (1998) on whose theoretical and conceptual findings the cash conversion cycle rests on, in explaining working capital management construct.

The literature review sources for this study consisted of articles spreading across different geographical regions of the world because publicly listed firms have more alignment areas than differences in complying with financial reporting standards

(Johnston, 2014**).** The literature review sources' central focus was peer-reviewed journal articles, dissertations, conference proceedings, and seminal works. I consulted Walden University Library databases such as Source Complete/Premier, ABI/Inform Complete, ScienceDirect, and Emerald Management Journals along with Boolean operations to navigate through articles relevant to my study, as well as other online sources within and beyond five years. Out of 162 searched articles, peer-reviewed articles were 85%, nonpeer reviewed amounted to 15%, while 146 were less than 5 years forming 90% and articles more than 5 years resulted in 10%. Key searched words and combination of terms were *working capital, working capital management, working capital components, working capital policy, working capital strategy, aggressive and conservative strategies, working capital financing and investment strategy, cash conversion cycle, performance, profitability indices, economic value-added, return on capital employed, and Tobin's q.*

Theoretical Foundation

Using a quantitative research approach, I attempted to deploy theory or an array of constructs to infer the probable relationship among variables in my study to clarify research phenomena. The seminal research of Gitman (1974) brought about the cash cycle concept of working capital optimization concerning liquidity. Nevertheless, Richards and Laughlin (1980) eventually operationalized the cash cycle into the cash conversion cycle to evaluate firms' working capital management efficiency. In the theoretical and empirical literature, researchers' views suggested the relationship between the constructs of working capital and performance was not transformed into an articulate theory (Falope & Ajilore, 2009). Evidence in the literature showed the evolution of the

static view to the operating cycle, and then to the cash conversion cycle approach of working capital, insinuating a trend of working capital theoretical foundation (Falope & Ajilore, 2009).

The cash conversion cycle, also called the dynamic view of working capital, transformed the static and operating cycle views of working capital. The static concept is operationalized through current and acid-test ratios, which are balance sheet components (Richards & Laughlin, 1980). Richards and Laughlin argued that the static view was based on a narrow outlook of the firm's solvency position, without a corresponding analysis of the operational aspects. Higher current ratios indicate the higher solvency position of the firm (Richards & Laughlin, 1980). According to Canina and Carvell (2008), higher current ratios did not always signify positive standing of a firm's short-term financial success; as high current ratio might result due to the improvement of account receivables, not necessarily from better sales. Bolek (2013) stated that it was not practicable to evaluate a business entity with static liquidity measures, except with the inclusion of the cash conversion cycle variables.

Static measures are based on a part or all of its current assets over the current liabilities, which did not render elaborate information on idle current assets and liabilities and how they honor its cash engagements (Canina & Carvell, 2008). Some of the pitfalls of the static balance sheet measures of liquidity gave rise to the operating cycle concept. The operating cycle view incorporates income statement measures of inventory and receivables to the static variables (Richards & Laughlin, 1980). Richards and Laughlin stated that the operating cycle appears more promising than the static liquidity measure

but not suitable as a cash flow measure since it does not integrate the time-variant concerning how the firm pays suppliers of its current liabilities. With the inclusion of the time component of account payables, the firm can assess the cash inflows due to the transformation of its investment in current assets.

The rationale for the cash conversion cycle was that it provided a comprehensive approach of gauging a firm's optimal working capital levels associated with inventory, receivables, and payables and the linkages between creditors and suppliers in the manufacturing process (Mbawuni et al., 2016). A manufacturing firm's current assets from operational context comprise inventory and account receivables, while current liabilities constitute account payables (Afrifa et al., 2014). The cash conversion cycle is calculated as the sum of the accounts receivable period and inventory conversion period minus the accounts payable period (Yazdanfar & Öhman, 2014**)**. However, Weinraub and Visscher (1998) conceptualized working capital strategies to measure firm performance variability. Working capital strategies are investment and financing decisions of corporate managers and business leaders to align the optimization of current assets and current liabilities (Ukaegbu, 2014). Several researchers have used the cash conversion cycle as the theoretical lens in different contexts to interrogate the variations between working capital management and performance (Altaf & Shah, 2017; Chauhan & Banerjee, 2018; Cumbie & Donnellan, 2017).

To validate the relationship between working capital management and performance, Shrivastava et al. (2017) asserted that a longer cash conversion cycle is counter-productive to the firm's profitability and performance. However, Singh et al.

(2017) posited that the research concerning working capital management and performance has various discrepancies. The authors attributed these anomalies may be due to differences in sample volumes, measures of variables used, and economic climate inherent in specific nations. The cash conversion cycle connects with this research because it weaved the study variables and constructs in a systematic manner that was able to probe the association between working capital management, working capital strategies, and performance of manufacturing firms. Corporate managers and business leaders might garner valuable knowledge from the association of study variables to proffer competitive direction for optimum firm performance by reducing risk and improving shareholder funds.

The efficiency of the cash conversion cycle depends on some assumptions. Firstly, the firm's performance might be enhanced by the reduction of the cash conversion cycle through efficient management of the working capital components and their interrelationships (Richards & Laughlin, 1980). Shorter number of days between inventory, payables, and receivables showed a firm converted its raw materials much quickly to sales with receipt of payment, compared to longer days, meaning the firm took more time to generate sales from its inventory through delayed payments (Eldomiaty et al., 2018). Secondly, that working capital management and working capital strategies are complementary concerning firm performance (Weinraub & Visscher, 1998), which enables the generation of an optimal level of working capital management and working capital strategies for probing the association between cost and benefits in managing current assets and current liabilities (Wasiuzzaman, 2015). Adam et al. (2017) stated that

using the appropriate types of working capital strategies can lead to the reduction of the cash conversion cycle thereby, improving performance.

Working capital strategies comprise aggressive, moderate and conservative attributes. More so, the firm's working capital strategies might be affected by several within-firm and outside-firm issues (Nobanee & Abraham, 2015). Tran et al. (2017) stated that a shorter cash conversion cycle in the daily operations of the firm means the firm adopts a more aggressive working capital strategy, while a longer cash conversion cycle suggests the firm uses a conservative working capital strategy. Abiodun and Samuel (2014) argue that working capital strategies promptly boost the smooth running of operations, which might positively impact the firm's performance when in proper synergy with working capital management.

Lastly, organizational leadership is required in creating and managing compliance of trade credit-related policies concerning buyers and suppliers. Trade credit is a legal instrument where the buyer purchases products or services, and payment to the supplier is deferred to a later date (Yazdanfar & Öhman, 2016). Yazdanfar and Öhman argue that the buyer views the agreement as a funding gap in payables recorded as a liability. At the same time, the supplier sees it as an investment in receivables, which appear as assets on the balance sheet. Therefore, corporate managers and business leaders need to coordinate these partnerships for optimal performance. The firm managers both give and collect credit for managing the relationship between suppliers and buyers**.** The cash conversion cycle's efficiency as a theoretical lens of working capital management aligns with

working capital strategies (Weinraub & Visscher, 1998) geared towards achieving an optimal value of working capital.

Literature Review

An Overview of the Nigerian Manufacturing Sector

Nigeria is a multiethnic, culturally diverse and naturally endowed with enormous resources, which has remained one of the most prominent economic and political frontiers in the continent of Africa. According to the World Bank (2019), she has a population of 197 million, which accounts for 47% of West Africa's population, which as a consequence require a vibrant manufacturing sector. Manufacturing is a transformative process that involves the conversion of raw materials and substances into finished products. Small manufacturing firms dominate the Nigerian economic landscape, which constitutes 97.2% of the manufacturing activities and provides 50% of employment and 50% industrial output (Agwu & Emeti, 2014). The economic success of a nation is predicated largely on her manufacturing sector capability (Monye, 2016). The Nigerian economy was originally agrarian pre-independence 1960 but gradually gave way to manufacturing processes due to the oil boom (Danladi et al., 2016; Monye, 2016). The discovery of enormous oil proceeds led to a neglect of the agricultural sector and the subsequent decline of the manufacturing sector, large firms producing artifacts of wood, metal works, brass and bronze, leather works, bags and textiles, and fire-based pottery works (Ajayi, 2011).

Before the mid-1980s, the sector experienced improvement over the years with the contribution of the industrial sector to the GDP increased by 12.6% to 32.4% between

1966 and 1972 (Teriba & Kayode, 1977). There were very low manufacturing activities during the political upheaval which turned out to the civil war at the beginning of the 1970s (Ajayi, 2011). According to Osita-Njoku (2016), the second National Development Plan of 1970-74 was initiated as an avenue to rebuild with the sole mandate of:

- Transforming the nation to a virile, self-sustaining, and united country.
- A just, dynamic and egalitarian society.
- A nation where her citizens are gainfully employed and democracy thrive.
- Equitable distribution of industries, quick expansion, and diversification of the industrial sector.
- Improve income generation and provide employment opportunities.
- Initiate new firms which products would enter foreign markets to continue import substitution drive.
- Promote local production of capital goods and the processing of raw materials amongst others.

As Raphael and Gabriel (2015) reported, the number of registered companies, capacity utilization, the fraction of manufacturing sector contribution to the GDP, and employment resulting from the manufacturing process all declined in various proportions within the mid-1980s until 2009. Asaleye et al. (2018) reiterate that most African economies including Nigeria initiated and carried out structural adjustment programs (SAPs) in the late 1980s and 1990s as suggested by the International Monetary Fund (IMF, 2018) and the World Bank (2019). As a consequence, to maximize the benefit from the sector on the economy. The structural adjustment program facilitated the

removal of government direct economic control to a more liberalized free market economy. To expedite the workings of the economy in 2003, the Nigerian Government initiated the National Economic Empowerment Development Strategy (NEEDS, 2004). One of the cardinal objectives of NEEDS was to promote and build a virile financial system to support the economic development process (Raphael & Gabriel, 2015).

The banking sector recapitalization policy of the Central Bank of Nigeria (CBN) became operational in 2004 with bank recapitalization hitting over 1000% improvement (Madichie, 2007). As demonstrated by Danladi et al. (2016) and Monye (2016), the manufacturing sector performance resulted in a paltry GDP contribution of 4.2% in 2009, 2.6% in 2012, 30% capacity utilization, as well as a 6% manufacturing output in growth. Nonetheless, Nigeria experienced an average GDP growth rate of 5.7% per year between 2006 and 2016 (World Bank, 2019). Also, the volatility of oil prices which is the main economic earner for the nation, made growth skyrocket to a value of 8% in 2006 compared to a low value of -1.5% in 2016 (World Bank, 2019), plunging the country into recession.

The Economic Recovery and Growth Plan (ERGP, 2017), an initiative of the Federal Government of Nigeria claim that the Nigerian economy plunged into recession in the second quarter of 2016, due to overdependence on the oil sector and the negligence to diversify the revenue base and foreign exchange of the country (Asaleye et al., 2018). According to the National Bureau of Statistics (NBS), 2018), the manufacturing sector contributed 14.82% in 2017 to the National Domestic Product (GDP). In a similar vein, the IMF (2018) reports that Nigeria achieved 0.8% economic growth in 2017 and a

projection of 2.1% and 1.9% for 2018 and 2019 respectively. The Nigerian manufacturing valued added for 2016, 2017, and 2018 are 8.680. 8.742, and 7.780 respectively are lower than her Asian counterparts (World Bank, 2019) who were almost at the same level in terms of economic growth in the early 1960s. Despite, the effort from the government to improve the manufacturing climate for optimum performance, the manufacturing industry faces growth inconsistencies (see Table 1 and Figure 1). In addition, the sector is bedeviled with a harsh financial environment amongst other challenges.

Financial Climate and Performance of Nigerian Manufacturing Firms

The manufacturing sector is capital intensive and can drive the sustenance of growth output and subsequent profitability of the sector (Asaleye et al., 2018). The citizens of a country's financial well-being depend largely on its manufacturing ability and rely on the quality of process management and subsequent resource allocation to the manufacturing of products (Rana et al., 2018). Ogunmuyiwa et al. (2017) argue that improved disbursement of bank credits to the private sector can enhance manufacturing output.

Nevertheless, Ogunmuyiwa et al. (2017) stated that the level of bank credits to the private sector witnessed some degree of fluctuations over the past two decades. Similarly, as Ekundayo et al. (2018) discussed, money supply, credit to the private sector, manufacturing output, and manufacturing value-added witnessed various highs and lows degrees for a considerable period. The less-than-optimal performance of the

manufacturing may have arisen as a result of the inability of the financial sector to finance the manufacturing sector effectively.

Table 2.

Manufacturing Sector of Nigeria's Contemporaries in the 1960s

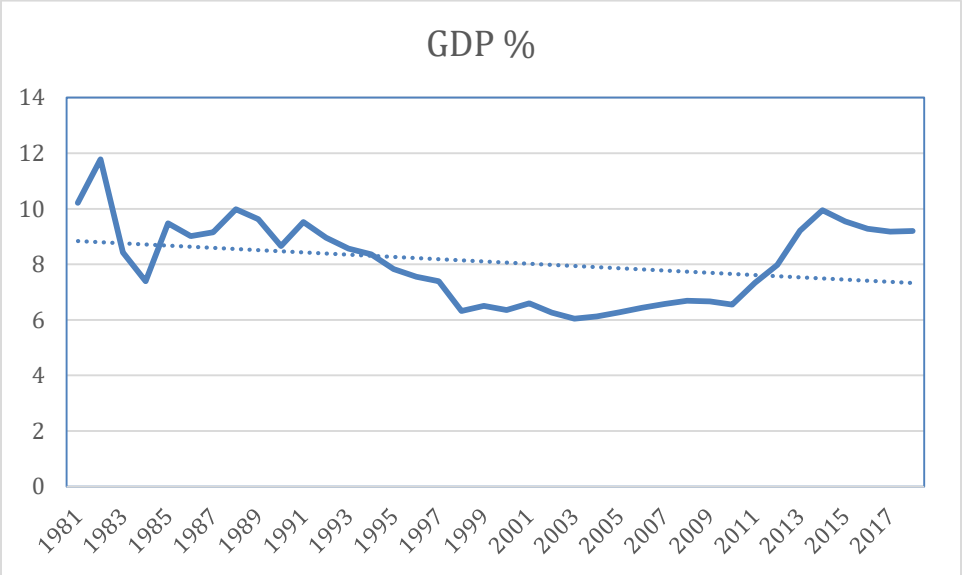
Country	Contribution of Manufacturing to GDP	% of Employment	GDP- Real Growth Rate	Inflation
South Africa	16%	De –industrializing – shedding jobs	4.9%	4.3%
Malaysia	32%	27%	5.7%	2.4%
India	17%	NA	8.4%	5.0%
Brazil	30.8%	13%	4.5%	4.6%
Nigeria	4.19%	De –industrializing – shedding jobs	6.4%	11%
Singapore	24%	21.6%	7.9%	4.3%

Adapted from Onuoha (2012)

Compared to large manufacturing firms, small-oriented firms face external finance's onerous task, as banks rate these firms as high risk prone due to concerns of collateral and short past credit profiles (Wang et al., 2015). In such circumstances, where banks ration credit to these firms (Wang et al.), working capital management portends an opportunity for corporate managers and business leaders to manage investment and financing options internally. Efficient working capital management is a competitive strategy of achieving manufacturing success by improving free cash flows used for the facilitation of a firm's daily operational activities and boosting performance (Simon et al., 2017).

Figure 2.

Trend Line of Nigerian Manufacturing Sector's Contribution to GDP from 1981 to 2018.



Author's computation from Central Bank of Nigeria (CBN), 2019.

Working Capital Management of Manufacturing Firms

Researchers and practitioners alike argue that working capital management decisions generally came to a better spotlight after the recent financial crises with its effect spread globally at varied proportions. Ramiah et al. (2014) argued that the economic downturn was caused by a lack of risk management and effective networking capital practices characterized by acute liquidity shortages with the epicenter from the United States. On the other hand, Neuhauser (2015) stated that factors such as lack of efficient subprime mortgage management led to high mortgage default rates, and failure of risk assessment and lack of regulation, which had differing adjustment speed and level of impact on national economies (Liow, 2016). For instance, Różański and Kopczyński

(2017) demonstrated that the Polish construction industry witnessed a downward spiral of about one and half times of assets turnover between 2006 and 2014 because goods produced could not be easily sold, as result of low turnover of sales. In addition, Różański and Kopczyński (2017) stated the stock turnover ratio increased by 1,036 days from 114 days between 2006 and 2016. Researchers and practitioners now pay more attention to the realities and significance of working capital decisions to the successes of daily manufacturing operations (Ramiah et al., 2014) which Nobanee and Ellili (2015) attributed to the increased frequency of working capital research after the recent financial crises.

Working capital management is managerial decisions involving a firm's short-term assets instead of long-term assets that are beneficial to the daily operations of manufacturing firms. Working capital management involves the optimization of current assets (inventory and accounts receivables), current liabilities (accounts payables and short-term debt), and the interrelationships with a potential to reduce working capital cycle, and improve the turnover of sales and performance (Casalin et al., 2017). While current assets are the firm’s investment in inventory and accounts receivables, current liabilities, on the other hand, are financing options open to the firm from suppliers, redeemable within an accounting period of one year (Mun & Jang, 2015). Proper working capital management rather than ineffective management provides corporate managers and business leaders of manufacturing firms to be within solvency, avoid financial turmoil, and sustain future financial growth and survival (Tran et al., 2017). Working capital management of firms can be routinely assessed from the balance sheets, checking

through the current liabilities (accounts payables and short-term debt) and the cash conversion cycle (Nwude et al., 2018). Sound working capital management rather than inefficiency may deliver optimal financial performance; corporate managers and business leaders could achieve firm's strategy by managing working capital components together, rather than singly, as they are interconnected (Shrivastava et al., 2017).

Components of Working Capital Management

Current Assets

Mun and Jang (2015) stated that current assets majorly comprise accounts receivables and inventory, compared to current liabilities, which are made up of account payables used to maintain efficiency and to gauge the level of risk of daily operations. Masri and Abdulla (2018) noted that higher accounts payable and inventory levels attract higher liquidity, as against lower accounts receivable, which results in lower liquidity position. Masri and Abdulla (2018) argued that accounts payables and receivables positively influence profitability, whereas inventory hurts profitability, thus making working capital an avenue for cash savings (Seifert & Gonenc, 2015). The amount of idle cash in working capital tied up in current assets is inimical to firm strategy, as funds could be used for positive net present value-oriented investments (Aktas et al., 2015). The inability of corporate managers and business leaders to align liquidity and profitability positions may negatively impact production of sales, undermining the firm's financial position, which requires effective linkages between different aspects of working capital.

Mun and Jang (2015) calculated current assets mathematically as:

$$CA = INV + AR \quad (4)$$

Where:

CA = Current Assets

INV = Inventory

AR = Accounts Receivable

Inventory

Casalin et al. (2017) discussed that inventories are indispensable assets of manufacturing activity used for the conversion of raw materials to finished products for customer satisfaction and firm performance. Firms must strive for adequate inventory levels, as efficient inventory optimization promotes improved financial performance outcomes (Shin et al., 2015). Alternatively, lack of proper inventory management may lead to loss of sales upon cycle counts at year-end, which could adversely impact performance (Karim et al., 2018), affecting current assets' administration. Production schedules potentially determine inventory levels, which may attract holding costs, if firms do not, as a matter of strategy, quickly convert it to finished goods and sold (Shin et al., 2015). The inability of firm managers to effectively manage inventories is inimical to the production process of manufacturing firms impacting the optimization of short-term assets. Lack of proper inventory management may lead to loss of sales, upon cycle counts at year-end, which could adversely impact performance (Karim et al., 2018), affecting receivables and payables. Managers should be abreast with competitive industry dynamics of optimal inventory required to avoid carrying costs, by generating effective strategies to convert inputs to outputs and sales, improving cash flow quickly.

Accounts Receivable

Singhania et al. (2014) stated that account receivables are generated because firms' trade manufactured goods or products on credit instead of receiving cash in exchange at the same time. According to Boden and Paul (2014) sound, trade-credit administration enables firms with less functional market profiles and functions to have the information used to align in the formation of stronger supply chains and the reduction of collection costs. Boden and Paul insist that selling products or goods without payment is costly, as funds become idle rather than been used for investments, increasing the probability of default risks from customers, which could negatively impact the cash conversion cycle affecting performance. Accounts receivables form a large part of a firm's assets and represent a high level of uncertainty, risk and internal control (Yao & Deng, 2018). Account receivables may be counterproductive during default, resulting in a longer cash conversion cycle. Nevertheless, they are recorded as assets on the balance sheet of creditors and provide a system for assessing firms in times of recessions.

Afrifa and Gyapong (2017) argued that firms in competitive industries invest more in trade credit with more accounts receivables than payables than concentrated industries where payables are greater than receivables. The last economic meltdown brought to the fore the inability of managers to assess customers' capacity to pay, which precipitated to default and financial distress (Hilscher & Wilson, 2016). European nations have experienced some default levels (Hilscher et al., 2015), which have made firms cut down on agreed days and length of payment (Li & Tang, 2016). The aftermath of the last recession made managers improve receivables management amongst firm types while

assessing risks and formulation of strategies towards customer satisfaction (Ramiah et al., 2014). The firm's accounts receivables' level depends on the extent of production activity and the economic regime, which came to the fore during the last economic downturn.

Current Liabilities

Accounts Payable

Accounts payables are sources of funding for most businesses achieved through delayed payments. Today's businesses largely take place on the platform of credit, such that the seller receives payment of goods or products at a later date (Desai et al., 2016). The seller records transaction as an account receivable, while it means a liability or account payable for the buyer (Desai et al., 2016). Accounts receivables and account payables are collectively called trade credit as payables make-up a large chunk of the supply chain (Moodley et al., 2017). Unlike account payables that are registered on the balance sheet's liability side, accounts receivables are recorded as an asset on the asset side of the balance sheet. Van den Bogaerd and Aerts (2015) pointed out that a good public reputation positively impacts the amount and time-lapse of trade credit enjoyed, which indicates a better trade quality and more trade credit received from suppliers. Account payables are financing outlets useful to recipients (customers and producers of goods) as goods are paid later, but if not properly handled, they may cause a rift between participants.

Short-Term Debt

Short-term debt forms an important component of the financing structure of most firms. Öhman and Yazdanfar (2017) stated that short-term debt is a debt facility

repayable within a year over total assets, compared to long-term debt repayable after a year over the total asset. Short-term debt is a commitment a firm takes to defray account incurred within a year, which is critical to bankruptcy-prone firms, especially in dividend payment times to shareholders (König & Pothier, 2016). Short-term debt is a critical part of a firm's capital structure (Kahl et al., 2015), which is affected by information imbalance between managers from the inside of firms and investors from the outside (Abad et al., 2017). According to Du and Palia (2018), short-term debt cause bank risks to external capital markets, which do not require intermediaries to consummate (Kahl et al., 2015). Short-term debt provides financial assistance to managers of firms for investments, managers should strive to create trust with creditors and defray what is owed, as short-term debt generates risks for banks, which is central to the financing decisions of the firm.

Gross and Net Working Capital Management

Gross and net working capital are two related but distinct concepts of working capital management used for manufacturing firms' decision-making. Whereas gross working capital or quantitative working capital typifies the total sum of current assets, networking capital or qualitative working capital is the difference between current assets and the firm's current liabilities (Boopathi & Leeson, 2016)**.** Unlike gross working capital used to assess or estimate the size and level of utilization of current assets, a firm holds (Boopathi & Leeson, 2016). Networking capital is used to gauge a business's liquidity position (Kasiran et al., 2016). Çelik et al. (2016) argue that positive networking capital, which means assets greater than liabilities, encourages production sustainability

with the current level of current assets after defraying short-term debt obligations. On the other hand, negative networking capital entails that liabilities are more than assets, representing the inability of firms' leaders to offset short-term liabilities on maturity (Çelik et al., 2016).

Jędrzejczak-Gas (2017) stated that positive networking capital shows current assets are greater than short-term liabilities, compared to a negative networking capital signifying current asset less than liabilities. Higher networking capital depicts more investment in working capital than less investment of working capital with lower networking capital (Afrifa, 2016). Prasad et al. (2019) emphasized that a low networking capital potentially results in higher returns on capital employed, which generates free cash flow for the firm's investment and growth. According to Ribeiro de Almeida and Eid Jr. (2014), the effective management of the components of current assets and liabilities is an avenue for the firm's managers to deliver on its strategy in assessing the costs and benefits of investments for optimum performance. Firms maintain good financial status if current assets exceed current liabilities compared to situations, where current liabilities are greater than current assets, which makes organizations not honor short-term financial obligations (Achode & Rotich, 2016). Firms' corporate managers should maintain viable relationships to enjoy sustainable partnerships with her creditors and customers, as this will enable quick access to trade credit, for better payables and receivables management. Talonpoika et al. (2016) calculated net working capital as current assets less current liabilities.

NWC = CA – CL ...…..... (5)

Where:

NWC = Net working capital

CA = Current assets

CL = Current liabilities

Optimal Working Capital Management

Corporate managers and business leaders of manufacturing firms desire a position of optimal working capital to effectively manage both current assets and liabilities for the firm's financial performance. An optimal working capital value exists when current assets (firm's investments) and current liabilities (the firm's financing) are equal (Wasiuzzaman, 2015). On the other hand, Tsuruta (2019) argues that both high and low deviations from the optimal value impact performance negatively. This suggests that corporate managers and business leaders should strive to meet stipulated target working capital, and at the same time avoid deviations (Prasad et al., 2019). Achieving an optimal value of working capital is a challenge for most managers. Notwithstanding, Chauhan and Banerjee (2018) stated that managerial competence on corporate managers and business leaders may reduce the gap to boost operations.

According to Wasiuzzaman (2015), the optimal working capital for firms in need of operational funds is lower than the firms which do not lack finance for daily routines. Businesses that target huge profits are often exposed to high risks, while a low level of risk is tied to a relatively low profit level (Tran et al. (2017). In less established markets, achieving an optimal value of working capital or the cost and benefit of acquiring capital goes into trade-off and is often an uphill task (Bin et al., 2019). According to Mun and

Jang (2015), variations of optimal working capital regimes depend on both firm-related and economic attributes, such as cash availability, the volume of output and debt-related concerns amongst others. Although the awareness and sustainability of optimal working capital seem a demanding task, understanding the linkages between short-term assets and liabilities concerning liquidity and profitability trade-off could help firm managers remain competitive.

Baser et al. (2016) stated that optimal working capital facilitates the effective management of cash, inventory, receivables, and payables and the ability to offset short-term obligations, thereby potentially reducing the risk of financial distress. Similarly, Guariglia and Mateut (2016) argued that optimal working capital is a potential source of backup for firms during harsh economic conditions, as was the case with the last economic meltdown. Guariglia and Mateut further articulated that emergencies could not be properly handled during the crises due to a lack of liquidity arising from corporate managers' inability to create a balance between current assets and current liabilities. The effective management of the interrelationships between receivables, inventory, and payables promotes the alignment between risks, solvency, and profitability for the firm's sustenance (Simon et al., 2017). Though optimal working capital is operationalized through effective synergy amongst working capital elements - accounts receivables, accounts payables, and inventory, business failure may arise if cost and benefit analysis is not put in a proper context.

Measures of Working Capital Management

Working capital management measures provide differing perspectives and contexts on the effectiveness of daily operations of manufacturing firms. In the literature, most working capital management researchers conceptualized and operationalized working capital management to comprise accounts receivable period, inventory conversion period, accounts payable period, and cash conversion cycle (Arachchi et al., 2017; Kusuma & Bachtiar, 2018; Lyngstadaas & Berg, 2016). Maintaining shorter accounts receivable period, inventory conversion period, and cash conversion cycle while delaying the accounts payable period for a longer period enhances the firm's financial performance (Richards & Laughlin, 1980). Whereas shorter accounts receivable period encourages early payment from customers, which increases the firm's liquidity, delayed payments may improve investments and profitability and impose a reputational concern for the firm. Nevertheless, Mun and Jang (2015) stated that understanding the costs and benefits and interrelationships between working capital management measures is a function of firm-specific characteristics and the inherent economic conditions of the prevailing environment. Corporate managers and business leaders of manufacturing firms should strive for multiple measures of working capital as individual components could have a different impact while recognizing countrywide attributes and performance conditions.

Accounts Receivable Period

Sathyamoorthi et al. (2018**)** stated that the account receivable period is the time lag between issuance of trade credit by producers to receipt of payment from customers.

Conversely, the account receivable period is also a trade credit offered to customers by suppliers awaiting payment **(**Killingsworth & Mehany, 2018). Accounts receivable period is the product of the fraction of average accounts receivable over sales and 365 days, which means the average number of days to elapse before the firm's management is paid its outstanding credit sales from customers (Afrifa et al., 2014). Bhatia and Srivastava (2016) and Ukaegbu (2014) argued that the length of account receivable days has a strong impact on profitability. Nonetheless, Baños-Caballero et al. (2016) discussed that the nature of the association between accounts receivable period and profitability depends on the receivable strategy used, suggesting that accounts payable period affects firms' performance. Afrifa et al. (2014) noted that reduced accounts receivable period means the firm's management can collect receivables much faster than a lengthened situation, which suggests the slow collection of owed credit.

Inventory Conversion Period

The inventory conversion period is the time required in days to convert inventory, comprising raw materials, work-in-process, and finished products to cash, mathematically expressed as the average inventories over the cost of goods sold multiplied by 365 days (Altaf & Shah, 2017). Koumanakos (2008**)** argued that excessive inventory attracts storage cost, deterioration, waste, and inefficiency, leading to financial loss, compared to the insufficient inventory, which dislocates the manufacturing process, leading to non-satisfaction of customers. Bendavid et al. (2017) reiterate that a little constraint on working capital distorts the firm's capacity to balance demand and supply. On the other hand, Hoberg et al. (2017) asserted that on average, more constrained firms held more

inventories while the effect of cost of capital on inventory was minimal. Lin et al. (2018) noted that inventory performance is positively associated with financial performance and product quality. A longer or shorter inventory conversion period other than an optimal may adversely affect working capital management and performance due to the customer and the firm's financial position.

Accounts Payable Period

Firms deploy account payables of trade credit as an alternative source of funding, which creates an avenue to defer the payment for goods purchased till a later date. Accounts payable are funds owed to creditors for supplying goods to the firm, which is generally seen as unrestrained credit by most firms (Nwakaego & Ikechukwu, 2016). The accounts payable period is the average time in days that elapses before the firm's management pays its creditors or suppliers (Cumbie & Donnellan, 2017). Although trade credit is worthwhile, it could be disadvantageous in attracting an extra cost of financing if the funds owed are defrayed after the stipulated discount time frame (Abuhommous, 2017). Lyngstadaas and Berg (2016) stated that the shorter accounts payable period improved profitability while a longer scenario reduced profitability, indicating a negative relationship between profitability and accounts payable period. In contrast, Nwakaego and Ikechukwu (2016) argued that accounts payable and profitability have a positive and significant relationship, as opposed to shorter accounts payable that reduces profitability, implying that profitable firms make earlier payments than less profitable firms. Since accounts payable and accounts receivable periods are distinct strands of information for

decision-making, the difference may give corporate managers and business leaders an idea of the firm's potential funding requirements.

Cash Conversion Cycle: A Comprehensive Metric for Working Capital Management

The cash conversion cycle is the central tool of working capital management efficiency used to decipher the firm's operational and financial dynamics. The cash conversion cycle, also known as the cash gap or cash flow cycle (Eljelly, 2004), is the change in days between the use of cash to purchase inventory and the subsequent receipt of cash for sales (Richards & Laughlin, 1980). Shrivastava et al. (2017) described the cash conversion cycle as the time lag in days required for a business entity to translate resource inputs to cash flows. According to Gitman (1974), the cash conversion cycle is the difference in the number of days between the payments for vital raw materials to the time cash is received for the sale of finished goods. The cash conversion cycle is a veritable performance measure for evaluating the success rate and optimizing the firm's working capital (Richards & Laughlin, 1980). The cash conversion cycle is an additive function. It is found from the sum of accounts receivable and inventories fewer accounts payable, which shows how well and soon current assets are translated to cash (Yazdanfar & Öhman, 2014).

Zeidan and Shapir (2017) stated that a reduced cash conversion cycle in days improves performance, cash flow ratio to equity, and share prices if sales or operating margins are not distorted. The authors further stated that lengthened cash conversion cycle in days negatively impacts profitability. In contrast, the reduction of the cash conversion cycle in days results in improved performance due to decreased keeping

invaluable working capital (Yazdanfar & Öhman, 2014). Singh et al. (2017) used the cash conversion cycle as an elaborate measure to probe working capital management efficiency relative to historical measures of liquidity. Proper coordination and evaluation of the firm's operational and financing options facilitate the effectiveness of the cash conversion cycle. Therefore, the cash conversion cycle is a measure for aligning the management of current assets and current liabilities, and a barometer for gauging the firm's operational and financial efficiency, which is enhanced by deploying appropriate working capital strategies.

Richards and Laughlin (1980) conceptualized the cash conversion cycle mathematically as:

CCC = ICP+ARP -APP…… (6)

Where

CCC = Cash conversion cycle

ICP = Inventory conversion period

ARP = Accounts receivable period

APP = Accounts payable periods

Measures of Working Capital Strategies

Adopting the appropriate working capital strategies is critical for the management of current assets and liabilities and the subsequent maximization of shareholder wealth. Ukaegbu (2014) described working capital strategies as a set of investment and funding decisions for optimizing a firm’s current assets and current liabilities to achieve optimal working capital levels. As pointed out by Adam et al. (2017), working capital strategies

comprise aggressive, conservative, and moderate, and the type chosen depends on the anticipated economic value that the firm requires. Afrifa (2015) argued that the type of strategy a firm decides to operate informs the number of current assets it holds relative to current liabilities, ultimately impacting profitability and performance. Similarly, Bei and Wijewardana (2012) demonstrated that the type of working capital strategies a firm adopts could be a function of the resources at the firms' disposal, transaction costs, information dynamics, and management philosophy regarding the risk and return. The firm's fortunes ultimately rest on the ability of its managers to generate cash over expenditure, which could be achieved through firm-specific strategies comprising working capital investment strategies and working capital financing strategies (Bei & Wijewardana, 2012).

Working Capital Investment Strategy

Using the appropriate working capital strategy is of utmost importance to corporate managers and business leaders for the firm's successful running. As discussed by Adam et al. (2017), a working capital investment strategy is any managerial action taken to use current assets efficiently. Aggressive working capital investment strategy favors reduced levels of current assets (Nobanee & Abraham, 2015), as Onwumere et al. (2012) contended that aggressive working capital investment strategy may be inimical long-term because the firms' current assets depreciate or lose value over time. While aggressive working capital investment strategy encourages the minimization of both inventories carrying levels and accounts receivable, a conservative working capital investment strategy improves sales volume (Banos-Caballero et al., 2012). Adam et al.

(2017) stated that the level of aggressiveness/conservativeness of the working capital investment strategy is calculated by the firm's total current assets over the total assets. The authors stated that a value of less than 0.50 depicts a relatively aggressive working capital investment strategy, while a figure greater than 0.50 suggests a relatively conservative working capital investment strategy.

Working Capital Financing Strategy

Management of business organizations deploys differing working capital financing options peculiar to their internal process mechanisms striving for operational efficiency and financial performance. Though liquidity and profitability positions are both critical to a firm’s financial position, it can achieve a balance through sound working capital management practices (Panda & Nanda, 2018) that portrays the success of short-term funding decisions. Thakur and Muktadir-Al-Mukit (2017) stated that working capital financing strategies are management decisions for closing funding gaps for current assets. Nevertheless, maintaining an optimal debt level is important for the sustainability of profits and improves the firm’s competitive ability in the industry (Yazdanfar & Öhman, 2015)**.** Adam et al. (2017) stated that the degree of aggressiveness/conservativeness of working capital financing strategies is found by dividing total current liabilities over total assets. The authors argued that the ratio value of total current liabilities over total assets less than 0.50 means a relatively conservative working capital financing strategy. In contrast, a value above 0.50 depicts an aggressive working capital financing strategy.

The type of working capital financing strategy a firm operates largely determines the volume of current assets it holds concerning performance. A conservative financing strategy promotes a larger volume of current assets but may have to contend with huge liquidity costs (Panda & Nanda, 2018). On the other hand, Panda and Nanda stated that an aggressive strategy presents the firm's situation holding lower amounts of current assets, which may have a resultant effect on elevated costs of illiquidity. Nabi et al. (2016) showed that lower figures of aggressive investment strategies translate to a more aggressive working capital financing strategy, which depicts a negative relationship between aggressive investment strategies and aggressive financing strategies. Nabi et al. (2016) demonstrated that higher total current assets over total assets connote less aggressiveness and more conservativeness than higher values of total current liabilities over total assets, which means more aggressive financing and less conservative financing. Sefideh and Asgari (2016) stated that profitability and working capital strategies are in a direct relationship compared to working capital strategies in an inverse relationship with both financial and operational risks, which require performance benchmarks.

Firm Performance: The Ultimate Dependent Variable

Firm performance is a subjective, dynamic, and multidimensional construct that is predominantly divided into financial and non-financial performance for probing the firm's profitability. Ahmada and Zabria (2016) argued that financial measures could not give adequate information about the performance and nonperformance characteristics of a firm’s routine operations in today's complex business landscape. Conversely, Mihaela (2017) articulated the connection between financial and non-financial performance

measures as contributors to the firm's success. The researcher observed that the firm's strategic actions and objectives are often converted and inputted into the firm's financial statements, suggesting the complementary effect of both firm performance dimensions. Richards and Laughlin (1980) discussed that performance could be divided into static and dynamic measures, internal and external indicators according to who requires the measurement or whether the entire company needs to be evaluated, or some divisions or departments (Vimrová, 2015).

Measures of Firm Performance

The conversion of financial numbers to the maximization of shareholder value is critical for the firm's growth and sustenance. Chaudhuri et al. (2016) argue that firm performance is largely used as a metric to measure the firm’s total financial position and compare similar firms in the same industry or industry groups. On the other hand, Mihaela (2017) stated that the firm's sole purpose is the enhancement of the firm's financial performance. Gupta and Sikarwar (2016) contend that interrogating wealth creation processes becomes inevitable for all stakeholders for timely decision-making. Swiatczak et al. (2015) argued that performance measures a manager deploys are an indicator of the manager’s perceptions of his/her strategic goals and subsequent alignment towards the firm's success. However, the use of inappropriate performance measures may mask the firm's real financial status, defeating the essence of monitoring the effect of proper governance on financial performance (Shah et al., 2015). Performance metrics help managers to have insight and rate their thinking, it is necessary to have a holistic posture of performance philosophy to aid competitiveness in the

marketplace. The accounting-based measures indicate past financial performance, whereas, market-based metric measures future performance (Chaudhuri et al., 2016). Similarly, economic measures to give information on the financial and monetary position concerning the policies, tactics that may be used to realize the firm's goals and identify areas that require changes in investment and improve forecast ability (Oduyemi et al., 2018).

This research deploys the economic measure of EVA, accounting indicator of ROCE, and the market performance metric of TQ. This potential diversification philosophy could generate a source of risk-sharing to facilitate organizational control. Performance facilitates understanding how wealth is generated for shareholders (Gupta & Sikarwar, 2016) for decision-making. Investors make decisions based on available alternatives deployed to generate anticipated cash flows for the firm (Alsoboa, 2017). Heinzelmann (2016) argued that performance measures help people and organizations in managing uncertainties and complexities. The performance levels of firms are likely indicators of managers' effort in galvanizing their organizations for overall organizational success. As a result, literature records the use of firm performance as the ultimate dependable variable in strategic management (Pucci et al., 2017), and other ancillary studies. Performance measures align both tangible and intangible considerations, which can be modeled according to need in line with the past, present, and future in assisting managers for informed decision-making. The sections that follow underpin evidence of using these proxies as performance variables to operationalize the construct of firm performance.

Economic Value Added

EVA is an indicator of the amount of economic profit of an organization, which interrogates shareholder wealth creation. Ramadan (2016) stated that value is created for shareholders if the revenue is higher than the expenses, as against loss in value when expenditure exceeds revenue in delivering raw material or inputs. However, there has been a debate on the relevance of EVA in large firms of developed economies compared to the small counterparts in less developed countries (Desai & Ferri, 2006). The preceding line of argument suggests that, although EVA is a value-based measure that is considered a comprehensive modern concept for evaluating the firm's overall performance, its usage requires cost and gain analysis concerning different contexts and different stakeholders.

Abate et al. (2004) explained the accounting context of EVA is the difference between the net operating profit after tax (NOPAT) and the dollar cost of capital, relative to the finance view that describes EVA as the sum of invested capital and the net present value. Balasubramanian and Lieberman (2010) demonstrated that consumers view EVA as the conversion of inputs to goods or provision of services, while employees are a means of decision-making, training and engendering positive reward systems investors as good returns on ROCE. Empirical findings show that EVA has more relevance than traditional accounting principles (Gupta & Sikarwar, 2016; Panigrahi et al., 2014). One major weakness of EVA is the several seeming ways of calculating the cost of capital, none of which are considered optimal (Vimrová, 2015); besides, its implementation appears expensive and complex (Desai & Ferri, 2006). Despite EVA's perceived

drawbacks, scholars from different geographical settings have deployed the metric for performance (Cumbie & Donnellan, 2017; Mosazadeh et al., 2015) and stock returns (Babatunde & Evuebie, 2017).

Return on Capital Employed

ROCE is a popular concept of traditional measure of performance. ROCE indicates the firm's management's ability to convert its most liquid asset to returns, typified by the early transformation of sales to cash, which is a function of the turnover (Wallace, 2017). Wallace contends that value is created for shareholders if the ROCE is more than the weighted average cost of capital (WACC), the reverse is the case if ROCE value is less than the WACC. Many researchers (Afrifa & Padachi, 2016; Omolade & Mukolu, 2013; Qurashi, 2017) operationalized performance as ROCE in various studies. Qurashi (2017) argues that ROCE calculation is based on accounting figures, which can easily be manipulated and may give an erroneous picture of the firm's finances, which are contingent on book values devoid of interrogating the current state of financial position. This implies that, despite the limitations, ROCE remains one of the most widely used metrics for understanding firms' performance.

Tobin's Q

TQ is the multipurpose ratio used in the literature in various contexts for explaining financial phenomena and investment decisions. Several researchers have used TQ as the dependent variable to assess market return (Akram et al., 2016), cash flow forecasting (Zeidan & Shapir, 2017), firm value (Nguyen et al., 2016b), and corporate performance (Laghari & Chengang, 2019). Perera and Priyashantha (2018) described TQ

as the sum of equity and book value of liability over the book value of total assets. Fu et al. (2016) defined TQ as the firm's market value expressed over the replacement cost of assets. TQ value greater than one implies that profit would surpass the cost of assets, compared to TQ value less than one, which indicates the possibility of disposal of the firm's assets (Akram et al., 2016). Fu et al. (2016) argue that firms with higher TQ values experience better performance in the long-term than firms with lower TQ values likely to perform much lower than high TQ firms. Although TQ values are historical, replacement costs are cumbersome to calculate, and researchers often omit or even forget to integrate intangible costs (Akram et al., 2016). Researchers still embrace the metric for the financial evaluation of business (Abuzayed, 2012).

Working Capital Management and Performance

The extant literature documents the association between working capital management and manufacturing companies' performance with differing outcomes from a global view. Deloof (2003), Padachi (2006), and Ukaegbu (2014) discussed the existence of the connection between working capital management and performance in the last 20 years. Researchers have used different variables to evaluate the level of connection that exists between working capital management and performance using a collection of econometric approaches (Singhania & Mehta, 2017). The world over, the knowledge gains of the association between working capital management and performance have led most firms to a unique strategic direction. Still, they have used different methodologies geared towards the use of a range of stakeholders.

Nonetheless, these strands of research are not without several inconsistencies, which Singh et al. (2017) attribute to differences in sample size, the proxy of construct measures, and specific countrywide economic conditions**.** Working capital management and performance studies can engender financial success and subsequent sustainability of the firm. Still, corporate managers need to understand the purpose while considering firm-specific and external factors.

Researchers have enunciated different theoretical foundations in working capital management and performance towards achieving financial control of the firm. Konak and Güner (2016), Kusuma and Bachtiar (2018), and Pais and Gama (2015) demonstrated the use of the cash conversion cycle. Alternatively, Olarewaju et al. (2017) used risk-return instead of Eya (2016) that deployed multiple theoretical approaches. Researchers use different theoretical lenses to work on capital management and performance relationships based on their specific view, context, and immediate purpose. The consensus amongst researchers and practitioners is that the type of theoretical approach is a necessary step in deciphering the strategies that could help corporate managers and business leaders remain competitive, which are different for every business entity. The cash conversion cycle has become popular and well-entrenched in working capital management and performance studies in the literature, used as the theoretical foundation in this research. Corporate managers and business leaders desire an optimal working capital position for organizations' smooth running and financial performance.

Altaf and Shah (2017) analyzed the interconnectedness between working capital management and performance of Indian firms traversing several industries and spanning

ten years using the cash conversion cycle. The authors found an inverted U-shaped curvilinear relationship between working capital management and performance. Similarly, Laghari and Chengang (2019) investigated the association between working capital management and Chinese firms' corporate performance. Results showed an inverted U-shaped curvilinear relationship between working capital management and performance measures deploying the cash conversion cycle. On the other hand, Cumbie and Donnellan (2017) report a U-shaped curvilinear relationship between working capital management and firm value of US firms using the cash conversion cycle. While both inverted U-shaped and ordinarily U-shaped curvilinear relationships depict optimal working capital where performance is maximized, the former and latter's optimal values suggest high and low numbers respectively. Whereas a lower optimal working capital implies a shorter cash conversion cycle, a high optimal working capital indicates a longer cash conversion cycle. A shorter cash conversion cycle in days favors quicker turnover of working capital to sales than a longer one which delays the using up of working capital affecting performance negatively. As corporate managers and business leaders strive for optimal working capital, they need to identify both low (Cumbie & Donnellan, 2017) and high (Boțoc & Anton, 2017; Mun & Jang, 2015) positions, as it affects the cash conversion cycle, in other to make timely changes to working capital strategies, as both below and above values affect profitability (Afrifa & Padachi, 2016; Prasad et al., 2019).

Shrivastava et al. (2017) examined the effect of working capital management and profitability of several firms covering ten years in India. Shrivastava et al. (2017) 's findings using the cash conversion cycle showed that a longer cash conversion in days

negatively affects profitability. Yazdanfar and Öhman (2014) investigated the effect of the cash conversion cycle on profitability using SMEs' Swedish data covering four years. They found a strong negative relationship between the cash conversion cycle and profitability. In contrast, Moussa (2019) explored the effect of working capital management on profitability using two performance metrics of listed firms in Egypt spanning 11 years. Moussa (2019) stated that the cash conversion cycle is positively correlated with performance. Whereas a negative relationship of cash conversion cycle and profitability suggests a better financial position, the converse indicates taking longer days to convert inventory to sales which can negatively affect performance. While both positive and negative cash conversion imparts firms' performance, a positive relationship suggests the involvement of large firms, as against a negative association that depicts smaller firms (Abdulazeez et al., 2018). Smaller firms require faster conversion of inventory to sales, as they are likely to lack access to external finance, so they depend more on trade credit from suppliers. On the other hand, larger firms have better access to external finance and from suppliers, which improves the liquidity position due to reduced volatility or risk (Le, 2019).

Dalci and Ozyapici (2018) explored the effect of financial leverage on the relationship between working capital management and profitability of listed hospitals in Europe spanning nine years. Dalci and Ozyapici using the cash conversion cycle under leverage found the reduction of profitability under the operation of a lengthened cash conversion cycle in days. Conversely, Nguyen et al. (2016a) investigated the effect of working capital management on two performance metrics using over a hundred listed

companies in Vietnam, with the cash conversion cycle as a theoretical base, and results showed no relationship between working capital management and profitability. Though Dalci and Ozyapici (2018) and Nguyen et al. (2016a) found that leverage impacts the association between working capital management and profitability, their results in the association between working capital management and profitability differ. The non-relationship between working capital management and profitability suggests that management may be unaware of working capital management as an efficiency tool. Still, rather they are more interested in liquidity than profitability-based strategies. In addition, high-leverage firms are usually burdened with external finance and not likely to fund inventory as required. Even though these firms may loosen their credit policy to make more sales, it may increase the number of days money owed the firm is collected from customers, or if they give discounts for any payment, could reduce profits or even default.

Akinlo (2012) examined the association between working capital management and profitability of Nigerian listed manufacturing firms using the cash conversion cycle and multiple regression analysis. Using data of over ten years, Akinlo (2012) found that working capital management is negatively correlated with profitability, which indicates that profitability is lowered on lengthened cash conversion cycle days. Similarly, Yakubu et al. (2017) examined the impact of working capital management on five non-financial firms of Ghana using the cash conversion cycle. Yakubu et al. using data of six years stated that the accounts payable period and current ratio are positively correlated with firm performance. The authors further revealed that the accounts receivable period and

cash conversion cycle have a negative but significant effect on performance. In contrast, the accounts payable period and current ratio have a positive but significant relationship with performance. In as much as the cash conversion cycle is a comprehensive metric of working capital management, corporate managers need not neglect individual relationships of working capital management with performance. This is because each parameter gives detailed information for decision making (Hassan et al., 2014), as the cash conversion cycle is an additive parameter (Tahir & Anuar, 2016).

Prasad et al. (2019) examined the impact of working capital efficiency on financial performance using the net trade cycle as a theoretical lens and five performance measures. The authors found that firms with higher working capital efficiency (lower net trade cycle) against firms with inadequate working capital efficiency (higher net trade cycle) potentially generate higher financial performance. Prasad et al. (2019) argued that firms with high working capital efficiency have less need of external funding in the short-term. As such, business concerns plan for long-term borrowing, which encourages expansion and investment in new projects. Madhou et al. (2015) investigated the association between corporate profitability, working capital, and firm characteristics using working capital management theory. According to Madhou et al. (2015), findings reveal that working capital influenced all three-performance metrics, while firms having surplus and deficit working capital have a positive coefficient on cash. The study of the relationship between working capital management of Turkish manufacturing firms, Şamiloğlu and Akgün (2016), found mixed results between working capital components, cash conversion cycle, and performance. Though the cash conversion cycle is a

composite and additive performance measure (see Yazdanfar & Öhman, 2014), the net trade cycle is the cash conversion cycle expressed as a sales percentage. As a result, firms in the same industry and using similar performance indicators may have the same percent performance. Simultaneously, the net trade cycle value differs, suggesting that firms have varied asset structures.

Working Capital Strategies and Performance

Firms constantly face important tradeoffs regarding strategies of investment, level of risk, and profitability in determining the structure of working capital. Afrifa (2015) stated that working capital strategies are guided by the cost and benefits of risk and returns, which are predominantly aggressive and conservative compared to moderate strategies. Mielcarz et al. (2018) argued that aggressive strategy promotes succor for financially constrained firms instead of the conservative strategy that encourages cordial relationships between clients, customers, and suppliers, maintenance of liquidity, and provides finance for constrained firms through trade credit. In addition, Mielcarz et al. (2018) argue that more profitable firms use conservative working capital management strategy during economic downturns, while firms that are not performing optimally may cut down on working capital investment to manage their cash flows. Bei and Wijewardana (2012) and Weinraub and Visscher (1998) described aggressive investment and financing working capital strategies as having a high risk and return level.

On the other hand, the authors explained that conservative investment and financing working capital strategies involved low risk and return levels. Lower risk and return investment regimes and financing working capital strategies are referred to as

moderate or matching. Managers require the use of appropriate working capital strategies to efficiently manage working capital for the firm's improved financial performance.

The literature documents the use of working capital strategies to manage working capital for the firm's improved performance (Masri & Abdulla, 2018; Onwumere et al., 2012; & Vishnani & Shah, 2007). As discussed by Adam et al. (2017), conservative working capital strategies are based on a larger volume of current assets and a smaller amount of liabilities relative to the total assets. The authors stated that aggressive working capital strategies operate largely with smaller volumes of current assets and a higher volume of current liabilities concerning total assets. Weinraub and Visscher (1998) stated that aggressive working capital strategies involve higher levels of return and risk than conservative working capital strategies that generate the reduced level of return and risk. Nabi et al. (2016) investigated the relationship between working capital approaches, profitability and shareholder's worth from a mix of cement and sugar companies in Pakistan covering seven years. Nabi et al. (2016) found a negative relationship between working capital investment and financing approaches with profitability.

Hassani and Tavosi (2014) investigated the association between aggressive and conservative working capital policies and profitability using samples of over two hundred companies in Iran covering more than six decades. Hassani and Tavosi (2014) found a negative and significant relationship between working capital policy and profitability risk. From an individual basis, the authors found a negative and positive relationship between investment and financing policies, respectively**.** Although the choice of a firm's

working capital investment and financing decisions depends on business nature (Nabi et al., 2016), corporate managers and business leaders could improve firm value by using sound working capital investment and financing strategies. It is for managers to decipher which individual policy (investment or financing), compared to the whole, is more weighted in other to create a balance for optimum performance. The findings also suggest that aggressive working capital investment strategies are in an inverse relationship with conservative working capital financing strategies

Panda and Nanda (2018) examined the relationship between working capital financing strategy and profitability of six manufacturing Indian firms covering six sectors involving covering several firms and years; results showed a U-shaped association between working capital financing strategy and profitability in three sectors. Alternatively, Panda and Nanda (2018) reported a concave U-shaped profile between working capital financing strategy and profitability for three other sectors. In contrast, Baños-Caballero et al. (2016) investigated the relationship between working capital financing strategies and Spanish SMEs' performance spanning from 1997 to 2012. Results revealed a concave relationship between working capital financing and performance. The authors argue that at reduced working capital financing ratio, working capital financing strategy is positively correlated with performance, compared to a negative relationship at high values of working capital financing ratio. Botta (2018) investigated the association between financing decisions and financial performance of several Italian hotel SMEs, and findings show that these SMEs largely depend on the availability of internal funds for financing decisions which often supersede other factors

in line with the pecking order theory. Nonetheless, the existence of an optimal capital structure that maximizes performance suggests that the use of a pecking order approach may not always be adequate, but rather a more comprehensive but easy to implement financial strategy is desired to achieve higher values of performance. The existence of optimal working capital structures particular to industry type and internal funds, then external in financing decisions, seems to mean that firm managers could optimize returns if they remain focused around the optimal by adopting specific strategies.

Shah et al. (2016) investigated the impact of working capital policy on over a hundred firms' performance differentiated into domestic and multinational firms in Pakistan. Involving ten economic sectors and deploying the operating cycle theory and stratified sampling technique, findings through ratio analysis reveal that domestic firms employ aggressive strategies. In contrast, multinationals deploy conservative strategies, as multinationals performed better than domestic firms (Shah et al., 2016). Tahir and Anuar (2016) examined the association between working capital management and the performance of Pakistan's textile firms using data covering over ten years. Engaging the generalized methods of moments approach, Tahir and Anuar (2016) revealed a negative correlation between total current liabilities over total assets, financial debt ratio, and performance compared to a positive relationship between total current assets on performance. Bei and Wijewardana (2012) investigated working capital policy and return on asset performance indicators of Sri Lankan firms using audited annual reports of several firms spanning six years and findings revealed that working capital strategies impact firm effectiveness differently. Though the type of working capital strategy a firm's

management adopts is often based on the availability of resources (Afrifa, 2015), corporate managers and business leaders of both local and multinationals could manage their capital employed in consonance with, rather than to solely depend on the traditional notion of optimizing both current assets and liabilities. As a result, practitioners of working capital strategies need to integrate the time lag recognizing the type of working capital strategies required and the actual time to effect change, as firms may operate one strategy and then change as business climate changes.

Summary and Conclusions

Considering this literature review, the emphasis was on using the cash conversion cycle theory and its proficiency in the explanation of the relationship between working capital management constructs in alignment with working capital strategies and performance. The literature review gave an insight into manufacturing activities and an overview of the Nigerian manufacturing sector. The literature review also covered pertinent areas, such as working capital management, working capital strategies, performance variables, and measures to ascertain the quantitative relationships between dependent and independent variables and the importance to various stakeholders. Specifically, the review centered on prior studies on the relationships between working capital management and performance, as well as between working capital strategies and performance, and the common and contrasting positions between researchers within and outside Nigeria.

In the last 10 years of working capital management studies, researchers have dwelled significantly on the influences of financial constraints (Altaf & Shah, 2017;

Chauhan & Banerjee, 2018; Kowsari & Shorvarzi, 2017). However, there was a paucity of research on the connection between working capital and performance measures in alignment with working capital management. As a result, in this research, the author incorporated the various strategies (Charitou et al., 2016) that management can deploy to solve the gap of financial constraints which is common with most firms of small origin, as is the case in most developing nations. Drawing inspiration from past studies on the association between working capital management, working capital strategies, and performance, this study adopted the traditional form of measurement, deploying the multivariate regression analysis model (Suttipun & Pratoomsri, 2019). This model is to explore and exploit some control variables that are relevant but not put in a proper context in prior research. This is necessary by deviating from more descriptive to empirical research and considering more sample size than prior studies, which seems very common in Nigeria's working capital management literature.

Furthermore, this literature review incorporated accounting, market, and economic-based measures that depicted the historical, past and future-looking financial measures. This might be useful to different groups of stakeholders of the business community and internal management, as no single measure truly deciphers firm performance (Chaudhuri et al., 2016). Overall, this literature review gave credence to the alignment of working capital management, working capital strategies, and performance, as sound management of working capital is of benefit to both the firm and the nation's economic growth (Konak & Güner, 2016). The study findings might help close the identified gaps, enabling corporate managers and business leaders in Nigeria and the

wider society to understand better the trade-off between liquidity and profitability in allocating scarce resources to working capital assets.

In conclusion, there were generally inconsistencies in the relationships between working capital management, working capital strategies, and performance that require further examination, especially in a developing country. Again, the literature identified a lack of sound working capital management as causing most business failures (Eya, 2016). Nevertheless, the literature identified the existence of optimal working capital, below and above, which undermined a firm's financial performance and position from a competitive standpoint in the same industry and compared to other industries (Tsuruta, 2019). This suggested that corporate managers and business leaders can make their organizations more effective in striving to be close to the optimal value and give a strategic direction to the firm, especially in a competitive, uncertain, and complex marketplace.

Chapter 3 of this proposal discussed the research methodology and other adjoining concepts, such as the statistical analysis method, target population, study variable and measures, and the linkage to the research question. This enabled the researcher to connect the Chapter 3 components in closing the gaps identified in the literature and hence answer the research question by testing the hypotheses. This alignment might explain the relationship between working capital management, working capital strategies, and Nigerian manufacturing firms' performance using the cash conversion cycle as a theoretical lens. As a result, the research purpose might be achieved.

Chapter 3: Research Method

Introduction

Chu and Ke (2017) stated that research methods are used in all strata of scientific studies. Still, they noted that the choice amongst alternatives depends on the researcher's motivation and intention to accomplish. The articulation of the type of methods inherent in specific learning disciplines is of invaluable significance for scholars who attempt to make choices between available methods in the research process (Ullah & Ameen, 2018). The purpose of this quantitative research study was to examine the relationship between WCM, WCS, and performance for corporate managers and business leaders at publicly traded manufacturing firms in Nigeria. Consequently, corporate managers and business leaders could deploy garnered knowledge in optimizing a balance between liquidity and profitability in managing short-term assets of the firm in daily operational activities to improve performance. This chapter focuses on research design and rationale, population, sampling, and sampling procedure. Other topics that were addressed are measurement and operationalization of variables and the data analysis plan of the study. Chapter 3 contains information about threats to validity, ethical procedures of the research, and a summary leading to Chapter 4.

Research Design and Rationale

A research design is the researcher's comprehensive plan or structure to answer the research question(s) to achieve the stated research objectives in alignment with other research components (Bickman & Rog, 2008). Zyphur and Pierides (2017) defined a research design as an avenue for the generation of representations. Zyphur and Pierides

stated that representation typifies sampling and quantitation, analysis of gathered data, and the linkage between representation, the world view of the target population concerning the effectiveness of hypotheses and generalizations. A research design's choice is predicated on the research question, methodological approach, operationalization, data collection, and data analysis and validation approach (Caniato et al., 2018). This study's research question was: What is the relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms considering secondary financial data from 2003 to 2017? The research question followed from Nigerian manufacturing firms' declining financial fortunes due to the challenge of not effectively managing short-term assets concerning long-term assets due to working capital management anomalies. The dependent variable was the performance, while the independent variables were working capital management and working capital strategies.

Over the last two decades, organizations in Nigeria have been facing liquidity crises due to working capital management inconsistencies (Eya, 2016; Oyedele et al., 2017). Olarewaju et al. (2017) argued that most businesses face threats of closure due to the current harsh economic environment, with not many corresponding internal management strategies to absorb any shock of the prevailing era. To answer the above research question, a nonexperimental correlational research design was the most favorable compared to experimental and quasi-experimental research designs. A nonexperimental correlational research design entailed investigating the extent of association instead of the causal relationship (Turner et al., 2013) between working

capital management, working capital strategies, and performance. Experimental and quasi-experimental research designs were not chosen because this present study did not involve treating variables (Kraus et al., 2016) and applying interventionist activities (Holmberg et al., 2016), respectively. Research designs are investigators' plans for finding answers to research problems while the research method facilitates the plan's implementation.

Methodology

For this research work, I used the quantitative research methodology and multiple regression analysis. Chu and Ke (2017) stated that research methods are used in all strata of studies. Chu and Ke argued that it behooves researchers to consider the choice between alternative methods that motivate what they want to achieve or accomplish. The quantitative research method has a positivist philosophical foundation that centers on objectivity, deductive processes. It allows counting, empirical measurement, formulation, and testing hypotheses using statistical analysis of data, thereby facilitating the description accuracy of study variables and coefficients (Kivunja & Kuyini, 2017). The quantitative research method was consistent with understanding the association between working capital management, working capital strategies, and performance. The multiple regression statistical method was suitable for analyzing data because it can be deployed to estimate the relationship between the dependent and independent variables and the predictability of the dependent variable from the independent variable (Uyanik & Güler, 2013). Quantitative researchers use validity, reliability, and generalizability to capture the method's rigor (Alban-Metcalfe & Alimo-Metcalfe, 2013).

Qualitative and mixed-methodological approaches were not suitable for this study. Qualitative research processes unable the deductive testing of a theory (Brooks & Normore, 2015). Additionally, the associations between study variables did not involve combining both inductive exploratory and deductive explanatory processes (Molina-Azorín & López-Gamero, 2016). Qualitative researchers follow constructivist orientations that are subjective and inductive, believing that meaning is embedded in the research subject's consciousness and experiences (Kivunja & Kuyini, 2017). Brooks and Normore (2015) state that qualitative investigators derive information through interactions between the researcher and the research participant. Qualitative researchers focus on credibility, transferability, dependability, and conformability to validate the data and findings' trustworthiness (Korstjens & Moser, 2018).

As explained by Carins et al. (2016), mixed-method research entails the aggregation and integration of both qualitative and quantitative methods in one study to answer a research question in other to understand a research problem. Almalki (2016) argues that when the mixed method is chosen as an appropriate approach for any scientific inquiry, it could generate more value due to the combination of methods that better articulate information, not normally possible considering a single approach. Almalki (2016) stated further that though the method takes ample time and the usual negative perception from some researchers, mixed-method provided opportunities for researchers to ventilate ideas using both qualitative and quantitative methods. Mixed-method investigators use inference validity as a yardstick to gauge how well the

researcher can capture and explain the complexity of the research problem by integrating qualitative and quantitative methods (Ponce & Pagán-Maldonado, 2015).

Population

Taherdoost (2016) described the target population as a group of cases from which the researcher draws samples. Asiamah et al. (2017) stated that the target population is the researcher's focal point from which he or she sources for data. As such, the target population can dictate the usefulness and credibility of the findings. Asiamah et al. (2017) opine that the target population underpins a set of elements that the researcher intends to make some findings or inferences. In this study, the target population was publicly listed manufacturing firms involved in manufacturing business between 2003 and 2017 in the NSE. Frankfort-Nachmias and Nachmias (2008) discussed that the population's choice is critical because the target population needs to conform to some stated conditions to have a good study sample. The number of listed manufacturing firms in Nigeria is rather small as against the developed economies. As of July 09, 2019, from the NSE (2019), about 66 publicly registered manufacturing firms adjudged from the author's count with a total market capitalization of $39, 482, 601, 920 billion (N14.288 trillion). According to the NSE (2019), listed companies stand to benefit from:

- Companies have the opportunity to raise capital for growth to meet company aspirations
- Wider financing opportunities and access to international investor and public funds for growth; use of shares as currency to facilitate acquisition activities.

- Provision for competitively priced financing for companies that require capital for growth, execution of strategic projects, and scale-up processes
- Potential for companies to collaborate with companies that buy and sell at the global stage becomes visible as a result of the evaluation by research analysts, investors, media, etc.

Sampling and Sampling Procedures

Sampling

Sampling is a prerequisite in the research process to answer the research question(s) since not all the cases can be attended to in the population. Taherdoost (2016) suggested a six-stage process for effective sampling run which include: (a) ascertain the target population, (b) choose sampling frame, (c) select sampling approach, (d) decide sample size, (e) gather data, and (f) evaluate response rate. Simon and Goes (2013) stated that the first thing about sampling is recognizing the target population from where the sample is to be collected. Next, according to Simon and Goes (2013) is to enumerate the procedure of sampling from the target population.

Sampling Procedure

The sample collection process for participating manufacturing firms was based on a simple random probability sampling technique because of the need to give every firm an equal chance to participate in the research process (Etikan et al., 2016). On the other hand, nonprobability sampling does not provide equal opportunity for every firm to be part of the study. It limits the possibility of generalization of findings to the broader population (Acharya et al., 2013)**.** The principal goal of deploying a random sampling

strategy for this study was to ensure the generalizability of the findings and improve the credibility of the selection strategy (Etikan & Bala, 2017). In this study, the data collection instrument was the audited individual annual financial reports of publicly traded manufacturing firms from the NSE database across different manufacturing sectors. Also, I employed the specific websites of the firms to gather other data. The reports are usually accessible to third parties. NSE regulation requires that publicly traded firms arrange and document the audited annual financial reports.

The audited financial reports were suitable to measure the constructs of WCM, WCS, and performance for the following reasons, (a) financial reports provide both time-series and cross-sectional information for relatively large sample size, (b) financial ratios are critical measures in performance evaluation and comparison amongst industries (Tasic & Feruh, 2012), (c) financial reports leverage on records to examine the behavior of phenomena (Johnston, 2014). Tasic and Feruh (2012) demonstrate that investors, creditors, business analysts use audited financial reports to make informed decision-making.

Data Collection Method

For the data collection technique, I collected secondary data through electronic retrieval of financial statements of 54 manufacturing firms from the NSE as well as from individual company websites. This data collection technique is reminiscent of the approach that investors and financial analysts deploy to monitor publicly traded companies' performance (Johnston, 2014). According to Hamann et al. (2013) and Tasic and Feruh (2012), the first step in secondary data retrieval is to see that the sources have

useful information to answer the research questions. Going further, Tasic and Feruh believe that a structured collection of financial data is critical for researchers to generate repeatable and comparable data across firms as a function of time that leverages a sound foundation for rigorous analysis. Secondly, secondary data collection required (a) importing of data into Microsoft Excel, (b) deploying measures to calculate all variables from 2003 to 2017, and (c) importing calculated values into IBM SPSS version 24.0 for analysis.

While secondary data research is often beneficial to the academic community and industry, it also has some drawbacks. Johnston (2014) argue that (a) secondary data is not expensive because investigators could avoid the design of an instrument and data collection processes by using already existing data, (b) secondary sources are reliable, (c) secondary data sources are capable of reducing bias compared to primary sources**.** Butler et al. (2012) believe that ethical concerns are reduced through the use of secondary data devoid of human subjects. A major drawback of secondary data is that the specific information required by the researcher may not be available or collected from a different geographical area other than where the researcher resides; the researcher was not part of data collection and may not validate values (Johnston, 2014). Together, I generated information on the cash conversion cycle, accounts receivable, inventory, accounts payable periods, working capital investment, and financing strategies to estimate financial performance measures. Afterward, I calculated the average values and used them to ascertain the relationship between the outcome and predictor variables.

Sampling Frame

Taherdoost (2016) defines the sampling frame as a collection of real cases from which a sample is usually withdrawn, which needs to represent the population concerned. In this study, I used a random sampling methodology to select listed manufacturing firms. The probability sampling technique enables researchers to ensure the chance of equal inclusion of every member of the population in the sample in the study (Taherdoost, 2016). Joshi and Rajarshi (2018) stated that probability sampling guarantees that the selected manufacturing firms are reminiscent of the target population, and as a consequence, make it certain that study findings are reliable.

Inclusion and Exclusion Criteria

Unlike financial firms such as banks, insurance companies with different accounting concerns and asset-structure (Afrifa & Padachi, 2016), manufacturing firms have an organized accounting system for the short-term assets in consonance with long-term assets. To properly manage the research process, I used a screening and eligibility guideline that include (a) firms must meet SEC set criteria to be registered for the stated period from 2003 to 2017, (b) firms need to have working capital management, working capital strategies, and performance information in the financial reports of the companies, (c) information that facilitates the calculation of EVA, ROCE, TQ, ARP, APP, ICP, CCC, and WCS. These screening and eligibility criteria assume that Nigerian manufacturing firms have witnessed working capital management anomalies transcending the recent financial crises, economic boom, and recessionary periods within

the study period from 2003 to 2017. Overall, the inclusion and exclusion criteria could aid comparability and the use of panel data that has more degrees of freedom.

Sample Size and Rationale

The number of listed manufacturing firms in Nigeria is meager compared to that of the advanced economies. I deployed a simple random probability sampling approach, in which I examined the financial statements of firms spanning several sectors. Tabachnick and Fidell (2013) asserted that allowable sample size combines both statistical and economic considerations. Also, I used the G*Power 3.1.9.6 analysis software to estimate a representative sample size of the population (Nakakura et al., 2014) from 2003 to 2017. The G*Power 3.1.9.6 is a statistical analysis software that is commonly used in social, biomedical, and behavioral sciences for the determination of statistical power and minimum sample size for differing tests such as t-tests, F-tests, Z-tests, chi-square tests, and a host of other tests (Faul et al., 2007**).**

Calculation of the appropriate sample size requires that researchers have information about the alpha level, statistical power, effect size, and the number of predictors (Tabachnick & Fidell, 2013). Alpha or significance level connotes how researchers require safety measures not to unintentionally reject a correct hypothesis, while statistical power describes the capacity of a test to stop the rejection of an incorrect hypothesis (Faul et al., 2009). Put differently; statistical power is the ability of a test to detect an effect when present. Tabachnick and Fidell (2013) suggests that effect size measures the size of relationships or sizes of dissimilarities in a test**.** Researchers have used a significance or alpha level of 0.05, statistical power of 0.80, and a medium effect

size of 0.15 (Faul et al., 2009) and different predictors to arrive at different sample sizes. The number of registered public manufacturing companies in most developing economies such as Nigeria is relatively smaller than in developed countries.

I used an alpha or significance level of 0.05, statistical power of 0.80, an effect size of 0. 20 and two predictors to generate a priori minimum sample size of 52 samples (Faul et al., 2009). Although the G*Power analysis resulted in a sample size of 52 as a minimum compared to a total sample of 66, I used 54 as the sample size to improve the power analysis. For instance, an alpha level of 0.05, power of 0.80, medium effect size of 0.15 and two predictors generates 68 samples as a minimum (Faul et al., 2009). This means that reducing the effect size while keeping both alpha level and statistical power constant yields an increase in the sample size. Etikan and Bala (2017) suggested that an optimal sample size of 50 was satisfactory for quantitative research based on data available. Statistical analysis was used to evaluate the financial statements and decipher the relationship between the study's dependent and independent variables. Another reason, for the population's choice is that all necessary data to answer the research question and test the hypotheses are available to the public. This is to understand further how this makes meaning to the relationship between working capital management, working capital strategies and performance.

Instrumentation

A research instrument is a data collection tool, while instrumentation is the act of putting-together, testing, and deploying a data collection instrument (Butler et al., 2012). Researchers use instruments and instrumentation to achieve their research objectives

through the measurement of research constructs. Corporate managers and business leaders need to properly measure these constructs through variables and the potential relationships evaluated for informed decision-making.

Measurement of Study Variables

Measurement, the hallmark of scientific inquiry requires careful consideration. Correct measurement of science variables is significant and important, especially in cases when the variables concerned are unobservable (Santos & Brito, 2012). Hagan (2014) stated that measures, from a quantitative context, numerically convey levels of attributes, hinged on coherent processes, enabling the statistical transformation of findings. Hagan argued that immeasurable concepts ordinarily lack the possibility of measurement. Measurement is the allotment of numerical figures to observations to determine phenomena (Butler et al., 2012). In finance, phenomena such as working capital management, working capital strategies, and performance are theoretical constructs that are operationalized and measured with instruments (Engberg & Berben, 2012).

The inefficient measurement of variables introduces accuracy issues affecting quantitative studies' quality, thereby giving false potential relationships between variables (Venkatraman & Ramanujam, 1987). Quantitative research is characterized by three classes of variables: analytical, measurement, and relational aspects (Frankfort-Nachmias & Nachmias, 2008). Frankfort-Nachmias and Nachmias stated that the analytical plays an integral systematic role in the overall research process. At the same time, the measurement dimension assesses whether the variables of the study efficiently measured what is required from the participants. Arguing further, the authors stated that the

relational segment explains the level or extent of resemblance between research variables.

Table 3.

Study Variables, Measurement Types and Measures

Constructs	Variables	Measurement Types	Measures
Working Capital Management	Accounts Payable Period (APP)	Ratio Scale	$\frac{Average\ Account\ Payable\ (365)}{Cost\ of\ Goods\ Sold}$
	Account Receivable Period (ARP)	Ratio Scale	$\frac{Average\ Account\ Receivable\ (365)}{Sales}$
	Inventory Conversion Period (ICP)	Ratio Scale	$\frac{Average\ Inventory\ (365)}{Cost\ of\ Goods\ Sold}$
	Cash Conversion Cycle (CCC)	Ratio Scale	ARP + ICP - APP
Working Capital Strategies	Working Capital Investment Strategy (WCIS)	Ratio Scale	$\frac{Total\ Current\ Assets}{Total\ Assets}$
	Working Capital Financial Strategy (WCFS)	Ratio Scale	$\frac{Total\ Current\ Liabilities}{Total\ Assets}$
Firm Performance	Economic Value Added (EVA)	Ratio Scale	NOPAT – (IC * WACC)
	Return on Capital Employed (ROCE)	Ratio Scale	$\frac{Net\ Profit\ before\ Tax}{Total\ Assets - Total\ Current\ Liabilities}$
	Tobin's Q (TQ)	Ratio Scale	$\frac{Market\ Value\ of\ Equity + Book\ Value\ of\ Debt}{Book\ Value\ of\ Assets}$

In this study, I employed three variables to operationalize the construct of performance, the dependent variable. Also, I used four variables for working capital management and two for working capital strategies. The performance variables

comprised EVA, ROCE, and TQ. The independent variables that I used were ARP, ICP, APP, CCC, and WCS. Working capital strategies are made up of WCIS and WCFS.

Dependent Variables of the Study

The dependent variables of this study were performance measures. Margaretha and Supartika (2016) stated that performance indicators should consider the different stakeholders or interest groups of the firm. In the same vein, the use of multiple performance measures is critical for the reflection of the interest of different stakeholders (Falavi & Abdoli, 2015; Feng et al., 2015). Shah et al. (2015) emphasized that a firm's performance measures have an integral influence on investors' decisions. Wang et al. (2016) argued that multiple approaches to performance measure generate a holistic posture of evaluating and monitoring firm performance rather than using a single variable.

Chaudhuri et al. (2016) stated that firm performance gauges the firm's total financial standing and acts as a barometer to benchmark firms in the same industry or between one industry and the other. Chaudhuri et al. (2016) argued that firm performance measures should have an integrative stance to reflect the real performance construct. In this research work, I used multiple performance variables to take care of publicly listed manufacturing firms' different interests. The variables were EVA, ROCE, and TQ. EVA is an economic measure that interrogates the current performance. ROCE is an accounting-based measure that probes the firm's historical stance. At the same time, TQ is the market-oriented parameter that looks at the firm's future dynamics. Taking together

these parameters made corporate managers and business leaders of manufacturing firms make informed decisions to the benefit of diverse stakeholders.

Economic Value Added

Shil (2009) describes EVA as a performance indicator that involves creating wealth for shareholders in the long run. According to Shil (2009), EVA values inform shareholders on the level of economic value added due to the firm's entrustment to corporate managers. Ismail (2013) stated that EVA has significance as it correlates with stock returns better than traditional measures. Ramadan (2016) calculated EVA as:

EVA = Net operating profit after-tax - cost of capital…….. (7)

Where

Cost of capital = Total capital employed * Weighted average cost of capital

Similarly, Cordeiro and Kent Jr (2001) calculated EVA from the following equation:

EVA = NOPAT – (IC * WACC)……..(8)

Where

NOPAT = Net Operating profit after tax

IC = Invested capital

WACC = E/V Re +D/V Rd (1-Tc)……(9)

Where

WACC = Weighted average cost of capital

Re = cost of equity

Rd = cost of debt

E = Firm’s market value of equity

D = Firm’s market value of debt

V = E + D

E/V = Percentage of financing that is equity

D/V = Percentage of financing that is debt

Tc = Corporate tax rate

Return on Capital Employed

ROCE is a performance metric of the firm. Though ROCE pertains to accounting figures that are open to malpractices, which do not depict recent accounting information (Qurashi, 2017), the metric is widely used for the firm's performance (Watson & Head, 2010). Afrifa and Padachi (2016) calculated ROCE as profit before interest and tax divided by capital employed. In a similar vein, Saleem and Rehman (2011) calculated ROCE as net profit before tax on the total debt plus total equity.

ROCE = Net Profit before Tax/ Total Debt + Total Equity……(10)

Tobin’s Q

Fu et al. (2016) described TQ as the firm's market value divided by the replacement cost of assets. Altaf and Shah (2017), and Arachchi et al. (2017) calculated TQ as the sum of equity's market value and the book value of debt over the book value of assets. However, Afrifa (2016) calculated TQ as the market value of equity plus the book value of total assets minus the book value of equity divided by the book value of total assets.

TQ = Market value of equity + Book value of debt/Book value of assets…….(11)

Independent Variables of the Study

To operationalize the independent variables, I used working capital management and working capital strategies constructs. Setianto and Pratiwi (2019) argue that managers stand a good chance of maximizing the firm's value by using the attributes of the combination of working capital management and working capital strategies. Working capital strategies are the various channels open for firm managers to invest in current assets and finance the same current assets (Ukaegbu, 2014). Effective alignment of working capital strategies and working capital management can improve timeliness and performance of operations.

Accounts Receivable Period (ARP)

Kumaraswamy (2016) defined the accounts receivable period as the average time that elapses before credit sales are paid to the firm. According to the author, the accounts receivable period entails the optimization of resources at the disposal of customers in receiving and collecting funds owed to the firm. Accounts receivable period informs the management of how well they collect funds owed the firm by customers. Mbawuni et al. (2016) and Bhatia and Srivastava (2016) calculated ARP as:

Accounts Receivable Period, ARP = $\frac{Average\ Account\ Receivable\ (365)}{Sales}$ .....(12)

Accounts Payable Period (APP)

Nwakaego and Ikechukwu (2016) stated that account payables are resources yet to be paid to suppliers by debtors to purchase inventory. Cumbie and Donnellan (2017)

described the APP as the average time in days, after which the management of the firm pays its suppliers. Le (2019) represented the accounts payable period mathematically, as

Accounts Payable Period, APP = $\frac{Average\ Account\ Payable\ (365)}{Cost\ of\ Goods\ Sold}$ …… (13)

Inventory Conversion Period (ICP)

Bhatia and Gupta (2018) stated that the ICP is the total time involved in transforming inventory into sales. The authors further argue that the inventory conversion period is the sum of the raw materials storage period (RMSP), work in progress conversion period (WIPCP), and the finished goods storage period (FGSP). Şamiloğlu and Akgün (2016), Oyedele et al. (2017) mathematically represented ICP as:

Inventory Conversion Period, ICP = $\frac{Average\ Inventory\ (365)}{Cost\ of\ Goods\ Sold}$ …….. (14)

Cash Conversion Cycle (CCC)

The cash conversion is the duration of time in days between the cash outlay for the purchase of inventory, its conversion to finished product and cash inflows due to sales, and the receipt of accounts receivables (Falope & Ajilore, 2009). Singh and Kumar (2017) reported that the CCC is considered a holistic measure of working capital management as against historical indicators of liquidity such as current and quick ratios. The CCC is a veritable measure that corporate managers and business leaders can use to evaluate how well working capital is optimized (Richards & Laughlin, 1980). Shrivastava et al. (2017) emphasized that the shorter the CCC, the less time it takes capital to be idle, and better fortune for the firm in plowing available resources to more profitable ventures.

Altaf, and Shah (2017), Singhania and Mehta (2017) algebraically represented CCC as,

CCC = ARP +ICP –APP……..(15)

Where

ARP = Accounts receivable period

ICP = Inventory conversion period

APP = Accounts payable period

Working Capital Investment Strategies (WCIS)

Working capital investment strategies are those investment decisions taken by the firm's management to improve the working capital or current assets position and thus enhance the firm's performance. Tahir and Anuar (2016) calculated the working capital investment strategy as current assets (CA) over total assets (TA). Adam et al. (2017) showed mathematically that WCIS could be represented as the degree of aggressiveness/conservativeness,

$$\text{WCIS} = \frac{Total\ Current\ Assets}{Total\ Assets} \quad \text{……..(16)}$$

The authors stated that a value of TCA/TA less than 0.5 represents a relatively aggressive working capital investment strategy, while the converse is true for a relatively conservative working capital investment strategy.

Working Capital Financing Strategies (WCFS)

Working capital financing strategies are described as the various funding actions that management of firms take for the availability of current assets for daily operational activities. Panda and Nanda (2018) demonstrated that a conservative financing strategy

encourages greater volumes of current assets but contends with high liquidity costs. The authors argue that the aggressive strategy shows a situation where the firm managers hold lower current assets, which may negatively impact liquidity. Tahir and Anuar (2016) expressed working capital financing strategies as current liabilities (CL) divided by total assets (TA). In the same vein, Adam et al. (2017) represented WCFS as,

$$WCFS = \frac{Total\ Current\ Liabilities}{Total\ Assets} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(17)$$

The authors argue that the ratio of TCL/TA shows the level of aggressiveness/conservativeness of working capital financing strategies. A value of less than 0.5 represents a relatively conservative working capital financing strategy. Alternatively, a value of TCL/TA greater than 0.5 depicts an aggressive working capital financing strategy.

Data Analysis Plan

The data analysis plan encompasses the use of appropriate software, the step-by-step process of how data is cleaned and screened and the various statistical tests employed to examine the hypotheses and how the data is organized and passed across to users. Secondary data analysis was used to enable the synthesis of findings (Ullah & Ameen, 2018) within and across various manufacturing sectors. Each variable was computed from the balance sheet and income statement information of the various manufacturing companies based on the audited financial statements from the websites' NSE and individual home pages (Appendix A). The resulting data (Appendix B) was inputted into Microsoft Excel and then imported into the IBM SPSS statistical software version 24.0 for multiple regression analysis.

Data Cleaning and Screening Criteria

To properly manage the research process, I used a data cleaning and screening guideline. These processes included, (a) I checked for any missing information and taking necessary precaution, (b) I made sure that outliers do not exist in the datasets; outliers can cause inaccurate results, hence should be identified through scatter plots, and dealt with to optimize the quality of financial data (Leys et al., 2013), (c) firms must meet SEC set criteria to be registered for the stated period from 2003 to 2017, (d) firms need to have working capital management, working capital strategies, and performance information in the financial reports of the companies, (e) information that facilitates the calculation of EVA, ROCE, TQ, ARP, APP, ICP, CCC, and WCS. These data cleaning and screening criteria assume that Nigerian manufacturing firms have witnessed working capital management anomalies transcending the recent financial crises, economic boom, and recessionary periods within the study period from 2003 to 2017.

Research Question and Hypotheses

This study was guided by the following research question and hypotheses:

RQ: What is the relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms considering secondary financial data from 2003 to 2017?

(H_0): There is no statistically significant relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms.

(H_1): There is a statistically significant relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms.

Statistical Tests for Hypotheses Testing

Various statistical tests were used to analyze the research question and hypotheses to test if there was a relationship between working capital management, working capital strategies, and Nigerian manufacturing firms' performance. The use of a specific statistical analysis approach is contingent on the research question, the number of constructs and variables, and the measurement scale (Tabachnick & Fidell, 2013). Different statistical models such as descriptive, correlation, and multiple regression were considered appropriate to answer the research question and test the null hypothesis. The multiple regression model was used to test the statistical significance deploying an alpha level of 0.05 and a confidence interval of 95%. The multiple regression model was then used to test if there was a statistical significance between the dependent variables (EVA, ROCE, & TQ) and the independent variables (CCC, APP, ARP, ICP, WCIS, and WCFS). The rationale for including the covariate independent variables is that research shows that these variables can predict the outcome variable **(**Masri & Abdulla, 2018; Singhania & Mehta, 2017). This is to facilitate the interpretation of results. The use of multiple regression requires knowledge of requirements and the test of various assumptions.

Multiple Regression Analysis

For this study, I used the multiple regression statistical technique through the ordinary least square method to buttress the research findings. Multiple regression

analysis was employed to determine the relationship between multiple variables and the prediction of phenomena in several life endeavors. For instance, in energy forecasts (Mottahedi et al., 2015), agriculture (Mistry & Bora, 2019), business (Suttipun & Pratoomsri, 2019) amongst other fields. As discussed by Olvera and Zumbo (2019), multiple regression models via ordinary least squares are normally characterized by the form's general formula: $Yi= ß_0 + B_1X_1i + B_2X_2i \ldots\ldots + B_nXni+ Ɛi$. Yi= is the predicted value of Y or the dependent or outcome variable, which in this study are either EVA, ROCE, or TQ. $ß_0$ is the intercept of Y, B_1 ….. B_6 are the coefficients of independent or predictor variables: CCC, APP, ARP, ICP, WCIS, and WCFS. X_{1i} ---X_{6i} is the independent or predictor variable, CCC, APP, ARP, ICP, WCIS, and WCFS while Ɛi is the error term.

For this study, I developed three models using the dependent and independent variables. I also tested the hypotheses by running the following three multiple regression equations.

$EVA = ß_0 + B_1CCC + B_2APP + B_3ARP + B_4ICP + B_5WCIS + B_6WCFS +Ɛ$……... (18)

$ROCE = B_0 + B_1CCC + B_2APP + B_3ARP + B_4ICP + B_5WCIS + B_6WCFS +Ɛ$…… (19)

Tobin's $q = ß_0 + B_1CCC + B_2APP + B_3ARP + B_4ICP + B_5WCIS + B_6WCFS +Ɛ$…… (20)

Requirements of the Multiple Regression Analysis

Multiple regression analysis in quantitative research, as it relates to this study, required the following, (a) the output of the statistical tests using version 24.0 of IBM SPSS, (b) separate bivariate relationships statistics between dependent and independent variables to check for any potential direction and strength of the linear relationship

between dependent and independent variables, (c) multivariate relationship statistics between dependent and independent variables to test for the overall significance using the F- statistic. For each bivariate and multivariate relationship, I checked the coefficient of determination (R), R square, and adjusted R square from the model summary, including the Durbin-Watson value (Warner, 2013). The value of R enabled me to find out if any relationship existed between dependent and independent variables. R square's values and adjusted R square were to determine the level of variances of the independent variable that is explained by the dependent variable and hence might underpin the level of the generalizability of the model (Osborne, 2000).

Next, the ANOVA statistics showed the p-value of the conventional alpha value of 0.05, the F-statistic, the sum of squares, mean square, and the degree of freedom. If the p-value is less than the alpha of 0.05, there is a statistical significance, and then the null hypothesis is rejected; otherwise, the alternate hypothesis is accepted (Warner, 2013). The next is to find out the unstandardized coefficients (B value) (intercept on the y-axis) of both dependent and independent variables about the standardized coefficient (Beta value), including the t-statistic and the variance inflation factor (VIF), to input the numerical values for the multiple regression model. Both predictor and outcome variables need to be tested for overall significance to accept or reject the null hypothesis. There are some assumptions outlined in the literature for multiple regression analysis that require validation.

Test of Multivariate Analysis Statistical Assumptions

Williams et al. (2013) advocated that researchers need to understand the significance of making assumptions in multiple regression analysis (ordinary least squares) via estimators. Williams et al. (2013) stated that assumptions are necessary for: (a) that an estimator must be unbiased such that the expected parameter mean value tallies with true value in the target population, (b) the estimator of a parameter need to be consistent in that the value should be as close to the true value in the target population as the population size increases, and (c) that the estimator is efficient, that is the variance be minimal as possible which is a function of the accuracy of measurements.

According to Laerd Statistics (2020), the following seven assumptions require consideration for linear multiple regression.

- The dependent variable is measured at continuous or metric level - For example, firm performance is measured as EVA, ROCE, and TQ have dollar equivalent units;
- The independent variable also measured at the continuous or metric level- For instance, the independent variables, working capital management and working capital strategies, are measured as CCC, APP, ARP, and ICP and WCIS and WCFS are measured in days and dollar equivalent units respectively;
- Linear association between dependent and independent variables;
- Observations are independent;
- No notable prevalence of outliers;
- Requirement of data to reveal homoscedasticity; and

- Regression line due to the residuals is largely normal.

As emphasized by Osborne and Waters (2002), and Williams et al. (2013) the above listed assumptions need to be satisfied before any meaningful inference and generalizations could be made from the target population about the wider population. The stance of the authors corroborates the need for, (a) independence of errors, (b) absence of complete multicollinearity amongst predictor variables, (c) achievement of zero conditional means of errors for the avoidance of undue influence on data, (d) normal distribution of variables**,** (e) involvement or presence of homoscedasticity or constant error variance, and (f) the linearity of the response variable on the predictor variables to be satisfied.

According to Laureate Education Producer (2016m), a Durbin-Watson value less than the threshold value of 4.0 satisfies the independence of errors of residuals, (b) VIF values of the predictor variables less than the conventional value of 10.0 show absence of multicollinearity, (c) a Cook's Distance from the residual statistics which is within 1.0 conform to the avoidance of any undue influence, (d) a Histogram that is largely normal depicts a normal distribution, (e) a scatter plot that is not funnel-like or cone-shaped describes the absence of Homoscedasticity, and (f) a probability plot derived from the scatter plot by fitting the best line showing a straight line satisfies the linearity assumption.

Threats to Validity

Frankfort-Nachmias et al. (2015) stated that validity represents the propensity to which an instrument can concisely explain what the instrument is stipulated to measure.

In corroboration, Heale and Twycross (2015) described validity as the ability to which an instrument measures the variables put together by researchers. As emphasized by Khorsan and Crawford (2014), validity connotes a position where the research results are not associated with any bias. The authors further stated that interpreting quantitative research findings is contingent upon both internal and external validity. Despite current knowledge in quantitative research, threats to validity continue to persist (Cheung et al., 2017), which might impact the trustworthiness of the research findings. Taken together, validity means the level of which a researcher's conclusive statements from the data used depict the real or actual position. Besides, reports of validity can strengthen the findings of the research and provide a template to reduce the level of arguments and counter-arguments of research findings.

External Validity

Khorsan and Crawford (2014) defined external validity in quantitative research as the level at which the findings can be generalized beyond the samples collected and used to a wider population in different scenarios. Cor (2016) gave insights of external validity threats to pharmacy quantitative research as (a) ecological validity (how findings may be generalized in controlled as compared to less controlled scenario), (b) temporal validity (how findings from research can stand the test of time), treatment variation validity (how the interpretations of study findings could be generalized across a different cadre of treatment), and (d) outcome validity (how expected generalizations can be aligned between different outcomes). To guide against threats to external validity, I made sure that sample selection from manufacturing firms is representative and appropriate and

made up of a diverse assemblage of the target population, and duration cuts across from 2003 to 2017 to aid generalizability of findings. As a result, I adopted random sampling where the chance of selection of elements is not restricted. Frankfort-Nachmias et al. (2015) argue that the sample's level of representativeness and the after-effects of experimental activities remain the major sources of external validity issues. In sum, external validity threats might be reduced to a high level where researchers are conscious of self-selection bias and the need for sample characteristics to be very near the target population (Cheung et al. (2017).

Internal Validity

Cor (2016) described internal validity as the extent to which causal relationships are formed based on the research's design characteristics. For this study, I employed a non-experimental quantitative correlational design, where the association between dependent and independent was examined rather than the causal relationship amongst the variables. As a result, it did not involve any threats of internal validity. For instance, for this research, I employed secondary data to examine the relationship between working capital management, working capital strategies, and Nigerian manufacturing firms' performance. Woodman (2014) discussed that causal relationship had remained a major source of internal validity concerns in quantitative research.

Construct Validity

In quantitative research, construct validity, according to Martin et al. (2013), involves how well the operational aspects and measurement of the construct are properly aligned. As presented by Heale and Twycross (2015), construct validity connotes the

level of efficiency at which an instrument measures the proposed construct of interest. As a result, construct validity could be a threat to quantitative researchers. In this research, the dependent variable was the performance, while the independent variables were working capital management and working capital strategies. I operationalized the construct of WCM with the ARP, ICP, APP, and the CCC.

Similarly, I operationalized performance with EVA, ROCE, and TQ while working capital management strategies were operationalized as WCIS and WCFS. Although this study involves the measurements of constructs and their operationalization through secondary data, computation, and subsequent use of statistical software, it did not involve using an instrument to measure the constructs. In line with the above argument, this study did not involve any threats of construct validity.

Ethical Procedures

Research ethics pertain to soliciting the cordial association between the researcher and the research subjects, protecting the subjects' rights, and the subsequent publication of the research findings (Banegas & Villacañas de Castro, 2015). Eksioglu et al., (2015) defined ethics as an aspect of knowledge that connotes moral underpinnings. Research ethics revolve around making sure that research subjects are not exposed to unnecessary danger or ridicule. As a follow-up, research subjects are informed in advance of potential risks and benefits connected with the research to choose subjects without any sentiments (Peter, 2015). Zyphur and Pierides (2017) advocated that in striving to achieve research purposes with potential researcher orientations, researchers should endeavor not to forget the potential ethical consequences of not aligning purposes and associated orientations

such as replication of quantitative research. This research did not involve human subjects, but I collected secondary data from listed manufacturing firms spanning 2003 to 2017 from relevant bodies.

In Zyphur and Pierides' s terms, orientations may facilitate several purposes that affect what is observed concerning the world view. Yin (2014) highlighted some conditions that need to be satisfied with avoiding ethical concerns in quantitative research. The author stated that keeping participants' identity in confidence, disclosing reasons for research, receiving consent, privacy, the concern of the vulnerable population, as avenues of checking ethical concerns in quantitative research. In recent times, several universities saddle ethics committees' responsibility in research to ethics committees with different nomenclature in naming context, but with similar orientations. Ethics committees are assemblages of non-homogenous and qualified professionals who undertake the task of monitoring, evaluating, and ensuring ethics-based concerns are not compromised in the research process (Eksioglu et al., 2015). Eksioglu et al. (2015) emphasized that the target is to interrogate the research cycle for valid, reliable, and trustworthy findings to shape a better future through quality studies in the scientific community.

Walden University regulation requires that every study meets its minimum standard of compliance with ethical standards and any other applicable international guidelines regarding the protection of selected organizations in the study. With this understanding, this study did not involve humans but rather data from listed manufacturing firms was used. I deployed statistical analysis to analyze secondary data

collected that comprised published financial reports from Nigerian manufacturing firms spanning 2003-2017. I prevented ethical dilemmas by ensuring data integrity and confidentiality were protected to safeguard the firms from unnecessary latent events. Moreover, I did not include the names of the firms to guarantee their privacy.

The data was specifically for the research process. Only the committee chair, second committee member, and the researcher had access to the raw data to ensure integrity is sacrosanct. I made sure that data is prevented from entering the hands of third parties other than the persons directly involved in the research to maintain the process's security. The data would be kept safely for five years after which it will be discarded to avoid unpleasant circumstances. In furtherance of ensuring ethical standards, as I looked forward to the research process, I completed the National Institute of Health (NIH) web-based training course for Protecting Human Research Participants on October 03, 2016, with certificate number 2197727 (Appendix C). Also, data collection did not progress until IRB approval was received (Approval No. 10-23-20-0642431).

Summary

In Chapter 3, I highlighted the importance of research method in virtually all areas of science, stated the study's purpose once again; described the research design, distinguished between types, and gave reasons for the one selected. Going forward, I explained the methodology that was used in this study and differentiated between the various approaches of research-quantitative, qualitative, and mixed-method approaches to research. Further, I introduced the target population as listed manufacturing firms in the Nigerian Stock Exchange and espoused these firms' potential benefits. Also, I gave

insights into the meaning of sampling, and the procedures inherent in sampling, inclusion and exclusion methods, as well as considered the statistical tool for the determination of sample size. Next, I considered how the dependent and independent variables were operationalized to scrutinize the research problem further and help answer the research questions. In the data analysis section, I identified how the G*Power 3 statistical tool was used to analyze data. At the same time, I explained how inconsistent data or outliers might be screened out not to affect the study's findings.

Besides, I outlined the research question and hypotheses and the process of results interpretation. Validity remains a cornerstone of the modern-day research process, and as such, I looked at different types and threats therein that could mar the research process if not properly addressed. For instance, the researcher and the wider society might be interested in the level of generalizability of the findings or whether the observed results were due alone to the independent or other extraneous variables and the extent to which test measures what was intended. Walden University, like most institutions, is very particular about ethical standards in the research process. To that extent, I outlined the various measures to maintain a cordial relationship between the researcher and research participants. This included the rights of the research participants not to be compromised, so that findings of the research might be reputable.

In Chapter 4, I reported the results, including the process of the data collection, testing of the hypotheses and the multiple regression statistical assumptions as it relates to the research question. Additionally, I fitted the three performance multiple regression models.

Chapter 4: Results

This study's research findings are presented in this chapter to reveal the relationship between working capital management, working capital strategies, and Nigerian listed manufacturing firms' performance. In this study, the specific problem was the challenges encountered by corporate managers and business leaders to integrate market, accounting, and economic measures that led to the understanding between performance, working capital strategies, and working capital management in lowering working capital levels and the subsequent reduction in business failures. Hence, the purpose of this quantitative correlational research study was to examine the relationship between working capital management, working capital strategies, and performance for corporate managers and business leaders at publicly traded manufacturing firms in Nigeria.

I thought that having sound knowledge of this relationship could empower corporate managers and business leaders of Nigerian manufacturing firms to create an optimal level between liquidity and profitability and, therefore, manage working capital levels, resulting in informed capital allocation decisions day-to-day operations. The overarching research question I developed premised on, what is the relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms considering secondary financial data from 2003 to 2017?

The hypotheses are as follows:

Null hypothesis (H_0): There is no statistically significant relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms.

The alternative hypothesis (H_1): There is a statistically significant relationship between working capital management, working capital strategies, and performance of publicly traded Nigerian manufacturing firms.

The dependent variable is performance comprising of EVA, ROCE, and TQ. On the other hand, the independent variables included working capital management operationalized as APP, ARP, ICP, and CCC and working capital strategies operationalized as WCIS and WCFS. The multiple regression model was the statistical method deployed to analyze the research data

This chapter contains the research data, statistical findings resulting from the examination of the study variables. This chapter is also made up of a step-by-step process of data preparation, discussion of study variables, and the approaches used in analyzing the research question. Furthermore, I report on the descriptive statistics of the data followed by the evaluation of the statistical assumptions peculiar to conducting multiple regression, such as checking for missing information and examining the presence of outliers in the data.

Data Collection

I obtained Institutional Review Board (IRB) approval based on my acceptance to abide by the terms and conditions of the Walden University ethical procedure. My IRB

approval number for this doctoral capstone is 10-23-20-0642431. The data collection was completed within 10 weeks of receiving IRB consent.

As espoused in Chapter 3, using the G*Power analysis, I generated a sample size of 52 as a minimum with a proposed time spanning from 2003 to 2017. However, 54 samples spanning different manufacturing categories were used for this research to improve the power of the analysis compared to a population of 66 samples available (see Table 4). I sourced the data from the financial statements of manufacturing firms domiciled in the NSE supported by the individual firms' websites. Hence, I deployed secondary data for this study. As a result of incomplete data for this time frame, only the years from 2014 to 2018, which had complete data, were considered for data collection.

Table 4

Manufacturing Categories

Name of Category	Number of Firms	Percentage (%)
Natural Resources	4	7.41
ICT	3	5.56
Agriculture	4	7.41
Conglomerates	3	5.56
Healthcare	5	9.26
Consumer Goods	16	29.63
Industrial Goods	10	18.52
Oil and Gas	9	16.67
Total	54	100.00

The dependent variables (EVA, ROCE, TQ), as well as the independent variables (APP, ARP, ICP, CCC, WCIS, & WCFS) variables, were computed from the information

gathered from the balance sheet and income statements of the firms using the formula ascribed to each variable as well as the stock quotes. These processes aided the testing of the hypotheses of the study.

Descriptive Statistics

Descriptive statistics gives information about the nature of the data. Table 5 shows a clear variation amongst the manufacturing firms' variables within the study period as exemplified by the mean, standard deviation, minimum and maximum values. Additionally, different firms deployed varied working capital strategies to achieve firm performance. For example, the values show that manufacturing firms maintained close WCIS and WCFS figures with values of 0.49 and 0.46, respectively, which are essentially near the 0.5 benchmark, determining the aggressiveness/conservativeness of the working capital strategy operation. On average Nigerian manufacturing firms operated a relatively aggressive WCIS and a relatively conservative WCFS. However, one striking feature is the negative value of CCC, which is – 182.46. This negative value means that on average, corporate managers and business leaders of Nigerian listed manufacturing firms delay payments to suppliers or creditors compared to the sum of inventory conversion and the receipt of payment from customers. For instance, the dependent variables – EVA, ROCE, and TQ- had a mean of 0.76, 0.08, and 0.71 compared to standard deviation figures of 13.17, 0.31, and 0.25. In the same vein, the minimum and maximum values varied between -56.56 and 30.01, -1.05 and 1.15, 0.33 and 1.49. Overall, the data showed that corporate managers and business leaders of listed

manufacturing firms in Nigeria approached their working capital goals differently, specifically resulting in different performance dimensions.

Table 5

Descriptive Statistics

Variables	Mean	N	Std. Deviation	Minimum	Maximum
EVA (‘000,000)	0.76	54	13.17	-56.56	30.01
ROCE	0.08	54	0.31	-1.05	1.15
TQ	0.71	54	0.25	0.33	1.49
ARP	109.12	54	132.41	7.02	829.00
ICP	128.30	54	170.31	0.48	1223.59
APP	419.87	54	1073.15	13.05	5967.43
CCC	-182.46	54	863.21	-4712.59	403.36
WCIS	0.49	54	0.25	0.02	0.92
WCFS	0.46	54	0.17	0.14	0.86

Hypothesis Testing and Statistical Assumptions

In this section, I examined the SPSS output on the three models proffered to ascertain the level of agreement with the assumptions espoused in Chapter 3. I arranged the analysis in alignment with the descriptions of the research hypotheses. Additionally, for each model, I evaluated the extent to which the multiple regression assumptions were complied with or violated. The assumptions included – independence of errors of residuals, multicollinearity, undue influence on data or presence of outliers, normality of the distribution, homoscedasticity, and the linearity of the regression equation. In all, I adopted the plots from the output of the SPSS and the adjoining numerical values to evaluate the level of compliance with the stated assumptions.

Evaluating the Economic Value-Added Regression Model – EVA Model

For the overarching research question of this study, I explored to understand whether there was a statistically significant relationship between WCM, WCS, and EVA of publicly listed Nigerian manufacturing firms. I deployed EVA as the dependent variable in the multiple regression equation and CCC, APP, ARP, ICP, WCIS, and WCFS as independent variables. The EVA model is stated below:

$EVA = ß_0 + ß_1CCC + ß_2\ APP + ß_3ARP + ß_4ICP + ß_5WCIS + ß_6WCFS + Ɛ_1$……..(21)

Where,

EVA = Economic Value Added

$ß_0$ = Regression constant and intercept on the y-axis

$ß_1, ß_2, ß_3, ß_4, ß_5, ß_6$ = specific constants attributed to the independent variables

CCC = Cash conversion cycle

APP = Accounts payable period

ARP = Accounts receivable period

ICP = Inventory conversion period

WCIS = Working capital investment strategy

WCFS = Working capital financing strategy

$Ɛ_1$ = Error term

I deployed ANOVA statistics and the *f* distribution test to test the level of association between EVA, CCC, APP, ARP, ICP, WCIS, and WCFS at a significance or alpha level of 5%. The null hypothesis stated no statistically significant relationship between working capital management, working capital strategies, and performance of

publicly traded Nigerian manufacturing firms. On the other hand, the alternative hypothesis stated that there was a statistically significant relationship between working capital management, working capital strategies, and the performance of publicly traded Nigerian manufacturing firms.

Test of the Multiple Regression Assumptions in the Economic Value-Added Model

Independence of Error of Residuals

Following Laureate Education Producer (2016m), the Durbin-Watson value was 2.005 from the model summary. This value is below the threshold value of 4.0 (Table 6) which showed that the independence of errors of residuals is satisfied.

Table 6

Model Summary EVA

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.467[a]	.218	.136	12.24	2.005

a. Predictors: (Constant), WCFS, APP, CCC, WCIS, ARP, ICP
b. Dependent Variable: EVA

Table 6 shows that the correlation coefficient $r(6) = 0.467$, $p = .033$. This indicates a positive and moderate correlation between EVA, CCC, APP, ARP, ICP, WCIS, and WCFS. The R square and the adjusted R square values are 0.218 and 0.136, respectively. This means that the independent variables explain about 21.8% of the variation of the dependent variable.

Absence of Undue Influence or Outliers

The residual statistics (Table 7) showed a Cook's Distance value ranging between .000 and .094. This is within the allowable threshold of 1.0. This range of values depicts the absence of any undue influence or outliers in the data.

Table 7

EVA Residual Statistics

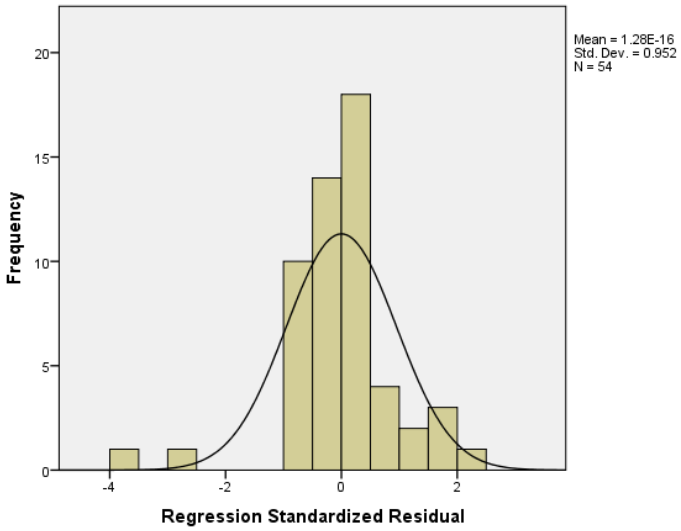
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-11.94	2.40	.76	2.42	54
Std. Predicted Value	-5.25	.68	.00	1.00	54
Standard Error of Predicted Value	1.78	9.59	2.13	1.35	54
Adjusted Predicted Value	-25.08	2.51	.47	4.23	54
Residual	-57.02	29.07	.00	12.94	54
Std. Residual	-4.36	2.23	.00	.99	54
Stud. Residual	-4.41	2.25	.01	1.02	54
Deleted Residual	-58.11	29.62	.28	13.84	54
Stud. Deleted Residual	-5.51	2.34	-.02	1.18	54
Mahal. Distance	.00	27.54	.98	4.48	54
Cook's Distance	.00	.94	.04	.16	54
Centered Leverage Value	-11.94	2.40	.76	2.42	54

Normal Distribution

Figure 3 is the histogram attributable to the dependent variable EVA. The Histogram is largely normal, which suggests a normal distribution.

Figure 3

Histogram of EVA

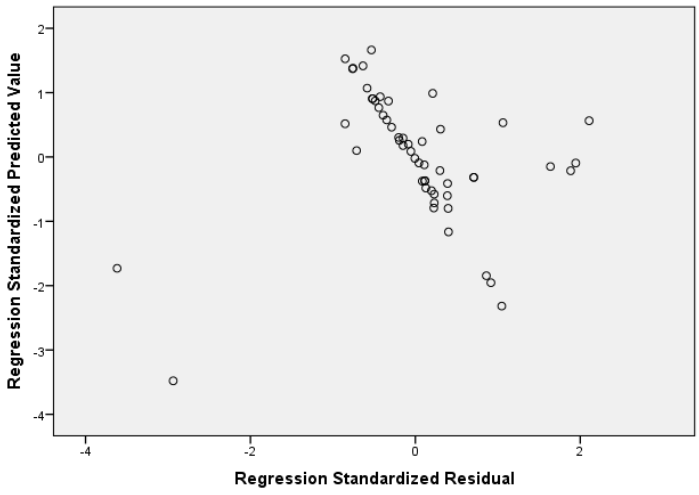


Homoscedasticity

As shown in Figure 4, the scatter plot is not funnel nor cone shaped, describing homoscedasticity's non-existence.

Figure 4

Scatter Plot of EVA

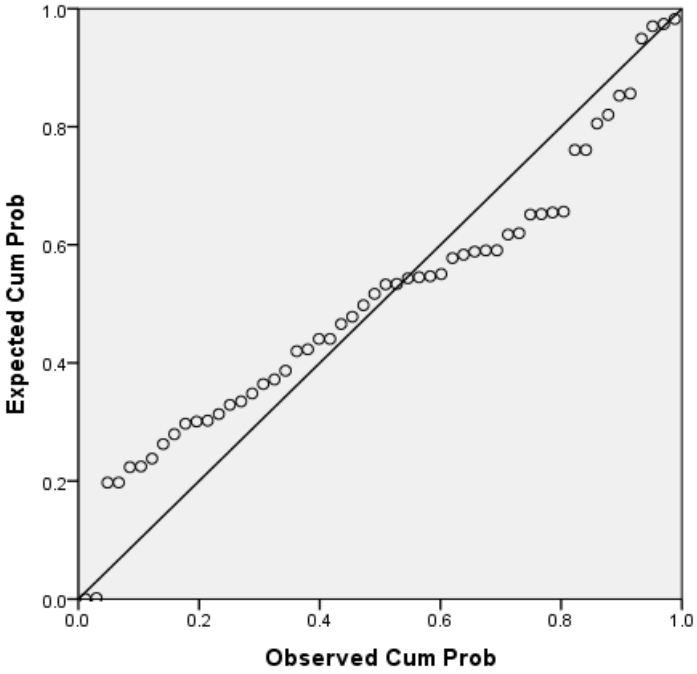


Linearity

The probability plot derivable from the scatter plot by fitting the best straight line is mainly linear, meaning that the linearity function is met (Figure 5).

Figure 5

Normal P-P Plot of Regression Standardized Residual (EVA)



Multicollinearity

Similarly, the VIF values of the predictor variables were less than the conventional figure of 10.0, which showed the absence of multicollinearity in the data (Table 8).

Table 8

Multiple Regression Analysis of EVA as Dependent Variable and sets of Independent Variables

Parameters	Unstandardized Coefficients		Standardized Coefficients Beta	*t*-Statistic	*P*-value	Collinearity Statistics	
	B	Std. Error				Tolerance	VIF
Constant	3.573	5.416		0.660	0.513		
CCC	0.003	0.002	0.184	1.348	0.184	.256	3.212
APP	0.006	0.031	0.045	0.179	0.859	.257	3.885
ARP	-0.555	0.232	-0.558	2.392	0.021	.300	3.337
ICP	0.303	0.197	0.392	1.535	0.131	.250	3.998
WCIS	17.082	8.893	0.330	1.921	0.061	.551	1.815
WCFS	-19.881	12.607	-0.264	1.577	0.121	.581	1.721

The multiple regression analysis was carried out to assess whether CCC, APP, ARP, ICP, WCIS, WCFS, and EVA were related to Nigerian listed manufacturing firms. The multiple regression equation is stated below:

$$EVA = 3.573 + .003*CCC + .006*APP - 0.555*ARP + .303*ICP + 17.082*WCIS - 19.881*WCFS + \varepsilon_1 \quad (22)$$

Table 8 shows the standardized and unstandardized coefficients of the multiple regression. The unstandardized coefficient, B, is 3.573 which is the regression line intercept on the y-axis with a *p*-value of 0.513. This value is not significant which could mean that the null hypothesis is supported. The ANOVA analysis revealed the overall significance of the multiple regression to be 0.033. However, the *p*-value of 0.033 is below the conventional alpha value of 0.05 (Table 9). The correlation resulting from the multiple regression analysis suggested that the predictor variables were highly correlated

(F (5, 48) = 2.672, $p < .05$). Hence, I rejected the null hypothesis, which means a statistically significant relationship between EVA, CCC, APP, ARP, ICP, WCIS, and WCFS. Table 8 shows that only one variable contributed significantly to the EVA regression model: ARP (Beta = -.558, $p < .05$).

Table 9

EVA ANOVA Analysis

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2000.28	5	400.06	2.672	.033[b]
Residual	7187.38	48	149.74		
Total	9187.66	54			

a. Dependent Variable: EVA, b. Predictors: (Constant), WCFS, APP,CCC, WCIS, ARP, ICP

Table 10

Correlation Analysis Between EVA as the Dependent Variable and the Independent Variables

Variables	EVA	ARP	ICP	APP	CCC	WCIS	WCFS
EVA	1						
ARP	-0.237	1					
ICP	-0.018	0.790	1				
APP	-0.180	0.738	0.763	1			
CCC	0.184	-0.608	-0.630	-0.979	1		
WCIS	0.142	0.018	-0.100	-0.274	0.324	1	
WCFS	-0.205	0.105	-0.112	0.081	-0.107	0.479	1

Evaluating the Return on Capital Employed Regression Model – ROCE Model

Following the overarching research question, I sought to examine the level of statistical significance in the relationship between WCM, WCS, and ROCE at publicly

traded Nigerian manufacturing firms. I used ROCE as the dependent variable while CCC, APP, ARP, ICP, WCIS, and WCFS were the study's independent variables. The ROCE model is given below:

$ROCE = ß_0 + ß_1CCC + ß_2\ APP + ß_3ARP + ß_4ICP + ß_5WCIS + ß_6WCFS + Ɛ_2$…….(23)

Where,

ROCE = Return on Capital Employed

$ß_0$ = Regression constant and intercept on the y-axis

$ß_1, ß_2, ß_3, ß_4, ß_5, ß_6$ = specific constants attributed to the independent variables

CCC = Cash conversion cycle

APP = Accounts payable period

ARP = Accounts receivable period

ICP = Inventory conversion period

WCIS = Working capital investment strategy

WCFS = Working capital financing strategy

$Ɛ_1$ = Error term

Using ANOVA statistics and the *f* distribution test, I tested the extent of association between ROCE, CCC, APP, ARP, ICP, WCIS, and WCFS at a significance or alpha level of 5%. The null hypothesis stated no statistically significant relationship between WCM, WCS, and ROCE of publicly-traded Nigerian manufacturing firms. On the other hand, the alternative hypothesis stated a statistically significant relationship between WCM, WCS, and ROCE of publicly-traded Nigerian manufacturing firms.

Test of the Multiple Regression Assumptions in the Return on Capital Employed Model

Independence of Error of Residuals

In the same vein, for the ROCE Model, the Durbin-Watson figure was 1.851. This value is less than the conventional value of 4.0 (Table 11) suggesting the independence of errors of the residuals.

Table 11

Model Summary ROCE

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.653[a]	.427	.367	24.78	1.851

a. Predictors: (Constant), WCFS, APP, CCC, WCIS, ARP, ICP b. Dependent Variable: ROCE

Table 11 gives the correlation coefficient $r(6) = 0.653$, $p = .000$. This suggests a positive and above 50% correlation between ROCE, CCC, APP, ARP, ICP, WCIS, and WCFS. The R square value is 0.427, while the adjusted R square is 0.367. This indicates that the independent variables explain approximately about 42.7% of the total effect on the dependent variable.

Absence of Undue Influence or Outliers

The residual statistics (Table 12) showed a Cook's Distance value ranging between .000 and.466. This is within the allowable threshold of 1.0. This range of values depicts the absence of any undue influence or outliers in the data.

Table 12

ROCE Residual Statistics

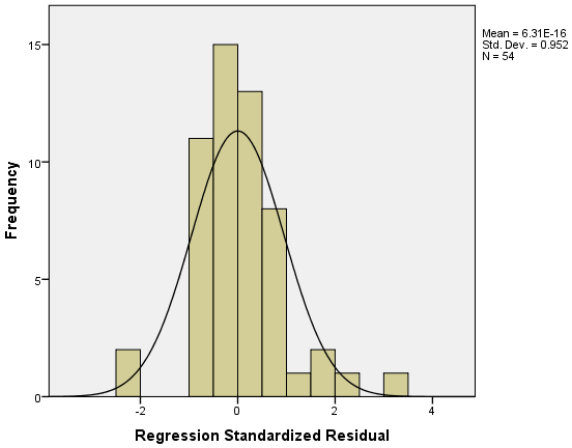
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-42.42	14.33	7.83	9.57	54
Std. Predicted Value	-5.25	.68	.00	1.00	54
Standard Error of Predicted Value	4.07	21.95	4.88	3.08	54
Adjusted Predicted Value	-63.60	15.47	7.53	11.63	54
Residual	-111.59	105.00	.00	29.63	54
Std. Residual	-3.73	3.51	.00	.99	54
Stud. Residual	-3.77	3.54	.00	1.00	54
Deleted Residual	-113.71	107.06	.30	30.64	54
Stud. Deleted Residual	-4.37	4.03	-.00	1.10	54
Mahal. Distance	.00	27.54	.98	4.48	54
Cook's Distance	.00	.47	.02	.068	54
Centered Leverage Value	.00	.52	.02	.085	54

Normal Distribution

Figure 6 is the histogram attributable to the dependent variable ROCE. The Histogram is largely normal which suggests a normal distribution.

Figure 6

Histogram of ROCE

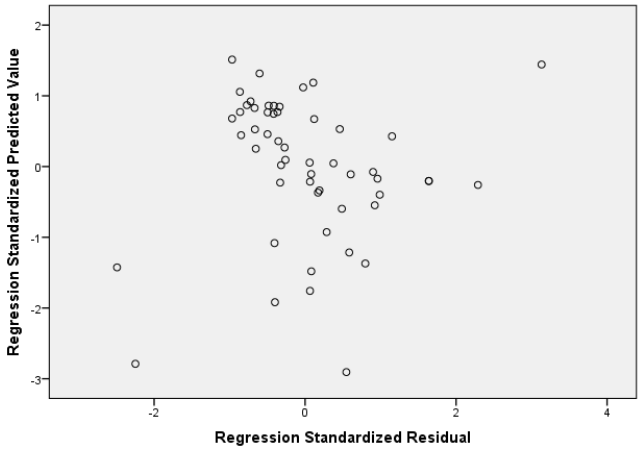


Homoscedasticity

The scatter plot as shown in Figure 7, is not funnel or cone shaped which describes the non-existence of homoscedasticity.

Figure 7

Scatter Plot of ROCE

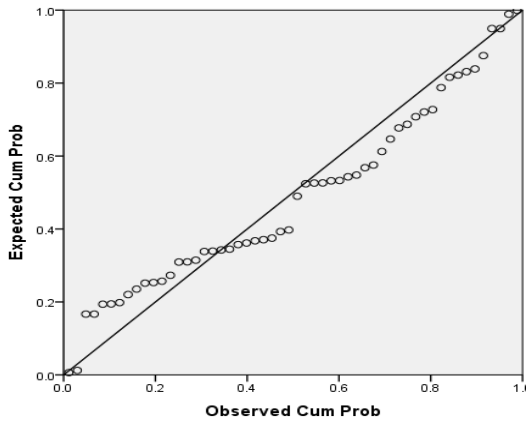


Linearity

While the probability plot is derivable from the scatter plot, fitting the best straight line is largely linear (Figure 8), meaning that the linearity function is met.

Figure 8

Normal P-P Plot of Regression Standardized Residual (ROCE)



Multicollinearity

The VIF figures of independent variables were below the allowable value of 10.0, indicating the absence of multicollinearity (Table 13).

Table 13

Multiple Regression Analysis of ROCE as Dependent Variable and sets of Independent Variables

Parameters	Unstandardized Coefficients		Standardized Coefficients	*t*-Statistic	*P*-value	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	21.272	10.967		1.940	0.058		
CCC	0.011	0.005	0.307	2.330	0.024	.258	3.742
APP	0.011	0.006	0.392	1.818	0.075	.257	3.885
ARP	-0.039	0.047	-0.166	-0.832	0.410	.300	3.337
ICP	-0.086	0.040	-0.472	-2.160	0.036	.250	3.998
WCIS	87.997	18.009	0.719	4.886	0.001	.551	1.815
WCFS	-98.808	25.530	-0.555	-3.870	0.001	.581	1.721

The multiple regression analysis was carried out to evaluate whether CCC, APP, ARP, ICP, WCIS, WCFS, and ROCE were related to Nigerian listed manufacturing firms. The multiple regression equation is stated below:

ROCE = 21.272 + .011*CCC + .011*APP – .039*ARP - 0.086*ICP + 87.997*WCIS – 98.808*WCFS+ ε_2 …….(24)

Table 13 shows the standardized and unstandardized coefficients of the multiple regression. The unstandardized coefficient, B is 21.272 which is where the regression line cuts the y-axis which has a *p*-value of 0.058 which is slightly above 0.05. This value is not significant which could suggest that the null hypothesis is supported. The ANOVA analysis gives the overall significance of the multiple regression with a *p*-value of 0.000.

This value is far below the threshold value of 0.05 (Table 14). The correlation emanating from the multiple regression analysis suggested that the predictor variables were highly correlated (F (5, 48) = 7.143, $p < .001$). Thus, I rejected the null hypothesis, indicating a statistically significant relationship between ROCE, CCC, APP, ARP, ICP, WCIS, and WCFS. Table 13 shows that four variables contributed significantly to the ROCE regression model: CCC (Beta = .307, $p < .05$), ICP (Beta = -.472, $p < .05$), WCIS (Beta = .719, $p < .05$), and WCFS (Beta = .555, $p < .05$).

Table 14

ROCE ANOVA Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	21930.43	5	4386.09	7.143	.000[b]
Residual	29473.49	48	614.03		
Total	51403.92	54			

a. Dependent Variable: ROCE, b. Predictors: (Constant), WCFS, APP,CCC, WCIS, ARP, ICP

Table 15

Correlation Analysis Between ROCE as the Dependent Variable and the Independent Variables

Variables	ROCE	ARP	ICP	APP	CCC	WCIS	WCFS
ROCE	1						
ARP	-0.295	1					
ICP	-0.314	0.790	1				
APP	-0.334	0.738	0.763	1			
CCC	0.307	-0.608	-0.630	-0.979	1		
WCIS	0.390	0.018	-0.100	-0.274	0.324	1	
WCFS	-0.143	0.105	-0.112	0.081	-0.107	0.479	1

Evaluating the Tobin's Q Regression Model – TQ Model

Again, from the overarching research question, I investigated the extent of statistical significance in the relationship between WCM, WCS, and TQ at publicly listed Nigerian manufacturing firms. I deployed TQ as the dependent variable and CCC, APP, ARP, ICP, WCIS, and WCFS were the independent variables of the study. The TQ model is stated below:

$TQ = ß_0 + ß_1CCC + ß_2\ APP + ß_3ARP + ß_4ICP + ß_5WCIS + ß_6WCFS + Ɛ_3$ ……..(25)

Where,

TQ = Tobin's Q

$ß_0$ = Regression constant and intercept on the y-axis

$ß_1, ß_2, ß_3, ß_4, ß_5, ß_6$ = specific constants attributed to the independent variables

CCC = Cash conversion cycle

APP = Accounts payable period

ARP = Accounts receivable period

ICP = Inventory conversion period

WCIS = Working capital investment strategy

WCFS = Working capital financing strategy

$Ɛ_1$ = Error term

Deploying ANOVA statistics and the f distribution test, I tested the level of association between TQ, CCC, APP, ARP, ICP, WCIS, and WCFS at a significance or alpha level of 5%. The null hypothesis stated no statistically significant relationship between WCM, WCS, and TQ of publicly-traded Nigerian manufacturing firms.

Conversely, the alternative hypothesis stated a statistically significant relationship between WCM, WCS, and TQ of publicly-traded Nigerian manufacturing firms.

Test of the Multiple Regression Assumptions in the Tobin's Q Model

Independence of Error of Residuals

In Tobin's Q Model, the Durbin Watson value is 1.921 compared to a conventional threshold figure of 4 (Table 16), indicating independence of errors of the residuals.

Table 16

Model Summary TQ

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.854[a]	.730	.702	13.92	1.921

a. Predictors: (Constant), WCFS, APP, CCC, WCIS, ARP, ICP

b. Dependent Variable: TQ

Table 16 gives the correlation coefficient $r(6) = 0.854$, $p = .000$. This indicates a positive and strong correlation between TQ, CCC, APP, ARP, ICP, WCIS, and WCFS. The R square value is 0.730 compared to the adjusted R square value of 0.702. This indicates that the independent variable explains approximately about 73% of the dependent variable's total effect.

Absence of Undue Influence or Outliers

The residual statistics (Table 17) showed a Cook's Distance value ranging between .000 and .311. This is within the allowable threshold of 1.0. This range of values depicts the absence of any undue influence or outliers in the data.

Table 17

TQ Residual Statistics

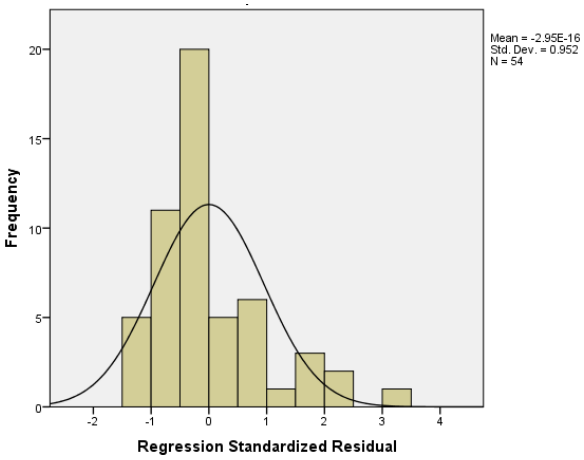
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	37.78	131.73	71.16	21.77	54
Std. Predicted Value	-1.53	2.78	.00	1.00	54
Standard Error of Predicted Value	2.07	12.53	4.15	2.09	54
Adjusted Predicted Value	36.52	144.99	71.63	23.02	54
Residual	-19.90	42.96	.00	13.25	54
Std. Residual	-1.43	3.09	.00	.95	54
Stud. Residual	-1.47	3.14	-.01	1.00	54
Deleted Residual	-22.61	44.49	-.47	14.82	54
Stud. Deleted Residual	-1.49	3.49	.00	1.04	54
Mahal. Distance	.19	41.98	4.91	7.77	54
Cook's Distance	.00	.31	.02	.05	54
Centered Leverage Value	.00	.79	.09	.15	54

Normal Distribution

Figure 9 shows the histogram due to the outcome variable Tobin's Q, which is largely normal, satisfying normality.

Figure 9

Histogram of Tobin's Q

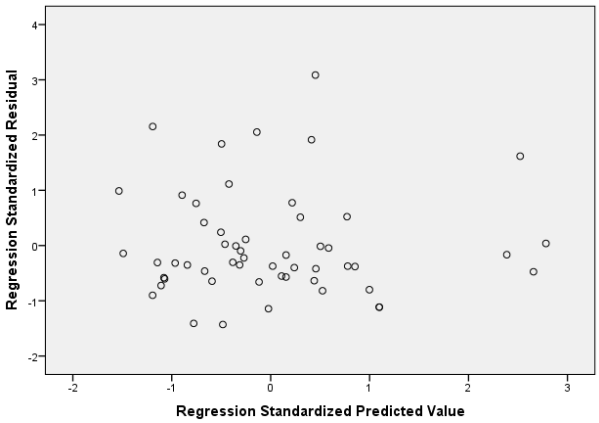


Homoscedasticity

The scatter plot (Figure 10) depicts is a nonfunnel or cone shape which suggests the absence of homoscedasticity.

Figure 10

Scatter Plot of Tobin's Q

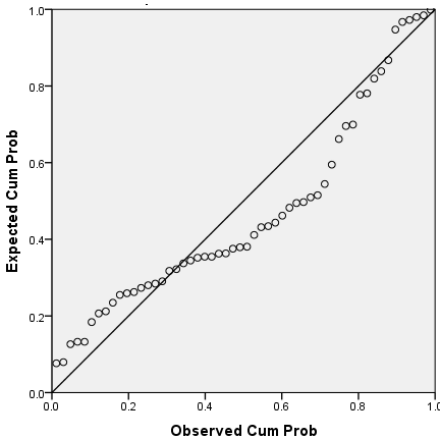


Linearity

The probability plot from the scatter plot by fitting the best straight line is largely linear, indicating that the linearity function is satisfied (Figure 11).

Figure 11

Normal P-P Plot of Regression Standardized Residual



Multicollinearity

The VIF of the independent variables was below the threshold value of 10.0, suggesting the absence of multicollinearity (Table 18).

Table 18

Multiple Regression Analysis of TQ as Dependent Variable and sets of Independent Variables

Parameters	Unstandardized Coefficients		Standardized Coefficients	*t*-Statistic	*P*-value	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	28.856	6.160		4.684	0.001		
CCC	-0.015	0.004	-0.512	-4.296	0.001	.253	3.452
APP	0.003	0.004	0.107	0.725	0.472	.257	3.885
ARP	0.009	0.026	0.044	0.324	0.747	.300	3.337
ICP	0.033	0.022	0.218	1.451	0.153	.250	3.998
WCIS	-46.220	10.115	-0.462	4.569	0.001	.551	1.815
WCFS	126.584	14.340	0.869	8.827	0.001	.581	1.721

The multiple regression analysis was used to assess if CCC, APP, ARP, ICP, WCIS, WCFS, and TQ related to Nigerian listed manufacturing firms. The multiple regression equation is as follows:

$$TQ = 28.856 - .015*CCC + .003*APP - .009*ARP - .003*ICP - 46.220*WCIS + 126.584*WCFS + \varepsilon_3 \quad (26)$$

Table 18 shows the standardized and unstandardized coefficients of the multiple regression. The unstandardized coefficient, B is 28.856, which is the intercept on the y-axis with a p-value of 0.001, which is less than the conventional value of 0.05. This value is statistically significant, and the alternative hypothesis is supported. The ANOVA analysis gives the overall significance of the multiple regression with a *p*-value of 0.000.

This value is far less than the threshold value of 0.05 (Table 19). The correlation emanating from the multiple regression analysis indicated that the predictor variables were highly correlated (F (5, 48) = 25.920, $p < .001$). Hence, I rejected the null hypothesis, which means a statistically significant and strong relationship between TQ, CCC, APP, ARP, ICP, WCIS, and WCFS. Table 18 reveals that three variables contributed significantly to the TQ regression model: CCC (Beta = -.512, $p < .05$), WCIS (Beta = -.462, $p < .05$), and WCFS (Beta = .869, $p < .05$).

Table 19

TQ ANOVA Analysis

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	25107.96	5	5021.59	25.920	.000[b]
Residual	9299.08	48	193.73		
Total	34407.05	54			

a. Dependent Variable: TQ, b. Predictors: (Constant), WCFS, APP,CCC, WCIS, ARP, ICP

Table 20

Correlation Analysis Between TQ as the Dependent Variable and the Independent Variables

Variables	TQ	ARP	ICP	APP	CCC	WCIS	WCFS
TQ	1						
ARP	0.379	1					
ICP	0.284	0.790	1				
APP	0.503	0.738	0.763	1			
CCC	-0.512	-0.608	-0.630	-0.979	1		
WCIS	-0.096	0.018	-1.000	-0.274	0.324	1	
WCFS	0.637	0.105	-0.112	0.081	-0.107	0.479	1

Summary

This study examined one key research question. The research question was if there was a relationship between WCM, WCS, and the performance of publicly traded Nigerian manufacturing firms. The study's findings revealed a statistically significant relationship between WCM, WCS, and the performance of publicly traded Nigerian manufacturing firms at varying levels. The results show that all three models have predictability characteristics, though in varying degrees. The findings showed that the ROCE Model, the TQ Model, and the EVA Model had four, three, and one variable(s) significant in the multiple regression analysis. The EVA model results show that only the ARP variable was significant in contributing to the regression model. Simultaneously, CCC, APP, ICP, WCIS, and WCFS were insignificant contributors to the multiple regression model.

In the ROCE model, CCC, ICP, WCIS, and WCFS variables were significant in predicting the dependent variable, while APP and ARP were insignificant contributors to the multiple regression model. In the same vein, the TQ model's findings indicated that CCC, WCIS, and WCFS were significant contributors to the multiple regression model. However, APP, ARP, and ICP were insignificant. The results show that the theoretical framework- the CCC was able to explain the relationship between WCM, WCS, and performance of listed Nigerian manufacturing firms.

The positive adjusted R square values for TQ, ROCE, and EVA are 0.702, 0.367, and 0.136. Taken collectively, the three models predicted the dependent variable in varying degrees with the TQ Model > the ROCE Model > EVA Model. Seth et al. (2020)

believes that the higher the adjusted R square values, the higher the explanatory power of the regression model

In Chapter 5, I explained the study findings and pried into the level of generalizability, the limitations encountered, and how future researchers can deploy the study findings to close other research gaps in the field of working capital management constructs for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative research study was to examine the relationship between WCM, WCS, and performance for corporate managers and business leaders at publicly traded manufacturing firms in Nigeria. The nature of the study was a nonexperimental correlational design deploying multiple quantitative regressions statistical methods. The quantitative research methodology was able to answer the research question using a correlational design. Over the last two decades, global working capital levels have declined to result in reduced investments, return on capital employed, affecting manufacturing firms' performance, leading to about $205.8 billion locked up in idle funds (PriceWaterHouseCoopers, 2018). Therefore, this research was carried out to better understand the linkages between study variables to unlock the potential of firm managers, leading to financial performance and sustainability. Overall, the findings showed that WCM and WCS significantly predicted the sampled Nigerian publicly traded manufacturing firms' performance.

Interpretation of Findings

The EVA Model

The EVA Model comprises EVA as the dependent variable and CCC, APP, ARP, ICP, WCIS, and WCFS as the independent variables. The literature on the association between working capital management, working capital strategies, and performance has resulted in various inconsistencies. There seems to be a lack of research regarding the relationship between EVA, WCM, and WCS amongst Nigerian manufacturing firms.

Considering that working capital goals are firm-specific, I decided to explore the relationship between WCM, WCS, and the performance of Nigerian publicly traded manufacturing firms. Following the literature review in Chapter 2, I argued that CCC, APP, ARP, ICP, WCIS, WCFS are predictors of performance. However, in Chapter 4, considering the multiple regression, I evaluated whether CCC, APP, ARP, ICP, WCIS, WCFS predicted EVA of the sampled manufacturing firms. The results revealed that only ARP was statistically significant and negative in EVA's relationship (Beta = -.558, $p < .05$). The EVA model was significant ($F(5, 48) = 2.672$, $p < .05$). EVA was found to be statistically insignificant with CCC, APP, ICP, WCIS, and WCFS. Panda et al. (2021) re-echoed ARP's importance on financial performance in manufacturing firms. The predictive model is:

$$EVA = 3.573 + .003*CCC + .006*APP - 0.555*ARP + .303*ICP + 17.082*WCIS - 19.881*WCFS + \varepsilon_1 \quad (27)$$

Accounts Receivable Period (ARP)

ARP's negative slope from the EVA regression Model (see equation 22) suggests that for every one unit rise in ARP, EVA reduces by -0.555. Put differently, EVA increases with a reduction in ARP. Early receipt of owed funds by customers might improve manufacturing firms' cash flow for the purchase of more inventory for quicker turnover and returns. Table 5 shows the values of WCIS and WCFS as 0.49 and 0.46, respectively. These values reveal on average that Nigerian manufacturing firms' managers use aggressive working capital investment strategy (TCA/TA <0.5) and conservative working capital financing strategy (TCL/TA <0.5). This means that

corporate managers and business leaders of manufacturing firms maintain a small current asset for easier conversion to cash while maintaining a corresponding level of current liabilities. The results measured by EVA were consistent with the conclusions of earlier studies that there was a negative and statistically significant relationship between EVA and ARP (Cumbie & Donnellan, 2017; Guermat et al., 2019; Yakubu et al., 2017).

On the contrary, this study was inconsistent with the findings of (Louw et al., 2016; Madhou et al., 2015; Mosazadeh et al., 2015). As the cash conversion cycle is a comprehensive metric of working capital management, corporate managers need not neglect individual relationships of working capital management with performance. This is so as every individual parameter gives a piece of specific information in alignment with the firm's overall corporate strategy (Hassan et al., 2014), as the cash conversion cycle is an additive parameter (Tahir & Anuar, 2016).

The ROCE Model

The ROCE Model comprises ROCE as the dependent variable and CCC, APP, ARP, ICP, WCIS, and WCFS as the independent variables. Because corporate managers and business leaders of firms approach working capital management differently, I decided to examine the relationship between WCM, WCS, and Nigerian publicly traded manufacturing firms' performance. Following the literature review in Chapter 2, I argued that CCC, APP, ARP, ICP, WCIS, WCFS are predictors of performance. However, in Chapter 4, considering the multiple regression, I evaluated whether CCC, APP, ARP, ICP, WCIS, WCFS predicted ROCE of the sampled manufacturing firms. The findings showed that four variables contributed significantly to the ROCE regression model: CCC

(Beta = .307, $p < .05$), ICP (Beta = -.472, $p < .05$), WCIS (Beta = .719, $p < .05$), and WCFS (Beta = .555, $p < .05$). The correlation emanating from the multiple regression analysis suggested that the predictor variables were highly correlated ($F (5, 48) = 7.143$, $p < .001$). The ROCE predictive model is:

$$ROCE = 21.272 + .011*CCC + .011*APP – .039*ARP - 0.086*ICP + 87.997*WCIS – 98.808*WCFS + \varepsilon_2 \quad (28)$$

Cash Conversion Cycle (CCC)

CCC's positive slope for (+.011) as a predictor of ROCE indicates that for every one unit rise of CCC, ROCE has a corresponding increase by 0.011. This suggests that CCC is in a direct relationship with ROCE – that is, as CCC increases, ROCE also increases accordingly. For the positive slope of CCC, this indicates that the sum of ARP and ICP is greater than APP, suggesting the conversion of inventory to sales and the receipt of payment is greater than the value of APP. In other words, this means that the firm's managers might be profitable and, as such, can pay their suppliers or creditors early rather than delay payments. Such a stance is capable of engendering cordial relationships between the managers, customers, and suppliers. After all, the firm managers are both trade creditors and debtors. Pirttilä et al. (2020) found that profitable firms defray their debt early. However, the findings of this research are in contravention of the findings of some past studies (Afrifa, & Padachi, 2016; Högerle et al., 2020; Pakdel & Ashrafi, 2019; Singh et al., 2017). While both positive and negative CCC impart manufacturing firms' performance, positive CCC suggests large firms compared to negative CCC that indicates smaller firms (Abdulazeez et al., 2018). Large firms deploy

conservative working capital investment strategies where adequate inventory is available to avoid disruption. On the other hand, small firms require an aggressive working capital investment strategy for quicker conversion of inventory to sales and the receipt of payment to reduce external financing potential through the issue of trade credit by creditors (Le, 2019).

Inventory Conversion Period (ICP)

The positive slope of ICP for (+.086) as a predictor of ROCE indicates that for every one unit increase of ICP, ROCE has a corresponding increase by .086. This means that ICP is in direct association with ROCE – that is, as ICP increases, ROCE also increases identically. For small-oriented firms that predominantly operate an aggressive WCIS to reduce external funding (Le, 2019), elevated ICP values might suggest that the firm managers are not optimally efficient. As a result, it may take more days to convert inventory to sales and the receipt of payment in their operations, negatively affecting performance. On the other hand, for larger firms that deploy conservative WCIS, increased values of ICP may indicate the firm's managers maintain a large volume of inventory and have a large customer base to satisfy. They take more time for the production of goods to their ready customers and the receipt of payment so long as downtimes are properly managed. The findings are consistent with the authors' results **(**Alsulayhim, 2019; Högerle et al., 2020; Qurashi, 2017). The findings are however, inconsistent with that of (Lamptey et al., 2017; Mazumder, 2015; Wöhrmann et al., 2012).

Working Capital Investment Strategy (WCIS)

The positive slope of WCIS for (87.997) as a predictor of ROCE suggests that for every one unit rise of WCIS, ROCE increases by an equal value of 87.997. This means that an increase in working capital investment - current assets has a corresponding increase in ROCE. It can also be said that an increase in ROCE brings about a corresponding increase in WCIS. That is to say that ROCE and WCIS are in direct relationship. The findings suggest that a conservative WCIS favors larger volume of current assets rather than a minimal investment of current assets. This study's results are consistent with the findings of prior studies (Avinash & Prasad, 2018; Charitou et al., 2016; Sarkar, & Sarkar, 2013). This research work is also inconsistent to the findings of (Avinash & Prasad, 2018; Pandey & Jaiswal, 2011; Sarkar, & Sarkar, 2013).

Working Capital Financing Strategy (WCFS)

The negative slope of WCFS for (-.98.808) as a predictor of ROCE suggests that for every one unit rise of WCFS, ROCE reduces by an equal value of -98.808. Explained differently that an increase in ROCE will attract a reduction in WCFS. Reduced current liabilities as a function of total assets suggest that the firm managers operate a relatively conservative WCFS (Panda & Nanda, 2018). According to the authors, a conservative WCFS promotes a large volume of current assets for conversion to products and the receipt of payment at the same time. So, corporate managers and business leaders of manufacturing firms may improve performance by explicitly identifying the set of strategies that best promote the quicker conversion of inventory to sales and the receipt of

payments while defraying monies owed suppliers. The results of Afrifa and Padachi, (2016), and Charitou et al. (2016) are consistent with this study's findings.

The TQ Model

The TQ Model comprises TQ as the dependent variable and CCC, APP, ARP, ICP, WCIS, and WCFS as the independent variables. Because corporate managers and business leaders of firms approach working capital management differently, I decided to examine the relationship between WCM, WCS, and Nigerian publicly traded manufacturing firms' performance. Following the literature review in Chapter 2, I argued that CCC, APP, ARP, ICP, WCIS, WCFS are predictors of performance. However, in Chapter 4, considering the multiple regression, I evaluated whether CCC, APP, ARP, ICP, WCIS, WCFS predicted TQ of the sampled manufacturing firms. The findings showed that three variables contributed significantly to the TQ regression model: CCC (Beta = -.512, $p < .05$), WCIS (Beta = -.462, $p < .05$), and WCFS (Beta = .869, $p < .05$). The correlation emanating from the multiple regression analysis suggested that the predictor variables were highly correlated ($F (5, 48) = 25.920$, $p < .001$). The TQ predictive model is:

$$TQ = 28.856 - .015*CCC + .003*APP - .009*ARP - .003*ICP - 46.220*WCIS + 126.584*WCFS + \varepsilon_3 \quad (29)$$

Cash Conversion Cycle (CCC)

CCC's negative slope for (-.015) as a predictor of TQ suggests that for every one unit rise of CCC, TQ reduces by an equal value of 0.015. Explained differently, this means that a shorter CCC favors increased financial performance as compared to a longer

CCC that does not favor performance. So, corporate managers and business leaders of manufacturing firms may improve performance by decreasing the CCC. This study is consistent with some prior research findings (Bhatia & Srivastava, 2016; Dalci & Ozyapici, 2018; Pakdel & Ashrafi, 2019; Singh et al., 2017). The onus is on the firms' managers to adopt a combination of working capital strategies that promote the reduction of the WCM components – ICP, ARP, and APP. For instance, for small firms that may be financially constrained, managers can deploy aggressive WCIS by maintaining optimal inventory through the conversion to sales and giving trade credit to customers, and managing relationships with customers to shorten ARP. Such a stance is likely to reduce the CCC to enhance performance. Again, a longer CCC may suggest that the firm managers make delayed payments while being efficient in converting inventory to sales and the receipt of payment from customers. The study findings are inconsistent with some earlier studies (Afrifa et al., 2014; Altaf & Shah, 2017; Perera & Priyashantha, 2018).

Working Capital Investment Strategy (WCIS)

The negative slope of WCIS for (-.46.220) as a predictor of TQ suggests that for every one unit rise of WCIS, TQ reduces by an equal value of 46.220. This means that an increase in working capital investment - current assets has a corresponding reduction in TQ. It can also be said that an increase in TQ brings about a corresponding decrease in WCIS. That is to say that TQ and WCIS are in an inverse relationship. The findings suggest that an aggressive WCIS that favors minimal investment of current assets rather than a conservative strategy encourages a larger volume of current assets. The findings of

this research are consistent with the study of (Erdoğan, 2019; Nazir, & Afza, 2009; Vahid et al., 2012). However, the findings of Akram et al. (2016), Khaksarian (2014), Mohamad (2018), Sefideh and Asgari (2016) are inconsistent with the results of this study.

Working Capital Financing Strategy (WCFS)

The positive slope of WCFS for (+ 126.584) as a predictor of TQ suggests that for every one unit increase of WCFS, TQ has a corresponding increase by 126.584. This result reveals that WCFS is in direct association with TQ – that is, an increase in WCFS brings about an equivalent increase in the value of TQ. A higher value of WCFS rather than a lower value tends to an aggressive WCFS. Panda and Nanda (2018) believe that an aggressive WCFS suggests that the firm's managers retain reduced levels of current assets for better and quicker conversion to products. This might have a consequence on the amount of liquidity. The findings from this study are consistent with that of Khaksarian (2014), Mohamad (2018), Nazir and Afza (2009). These authors' results are inconsistent with this study (Afrifa et al., 2014; Akram et al., 2016; Altaf, 2020; Sefideh & Asgari, 2016).

Limitations of the Study

As might be the case with most research works, this study was not without limitations. Data for this study was limited to Nigeria alone because (1) The Nigerian economic environment in working capital management is not well-developed, and (2) I am a Nigerian citizen. Additionally, I used the NSE for my data, so as such, generalizations can only be made about listed manufacturing companies compared to non-listed firms. Again, the manufacturing firms used in this study are of Nigerian origin,

and as such, generalization could only pertain to Nigeria alone compared to other nations. Another limitation to the study is the unavailability of data for all the time series between 2003 and 2017. Since the whole data was not available, the time-series data from 2003 to 2013 were essentially omitted.

Calculation of EVA remains a concern generally (Shil, 2009) but in particular in developing countries. In the calculation of the weighted average cost of capital (WACC) for the evaluation of one of the dependent variables (EVA), the market value of debt was assumed to be equal to the book value of debt for the following reason: The Nigerian economic environment is not very organized in terms of EVA calculation. Hence unavailability of complete parameters for EVA calculation is non-existent. McLaren (2005) believes that though the market and book values are distinct, in the calculation of EVA, the two variables can be interchanged. It is the researcher's view that if the interest rates are largely stable, then the book and market values might be very close. The CBN Monetary Policy Rate (MPR) for the period under investigation was fairly stable; as such, inflation may have been fairly stable as well. Hence, it could be assumed that debt's market value is suggested to be largely equal to the book value of debt. The CBN MPR for 2014, 2015, 2016. 2017 and 2018 are 13.0%, 11.0%, 12.0%, 14.0%, and 14.0% respectively (www.cbn.gov.ng).

Recommendations

According to Laerd Statistics (2020), future research recommendations are most often than not fall-outs from the limitations of the study. As demonstrated in Chapter 2, working capital management studies have well-defined related to most industry sectors.

Most researchers centered on specific industry areas instead of a more holistic approach. This research strived to narrow this gap by considering cross-sectional and time-series data in Nigeria's manufacturing business. This study was concerned with the association of variables rather than causation amongst the variables. This might provide a template for future researchers to deploy an experimental or quasi-experimental methodological approach controlling for extraneous variables. Although manufacturing firms deal with a lot of working capital assets compared to non-manufacturing firms, as is the case of this research, working capital management and working capital strategies are abound in other industries. Future research may delve into other industry sectors (financial and service) and make a comparison with the manufacturing sector to enrich the literature on working capital practices.

Optimal working capital management processes involve the interaction between corporate managers and business leaders of the firm with suppliers and customers. Future researchers could explore and exploit the concept of trade credit as a means of funding relating to working capital management and supply chain goals because the firm’s management is both trade creditors and trade debtors (Shi et al., 2020). This research centered on publicly listed manufacturing firms that follow stern corporate governance, regulatory control, and standard financial reporting in dealing with shareholders. Unlike listed companies, the management of privately-owned companies has a supple disposition regarding working capital management concerns. Hence, future researchers could exploit this avenue to recreate other research on privately held firms.

This study used performance measures that transcended accounting, market, and economic dimensions to cater to stakeholders' different interests. Opportunities are open for future researchers to conduct qualitative research on EVA for more detailed learning considering all the EVA evaluation parameters. This is critical because these parameters crisscross the income statement, balance sheet, capital structure information, return on individual firms compared to the market, and risk involved in raising funds for investment. Additionally, from a posture of this study, future researchers could undertake a mixed-method approach in integrating the experiences of knowledgeable employees from appropriate sections of the firms. In combination with empirical information, this might empower corporate managers and business leaders to operate optimally for the benefit of all stakeholders. Future research may also be carried to ascertain the possibility of some performance measures capturing more of the effect of working capital strategies due to the specific industry types.

Implications

Walden University’s mantra is premised on delivering positive social change to all stakeholders of the institution. The design of this study was sacrosanct in that it delivers on this foundation. Understanding the association between WCM, WCS and performance might make corporate managers and business leaders properly manage and allocate scarce resources. As corporate managers and business leaders of manufacturing firms implement this study's findings, they might improve the technical know-how of the employees with its attendant effect on customers and suppliers. This singular stance might have a multiplier effect on the financial status and, hence, enhance the business

concern's sustainability (Alarussi & Alhaderi, 2018). From a competitive standpoint, firm managers might generate and integrate corporate social responsibility budget in the firm's overall strategy for the provision of people centric projects to better the social, environmental and financial well-being of the people and society at large. As a competitive strategy, firm managers might prepare dedicated corporate social responsibility budgets to provide people-oriented projects in operational communities (Rodriguez-Fernandez, 2016). Again, profitable firms pay taxes to policymakers that are potentially used to provide infrastructures such as roads, schools, and hospitals, amongst others, for the populace's good living conditions to maintain peace and order.

Conclusions

The conclusion of this research work would not have been a reality without re-taking a cursory look at the operations of the manufacturing process, research questions, hypotheses, theoretical foundation, and the interconnectedness therein. The well-being of the citizens of a nation depends largely on her manufacturing capability and predicated on the capacity of process management and the attendant resource allocation to the transformation of raw materials to products and services (Rana et al., 2018). Working capital management construct provides the strategic template to the firm’s investment, financing, capital allocation affecting liquidity, and performance (Olarewaju et al., 2017). However, the working capital management environment has been involved with several challenges, leading to business failures (Eya, 2016; Tran et al., 2017).

This study's overarching research question was whether there was a relationship between WCM, WCS, and performance at publicly traded manufacturing firms in Nigeria

through the formulation of three models. The CCC was the theoretical lens used for the study (Richards & Laughlin, 1980). The CCC is an additive measure in days of the working capital management construct (Richards & Laughlin, 1980). The CCC rationale was that it presented a holistic approach of evaluating a firm's optimal working capital levels in alignment with inventory, receivables, and payables and the linkages amongst customers and suppliers in the manufacturing process (Mbawuni et al., 2016). Going further, the cash conversion cycle's central theme is that a shorter CCC rather than a longer CCC creates operational efficiency with a potential for better performance (Richards & Laughlin, 1980). Findings from this study have revealed that CCC's negative and positive values are obtainable using different performance measures giving differing meanings deploying firm-specific working capital strategies. This informs corporate managers and business leaders of using multiple performance metrics to be operationally efficient, strive for optimal working capital, remain competitive, and benchmark competitors in the same industry.

This study, therefore, provided a context for a deeper understanding of the interrelationship between WCM, WCS, and performance of Nigerian manufacturing firms that have been widely under-researched. The study's findings showed that all three models were statistically significant and showed consistency with prior studies, hence answering the research question that WCM, WCS, and performance are related to publicly traded manufacturing firms in Nigeria. Again, this study's findings provide an opportunity for corporate managers and business leaders to identify specific strategies of

the firm, create operational effectiveness, and properly manage customers and suppliers for the benefit of all stakeholders.

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Appendix A: Source Data

PARAMETERS/COMPANY CODE 001	2013	2014	2015	2016	2017	2018	MEAN
Accounts Receivable	13,631	76599	8538	21970	125915	21545	50913.4
Cost of Good Sold	1730637	1589556	2167690	2647441	2228404	586518	1843922
Accounts Payable	112,294	180116	124581	181120	178177	257669	184332.6
Sales	2,010,107	1897249	2501414	2990048	2568508	691771	2129798
Inventory	369,162	368773	475063	511857	510604	589735	491206.4
Total Current Assts	388,503	452118	511244	551057	655403	637739	561512.2
Total Assets	1,685,095	1753149	1840324	2258128	2239592	2499571	2118153
Total Current Liabilities	447,248	432431	442874	448112	491167	453744	453665.6
Net Profit before Tax	131,548	118922	120439	124014	127563	37009	105589.4
Total Debt	727,788	642259	662978	662353	708419	690053	673212.4
Total Equity	957,307	1110890	1177346	1595774	1531173	1809518	1444940
Market Value of Equity	109978	109978	109978	109978	109978	109978	109978
Book Value of Debt	727,788	642259	662978	662353	708419	690053	673212.4
Book Value of Assets	1,685,095	1753149	1840324	2258128	2239592	2499571	2118153
Net Operating Profit after Tax	135,460	170079	82954	83398	88052	31009	91098.4
Invested Capital	1237847	1320718	1397450	1810015	1748425	2045827	1664487
Cost of Equity	0	0.12140202	0.1151931	-0.00640484	0.175741802	0.1102325	0.103233
Cost of Debt	0.066893106	0.07203792	0.0585871	0.051733743	0.065314454	0.0616561	0.061866
Firm's Market Value of Equity	150000	150000	150000	150000	150000	150000	150000
Firm's Market Value of Debt	727,788	642259	662978	662353	708419	690053	673212.4
Total Value of Equity and Debt	1753149	1753149	1840324	2258128	2239592	2499571	2118153
% financing that is Equity	17.08840859	18.9332024	18.450683	18.46487918	17.47398415	17.856016	18.23575
% financing that is Debt	82.91159141	81.0667976	81.549316	81.53512082	82.52601585	82.143983	81.76425
Market value of equity and debt	877788	792259	812978	812353	858419	840053	823212.4
Corporate Tax Rate	-0.02973819	-0.4301727	0.3112363	0.32751141	0.309737149	0.1621227	0.136087
Income Tax Expense	3912	51157	37485	39511	40616	41142	41982.2
WACC		0.10650571	0.0541612	0.02718371	0.06791524	0.0621189	0.063577
Finance Costs	48684	46267	38842	34266	46270	42546	41638.2
Stock Price	10.48	10.47	10.3	9.79	9.697	8.82	9.8154
Beta		-0.0290683	0.0796220	0.414270069	-0.06828887	-0.4605015	-0.01279
Risk free rate		0.1189	0.1428	0.0736	0.1734	0.1374	0.12922
Stock Return		-0.0009542	-0.0162368	-0.04951456	-0.00949948	-0.0904403	-0.03333
Market Return		0.03282606	-0.2039242	-0.11952242	0.13910742	0.1963952	0.008976
All Share Index	38026.19	39274.44	31265.43	27528.51	31357.93	37516.48	33388.56
Total Return		0.12140202	0.1151931	-0.00640484	0.175741802	0.1102325	0.103233

VARIABLES	VALUE
ARP	8.725424
ICP	97.23316
APP	36.48821
CCC	69.47037
WCIS	0.265095
WCFS	0.21418
EVA	-14724.6
ROCE	0.063437
TQ	0.369752

Appendix B: Study Variables

CODE	ARP	ICP	APP	CCC	WCIS	WCFS	EVA	ROCE	TQ
001	8.725424	97.23316	36.48821	69.47037	0.265095	0.21418	-14724.6	0.063437	0.369752
002	68.59646	54.63882	277.914	-154.679	0.396769	0.28874	137404.2	0.111187	0.457223
003	326.4825	312.8716	5351.945	-4712.59	0.016621	0.586991	-661431	-0.24237	1.223785
004	113.6537	124.1233	1894.805	-1657.03	0.180153	0.755989	-5.4E+07	-0.41098	1.485744
005	160.9155	113.8807	319.3449	-44.5486	0.897174	0.591237	13905.22	0.0791	0.967125
006	828.9969	1223.587	5967.426	-3914.84	0.437331	0.413685	-1065.76	-0.37744	1.208162
007	99.36071	123.2223	120.1304	102.4526	0.352892	0.158524	-39296.1	0.021657	0.515348
008	135.097	182.3904	351.4511	-33.9638	0.139745	0.393047	-824985	-0.20249	1.067927
009	7.01546	175.5459	41.70953	140.8518	0.821584	0.625128	-288089	-0.04166	0.866857
010	7.465366	232.2874	96.31764	143.4351	0.209014	0.143095	4454519	0.285808	0.326479
011	67.07852	218.3302	394.7755	-109.367	0.179647	0.146865	9407779	0.205665	0.394352
012	99.79028	64.75029	60.54327	103.9973	0.602428	0.630294	-655465	-0.04976	0.83294
013	118.9229	64.96841	317.9635	-134.072	0.437595	0.540622	719961	0.242315	1.23964
014	339.9798	356.1911	292.8137	403.3572	0.569826	0.593491	-1478881	-0.26311	0.817677
015	102.5278	96.63347	249.7634	-50.6022	0.292303	0.423061	-72424.3	0.077505	0.658684
016	112.1956	173.2495	338.9292	-53.4841	0.730009	0.439895	1287351	0.08673	0.492734
017	125.9973	220.4827	518.793	-172.313	0.274915	0.491592	-141441	-0.82884	0.952215
018	161.8465	329.0839	127.9293	363.0011	0.76761	0.43098	-130994	-0.03221	0.859691
019	22.74188	143.6845	62.95359	103.4728	0.301407	0.32134	41103.93	0.050999	0.407305
020	57.68675	66.25647	173.04	-49.0968	0.474348	0.403508	726186.3	0.048015	0.614303
021	68.71996	62.77089	202.9119	-71.421	0.202289	0.253557	709354.5	0.003278	0.653678
022	208.4189	101.074	173.1629	136.3299	0.770105	0.426948	19890518	0.346277	0.479216
023	77.79047	74.21999	49.11352	102.8969	0.567101	0.495767	-7358108	0.065669	0.594346
024	67.04673	81.94104	179.6041	-30.6163	0.338792	0.382169	553617.1	0.076692	0.621504
025	21.68916	66.69698	39.99192	48.39421	0.231574	0.355891	623680.8	0.045778	0.67209
026	91.05996	123.7247	466.8464	-252.062	0.200788	0.506662	-1377706	-0.00285	0.844105
027	27.87211	27.00606	61.27748	-6.39931	0.357868	0.249802	17035098	0.133906	0.751954
028	53.41014	57.45137	150.3269	-39.4653	0.481313	0.564205	22495702	0.592882	0.718833
029	24.9506	67.92084	218.2657	-125.394	0.194273	0.377753	23979567	0.195565	0.547547
030	362.2862	152.9366	171.2019	344.0209	0.778034	0.641195	-35895.8	0.056847	0.711748
031	77.78406	131.4261	187.9357	21.27447	0.637659	0.409475	2097106	0.080899	0.502039
032	96.009	74.41925	211.2632	-40.8349	0.646505	0.474525	3241067	0.144395	0.585952
033	121.2523	73.92228	298.9889	-103.814	0.636634	0.536916	3104640	0.450469	0.664052
034	86.44876	124.2822	92.06225	118.6687	0.653174	0.57411	-41221.4	0.104618	0.707899
035	26.53302	92.64927	43.94991	75.23238	0.642038	0.481599	-64205.9	-0.02313	0.633973
036	34.20516	115.9483	125.8759	24.27761	0.440945	0.27494	165379.3	0.126577	0.395608
037	256.0436	101.4544	157.1817	200.3163	0.643202	0.266277	3011524	0.196314	0.367455
038	14.01279	85.25657	102.8034	-3.53407	0.8601	0.536801	1677761	1.148098	0.635511

039	50.69728	124.5402	36.97947	138.258	0.614999	0.450018	160788.2	0.299927	0.774842
040	8.308284	103.1858	228.5151	-117.021	0.122815	0.213523	30009797	0.281172	0.345985
041	78.57703	55.62203	153.822	-19.623	0.787346	0.544969	79556.79	0.299536	0.594478
042	34.77501	99.80158	197.3806	-62.804	0.127471	0.151953	-6490910	0.032952	0.419658
043	70.0406	185.9947	157.9643	98.07105	0.718212	0.424858	-24470.6	0.063778	0.622939
044	40.01913	54.58437	353.1688	-258.565	0.193289	0.859454	-44339.1	-1.04602	1.322576
045	41.80349	84.65015	306.4813	-180.028	0.158871	0.413102	-73583.2	-0.03948	0.84822
046	95.94952	25.05254	100.0793	20.92274	0.71295	0.713436	1818865	0.18056	0.829094
047	99.11882	24.23671	141.254	-17.8985	0.916901	0.73176	1332561	0.150317	0.752552
048	49.78244	12.15713	40.81435	21.12522	0.794431	0.643647	928684.9	0.166711	0.721375
049	30.3216	32.78475	45.61614	17.49021	0.392866	0.312301	7143208	0.244639	0.643719
050	105.3742	21.7025	88.40973	38.66696	0.70224	0.602793	-513863	0.020573	0.665974
051	354.6396	34.37343	677.2809	-288.268	0.153078	0.430202	-5.7E+07	-0.02393	0.819195
052	52.92028	40.19791	102.2711	-9.15294	0.710367	0.766424	7482058	0.44286	0.795453
053	46.41721	0.481747	13.05204	33.84692	0.896153	0.605601	40666.4	0.146232	0.63203
054	52.92028	40.19791	102.2711	-9.15294	0.710367	0.766424	7482058	0.44286	0.795453

LEGEND:

ARP	Accounts Receivable Period
ICP	Inventory Conversion Period
APP	Accounts Payable Period
CCC	Cash Conversion Cycle
WCIS	Working Capital Investment Strategy
WCFS	Working Capital Financing Strategy
EVA	Economic Value Added
ROCE	Return on Capital Employed
TQ	Tobin's q

Appendix C: Protecting Human Research Participants Certificate

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Ayebainasuoton Alagoa** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 10/03/2016.

Certification Number: 2197727.