

**WORKING CAPITAL MANAGEMENT AND PROFITABILITY OF FIRMS  
LISTED UNDER THE CONSTRUCTION AND ALLIED SECTOR AT THE  
NAIROBI SECURITIES EXCHANGE, KENYA**

**BY**

**LUNG' AHO CHRISTINE ANDISI**

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**DECLARATION**

This project is my original work and has not been presented for the award of Masters degree in Business Administration (Finance) in any other university.

Signature \_\_\_\_\_ Date \_\_\_\_\_

LUNG' AHO CHRISTINE ANDISI

Reg No: D53/OL/CTY/26682/2015

I confirm that the work in this project has been done by the candidate under my supervision.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Dr. Job Omagwa,

Department of Accounting & Finance,

School of Business,

Kenyatta University.

## **DEDICATION**

This project is dedicated to my family. You are a testament that we can achieve all things we set our minds to.

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## ABBREVIATIONS AND ACRONYMS

<b>APP</b>	-	Average Payment Period
<b>ACP</b>	-	Average Collection Period
<b>CBK</b>	-	Central Bank of Kenya
<b>CCC</b>	-	Cash Conversion Cycle
<b>CMA</b>	-	Capital Market Authority
<b>EBIT</b>	-	Earnings before interest and Taxes
<b>FE</b>	-	Fixed Effects
<b>FMCG</b>	-	Fast Moving Consumer Goods
<b>IHP</b>	-	Inventory Holding Period
<b>GDP</b>	-	Gross Domestic Product
<b>GOK</b>	-	Government of Kenya
<b>KNBS</b>	-	Kenya National bureau of Statistics
<b>NCA</b>	-	National Construction Authority
<b>NI</b>	-	Net Income
<b>NOI</b>	-	Net Operating income
<b>NSE</b>	-	Nairobi Securities Exchange
<b>RE</b>	-	Random effects
<b>ROA</b>	-	Return on Assets
<b>ROE</b>	-	Return on Equity
<b>ROI</b>	-	Return on Investment
<b>SME</b>	-	Small and Medium Enterprises
<b>OLS</b>	-	Ordinary least square
<b>VIF</b>	-	Variance inflation factor
<b>WCM</b>	-	Working capital management

## OPERATIONAL DEFINITION OF TERMS

<b>Working Capital</b>	These are the various components of a company's short-term assets and liabilities. Short term assets comprise stock/inventory, cash and debtors while short term liabilities comprise trade payables.
<b>Working Capital Management</b>	This entails the prudent management of an entity's working capital components to ensure firm profitability whilst maintaining proper levels of liquidity.
<b>Profitability</b>	Profitability is the ability of a company to generate income in excess of its expenses from the use of its assets.
<b>Cash Conversion Cycle</b>	This is the period that elapses from the time firm makes a cash disbursement towards the purchase of inputs to produce inventory to the point when it collects cash from the sale of goods.
<b>Inventory holding period</b>	This is the average number of days of inventory kept by an entity before it is sold.
<b>Average collection Period</b>	This is the time in days it takes an entity to collect payments from its debtors once a sale is concluded.
<b>Average payment Period</b>	This is the time in days a firm takes to pay suppliers / creditors once a purchase of goods or services is concluded.

## ABSTRACT

The construction and allied sector remains key to Kenya's vision of becoming an industrialised nation by year 2030 as per Kenya Vision 2030. The industry has however faced challenges in terms of erratic profits, reduced access to credit and competition from imports that have affected its growth. The study sought to assess the effect of working capital management (cash management, inventory management, debtors management and creditors management) on profitability of listed construction and allied firms listed at the Nairobi Securities Exchange (NSE), Kenya. The study was anchored on the cash conversion cycle theory, transaction cost theory and agency theory. Descriptive longitudinal design was adopted. The target population comprised all the construction and allied companies listed at the NSE, Kenya. Data was obtained from the annual financial statements of the firms for the years 2010 to 2016. Diagnostic tests were conducted and were all in the affirmative. Data was analysed using Descriptive analysis, Pearson's Correlation analysis and panel regression analysis (fixed effects model). Results were presented in tables. Correlation analysis documents a negative and weak correlation between average collection period and inventory holding period with profitability. The average payment period and the cash conversion cycle were positively correlated with profitability, but this relationship was found to be weak. The study found an inverse and insignificant relation between average collection period and inventory holding period with profitability. The average payment period and the cash conversion cycle were positively related with profitability but this relationship was found to be insignificant. These findings indicate that the firms should increase their payments period and cash conversion cycles and reduce debtor days and inventory days to increase profitability. The study found that the average payments period had the greatest predictive strength in the working capital equation while cash conversion cycle had the weakest predictive strength. Working capital however explains a small portion of profitability as measured by net income. The study concludes that there is an overall inefficiency in the management of working capital by managers of firms operating in the construction and allied sector in Kenya.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Economic profits are usually seen as a measure of success for a company (Keramidou, Mimis, Fotinopoulou, & Tassis, 2013). From this point of view, the success of construction and allied firms can be said to have been erratic for the last seven years. The combined profit after tax of the listed construction and allied companies, based on their annual financial statements, was KShs 6.3 billion in 2010 which rose to KShs7.9 billion in 2011 and dropped to KShs 6.3 billion in 2012. The profit after tax for the years 2013 to 2016 was as follows: KShs7.4 billion, KShs 5.3 billion, KShs 8.8 billion and KShs 8.0 billion respectively. Given the importance of the construction and allied sector towards the achievement of Vision 2030 (GOK, 2007) managers and policy makers are required to focus on how these industries can remain competitive and efficient so as to achieve positive results over time (Keramidou, Mimis, Fotinopoulou, & Tassis, 2013) .The Construction and Allied sector in Kenya has been impacted by competition from imports, high cost of production and a rising cost of credit (KNBS, 2017). When challenges of: global competition, profit contraction and a rising need for cash for the purpose of expansion affect companies, shifting attention to working capital as a source of financing provides management with a competitive advantage (Aminu & Zainudin, 2015). Working capital is one of the components of the determinants of profitability. Further, there is a very close relationship between the two elements as this relationship plays a key role in increasing shareholder value (Singh & Kaur, 2017).

Working capital management is a key management responsibility. Irrespective of a company's size, nature of business or profit orientation, working capital management is necessary to aid in the smooth running of day to day functions (Raheman, Afza, Qayyum, & Bodla, 2010). Efficient working capital management will ensure that a company has sufficient resources to settle its arising obligations whilst investing in current assets that

will generate revenue and hence profitability (Shin and Soenen, 1998). Sadiq (2016) argues that a company will not be able to survive, despite achieving profitability if it is unable to settle its short-term obligations. Deloof (2003) puts forth the profitability- liquidity dilemma as below: by increasing the investment in inventory and lengthening the credit period, a company will increase its sales but run the risk of debtors' default and tying up its money in working capital. However, reducing the investment in inventory will lead to the risk of loss of business should stock-outs arise. The author further states that delaying the payment period will avail cash to a firm but will result in forfeiting discounts attached to early payment and eventually damaging supplier relationships.

In the Kenyan context, working capital management is crucial to companies operating in all sectors, more so the construction and allied industry as they have a high investment in current assets such as inventory and work in progress which require keen management (Akoto, Awunyo-Vitor, & Angmor, 2013). There are five companies classified under the construction and allied segment at the Nairobi Securities Exchange, Kenya. These firms are involved in the manufacture of cement, paint and electrical cables.

### **1.1.1 Profitability**

Profitability refers to the excess of revenue over expenses at any given point in time for a company (Al-Jafari & Samman, 2015). The continued growth of an organisation depends on its ability to grow its profitability which requires that it is able to generate funds from day to day activities. The listed construction and allied companies in Kenya have had erratic profits between the years 2010 and 2016. Per the table below, the combined profit after tax of the listed construction and allied companies based on their annual financial statements was KShs 6.3 billion in 2010 which rose to KShs7.9 billion in 2011 and dropped to KShs 6.3 billion in 2012. The profit after tax for the years 2013 to 2016 was as follows: KShs7.4 billion, KShs 5.3 billion, KShs 8.8 billion and KShs 8.0 billion respectively. The data also indicates an erratic growth rate in profit over the years with the lowest growth rate of -28% and the highest profit growth of 64%.

**Table 1.1:** Profit after tax of Construction and Allied Firms at the NSE

Years	2,010	2,011	2,012	2,013	2,014	2,015	2,016
	KShs '000'	KShs '000'	KShs '000'	KShs '000'	KShs '000'	KShs '000'	KShs '000'
ARM	1,075,268	1,150,498	1,245,638	1,348,803	1,493,393	- 2,890,841	- 2,800,175
Bamburi	4,678,000	5,815,000	4,882,000	3,673,000	3,903,000	6,064,000	5,890,000
Crown	91,417	129,002	133,543	213,843	19,715	30,748	131,796
EAPC	284,051	561,255	-	972,715	1,775,383	- 386,631	6,320,108
Cables	183,850	314,730	522,060	398,202	341,149	- 741,204	582,602
<b>Profit After Tax</b>	<b>6,314,596</b>	<b>7,972,496</b>	<b>5,812,538</b>	<b>7,411,244</b>	<b>5,372,640</b>	<b>8,784,826</b>	<b>7,951,994</b>
Average Profit After Tax	1,262,517	1,594,097	1,162,105	1,481,846	1,074,125	1,756,562	1,589,996
Profit Growth rate		26%	-27%	28%	-28%	64%	-9%

**Source :** ( Company financial statements, 2018)



According to Fitzsimmons, Steffens and Douglas (2005) profitability is a measure of firm success as it increases a firm's ability to grow. Growth is usually measured by the rate at which a firm uses its assets to generate earnings (Wet & Erasmus, 2011). The higher the ROA, the more effective the use of the assets to the advantage of the shareholders (Al-Matari, Al-Swidi, & Fadzil, 2014). Eriksen and Knudsen (2003) state that ROA is the most consistent measure of profitability. Thachappilly (2009) identified return on investments (ROI) and return on equity (ROE) as additional measures of profitability. Profitability ratios provide measures to evaluate the periodic success of a firm (Alo, Akosile, & Ayoola, 2016). Gazolla and Amelio (2014) proposed an additional measure, net income and hold that this is the traditional measure of the performance of business. With the passage of time and with refinement in financial statement reporting, it has been noted that the measure of a company performance through net income alone may not be sufficient FASB (1987). Gazolla and Amelio (2014) in their research recommend that this measure should be supplemented by the use of the return on equity when assessing firm performance.

Profitable firms contribute to the GDP of a country and to the overall levels of employment (Işık, 2017). It is therefore imperative to determine the elements that influence the profitability of a company. Various researches have conducted studies that try to narrow down the factors that influence profitability. Chowdhury and Amin (2007) and Al-Jafari and Samman (2015) established that working capital is a key determinant of profitability. Bhayani (2010), Burja (2011) and Işık (2017) found that liquidity and the age of the firm influence revenue. Researchers have also narrowed down into these studies and explored the relationship between working capital and firm profitability. Researchers such as Babatunde and Akeju (2016) and Jagongo and Makori (2013) highlight the importance of WCM to profitability of manufacturing firms. Our research study focused on the relationship between working capital and profitability. This is due to the importance of working capital to the survival of firms. A firm's success greatly depends on a manager's ability to manage the elements of working capital as these are the resources that are used to finance its revenue generating activities (Mwangi, Muathe, & Kosimbei, 2014).

### **1.1.2 Working Capital Management**

Working capital management (WCM) relates to the management of a company's short term assets and liabilities so as to achieve the optimum balance between profitability and liquidity (Raheman, Afza, Qayyum, & Bodla, 2010). It entails the management of the elements of inventory, debtors, cash and creditors. WCM is key to a firm as it is a critical component to running the day to day operations. A company must be liquid enough to settle its short-term obligations and to maximise shareholder wealth through profit growth (Ajao & Small, 2012). Management of working capital is important for construction and allied firms as a large proportion of their assets is held in working capital elements such as work in progress and inventory and prudent management of these resources is key to profitability achievement (Akoto, Awunyo-Vitor, & Angmor, 2013).

Efficient working capital management is known to have positive effects such as speedy payment of short-term commitments, increase internal financing and reduction of the instances of company failure due to insolvency. The effects of poor working capital management include; overtrading, reduced liquidity and loss of business due to stock outs (Agyei & Yeboah, 2011). Prudent management of working capital is key to the overall corporate strategy and creation of shareholder wealth (Babatunde & Akeju, 2016) due to its impact on a firm's profit levels, risk and ultimately its value (Garcia-Teruel & Martinez-Solano, 2007).

In Kenya, management of working capital requires important consideration due to the prevailing economic conditions of: competition from imported products and the decrease in the availability of credit which have caused companies to struggle financially (KNBS, 2017). As resources available to such organisations become scarce, management of the firm's working capital will be the most critical way through which firms will attain profitability and an improvement in performance (Muhammad, Jibril, K/Wamba, Ibrahim, & Ahmad, 2015). Efficient management of a firm's internal resources results in increased profitability and a reduction in the default risk which in turn improves firm value.

### **1.1.3 The Construction and Allied Industry in Kenya**

The Kenya Vision 2030 has identified construction as one of the key pillars to enable it to become a prosperous and globally competitive nation by the year 2030 (GOK, 2015). Construction falls under the Social pillar of population, urbanisation and housing and the Economic pillar of infrastructure development. Infrastructure development will entail the construction of safe infrastructure projects to ensure that all parts of Kenya are interconnected through networks of: roads, rail, airports and telecommunication (GOK, 2007). Under social pillar, the vision of the Kenya Government is to ensure adequate and good quality housing for all citizens. This vision was to be actualised through: developing good quality affordable housing that is accessible to all citizens, availing finance to builders and buyers of housing, instituting reforms in the housing sector and urban planning of the major Kenyan cities (Ministry of Finance, 2015).

The construction industry is seen as one of the major stakeholders in the economy of developing countries. However, these industries face challenges such as little access to finance, erratic profits and constrained access to raw materials (Datta, 2017). The listed Construction and Allied companies in Kenya have had erratic profits between the years 2010 and 2016 as listed in table 1.1. Statistics indicate that the growth in the industry has been fuelled by the consumption of imported products as opposed to the consumption of locally manufactured products. The 2017 economic survey indicated that between the years 2012 and 2016, the value of imports of cement and paint increased to KShs 9.5 billion (from KShs 8.1 billion) and KShs 9.9 billion (from KShs 5.8 billion) respectively. On the other hand, the value of exports of cement decreased to KShs 7.7 billion (from KShs 8.1 billion) while the export of paints increased marginally to KShs 2.2 up from KShs 1.8 billion (KNBS, 2017).

Favourable government policies such as the suspension of import duty on key raw materials in the industry facilitated accelerated growth in the sector in the early years (KNBS, 2017). With the passage of time however, these industries have faced slower growth attributed to increased competition from imports in the East African bloc which has also reduced the volume of exports. The weakening of the Kenya Shilling against major world currencies over the years has increased the cost of importing key inputs for the sector and this has

translated to the increase in the cost of the output of the industries as compared to imported products. Further, there has been a decrease in the availability of credit to these firms attributed to the increase in the cost of loans and followed by the interest rate cap introduced in 2016 which increased the underwriting standards for many of the banks in Kenya (CBK, 2017). The decrease in the availability of credit to finance expansion and working capital needs has meant that companies have struggled to finance current assets such as inventory which has impacted greatly on revenue and profitability.

## **1.2 Statement of the Problem**

The Construction and Allied industry is at the heart of the social and economic pillars of Kenya's vision 2030 (GOK, 2007). This industry is critical to the achievement of Kenya's Vision 2030. However, the growth of the construction and allied sector has been attributed to the consumption of the imported products as opposed to the consumption of locally manufactured goods. The industry has faced challenges in terms of erratic profits, reduced access to credit and competition from imports. As detailed in table 1.1, the combined profit after tax of the listed construction and allied companies, based on their annual financial statements, stood at KShs 6.3 billion in 2010 which rose to KShs7.9 billion in 2011 and dropped to KShs 6.3 billion in 2012. The profit after tax for the years 2013 to 2016 was as follows: KShs7.4 billion, KShs 5.3 billion, KShs 8.8 billion and KShs 8.0 billion respectively. The data also indicates an erratic growth rate in profit over the years with the lowest growth rate of -28% and the highest profit growth of 64%.

Due to the nature of business, such industries have a high investment in current assets such as inventory and work in progress which require proper management (Akoto, Awunyo-Vitor, & Angmor, 2013). Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015) suggest that as resources available to organisations become scarce, management of the firm's working capital becomes the most critical way through which these firms will attain profitability and an improvement in performance. This is with the aim of enabling the local companies to be able to compete favourably with the foreign companies operating in the country.

Empirical evidence confirms that working capital management affects firm profitability. There is equally empirical evidence documenting contradictory findings regarding the relationship of the various working capital components with profitability. Empirical evidence by Jagongo and Makori (2013), Gull and Arshad (2013), Gakure, Cheluget, Keraro, and Onyango (2012) indicate that there is a negative relationship between the cash conversion cycle, average collection period, inventory holding period with profitability and a positive relationship between the average payment period and profitability. On the other hand studies carried out by Abuzayed (2012) and Omesa, Maniagi, Musiega, and Makori (2013) found that there is a positive correlation between the cash conversion cycle and profitability. The empirical contradictions on the nature of the relationship between working capital and profitability formed a basis for the current study.

In view of empirical evidence from the Kenyan context, there is limited research on the impact of working capital management on profitability specific to the construction sector. Jagongo and Makori (2013) studied the relationship between working capital management and firm profitability on manufacturing and construction firms listed on the Nairobi Securities Exchange, Kenya. The researcher however noted that there was no research carried out in the Kenyan context specific to the construction and allied sector. This study therefore attempted to fill these gaps and contribute to the extant literature by using panel data methodology to determine the relationship between working capital management and profitability among the Construction and Allied firms as listed on the Nairobi Securities Exchange during the period 2010-2016 .

### **1.3 Objectives of the Study**

The study sought to achieve general and specific objectives.

#### **1.3.1 General Objective**

The main objective of the study was to determine the effect of working capital management on the profitability of construction and allied firms listed at the Nairobi Securities Exchange, Kenya.

### **1.3.2 Specific Objectives**

The study sought to achieve the following specific objectives:

- i) To determine the effect of cash management on profitability of construction and allied firms listed at the NSE, Kenya.
- ii) To determine the effect of inventory management on profitability of construction and allied firms listed at the NSE, Kenya.
- iii) To determine the effect of debtors management on profitability of construction and allied firms listed at the NSE, Kenya.
- iv) To determine the effect of creditors management on profitability of construction and allied firms listed at the NSE, Kenya.

### **1.4 Research Hypotheses**

The following null hypotheses were tested:

H<sub>01</sub>: Cash management has no significant effect on profitability of construction and allied firms listed at the NSE, Kenya.

H<sub>02</sub>: Inventory management has no significant effect on profitability of construction and allied firms listed at the NSE, Kenya.

H<sub>03</sub>: Debtors management has no significant effect on profitability of construction and allied firms listed at the NSE, Kenya.

H<sub>04</sub>: Creditors management has no significant effect on profitability of construction and allied firms listed at the NSE, Kenya.

### **1.5 Significance of the Study**

This research sought to assess the impact of the various working capital management components on the profitability of listed construction and allied firms. The management and owners of construction firms will benefit from the findings and recommendations of

this research on working capital management to enable them implement effective practices to increase the profitability of their businesses and ensure continuity. The findings contribute to the general body of knowledge on the relationship between working capital management and profitability of construction and allied sectors. The suggestions for further study act as a basis for further study for scholars and researchers in the field of finance.

### **1.6 Scope of the Study**

The research sought to determine the effect of working capital management on profitability of firms listed under the construction and allied sector at the Nairobi Securities Exchange, Kenya. The study was limited to the determination of the effect of working capital management on profitability. The assessment covered a seven-year period: 2010 to 2016. The target companies were those listed under the construction and allied sector as at January 2017. The independent variables in the study were inventory holding period, cash conversion cycle, average collection period and average payment period. The dependent variables were net income and return on assets.

### **1.7 Organization of the Study**

The study was organized into five chapters. The first chapter presents the background to the study, the general and specific objectives, significance of the study and the scope of the study. The second chapter presents; the theories anchoring the study, the findings of past literature on the relationship between working capital management and profitability, the research gap to be addressed by the study and the conceptual framework of the study. Chapter three presents the research design, target population, instrument for data collection, analysis of data and presentation and the ethical considerations while chapter four presents the findings and interpretation of the data analysis conducted. Chapter five presents the summary of findings and the conclusions drawn and recommendations drawn from the study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter details the review of theories that support this study. It also reviewed academic and empirical literature on the impact of working capital management comprising; cash conversion cycle, receivables collection period, inventory days and creditor payment period on profitability by various researchers for purpose of demonstrating the research gap that was filled by this study. Similarly, a conceptual framework captured the study variables.

#### **2.2 Theoretical Review**

In order to undertake this research, the following theories were reviewed; Cash Conversion Cycle theory, Transaction Cost Theory and Agency Theory.

##### **2.2.1 Cash Conversion Cycle Theory**

This theory was put forth by Richards and Laughlin (1980) who noted that managers spend a substantial proportion of their daily activities in managing working capital. This entails spending a considerable amount of time in activities such as managing past due sales, monitoring cash movement, negotiating credit terms and sourcing for short-term finance (Aminu & Zainudin, 2015). The proponent states that firms should not rely on static measures of liquidity such as the current asset and acid test ratios as these ratios present the liquidation rather than the going concern approach to measuring a firm's liquidity. A firm's primary recourse to meeting its obligations should be through the employment of inventory and receivable investments in the normal course of operations rather than through liquidation of assets. They thus introduced the concept of the cash conversion cycle as a tool to assess the efficiency of working capital management.

The cash conversion cycle is made up of three elements: inventory management, debtor management and payables management (Aminu & Zainudin, 2015). A business provides



customer with credit so as to increase sales but it must first assess the creditworthiness of customers before extending the same and then subsequently monitoring their performance to mitigate against default. Businesses that don't monitor sales credit incur losses attributable to bad debts. Inventory management is also key to a firm's liquidity as a company must establish the optimum order quantity to prevent stock outs whilst maintaining holding costs at a reasonable level. A firm must also then establish the optimum frequency to pay for its purchases so as to use cash collected from sales as opposed to internal cash that may then require a firm to be financed by finance credit. Deloof (2003) suggests that maintaining an ideal level of working capital will maximize shareholder value. A firm must therefore establish the optimum duration from when cash is invested in the purchase of raw materials or finished goods to when the resources are converted back to cash through the collection from trade debtors so as to ensure profitability is achieved whilst ensuring that the firm has the appropriate liquidity to settle its short term obligations.

### **2.2.2 Transaction Cost Theory**

The transaction cost theory, postulated by Williamson (1981), suggests that a firm attains profitability not only by operating in profitable markets but also by organizing its operations in the most efficient way so as to minimize costs. The proponent goes further to suggest that there are three levels in which an organisation should obtain efficiency so as to be profitable: the structure of the enterprise (unitary or multidivisional forms), establishing the activities to be performed within the firm and organization of its human capital, that is, and matching governance structures to the workforce. With reference to working capital, a firm must manage its trade credit using the lowest possible cost. This is achieved by assessing creditworthiness in the ordinary course of business as opposed to using external sources such as credit referencing bureaus, enforcing collectability and enhancing collection of debts by threatening to cut off further supply of goods and varying the level of demand (sales) by varying the extent of credit offered to its customers (Bellouma, 2014). A firm can also reduce the losses resulting from customer default by repossessing the goods previously sold and reselling them.

The central claim of the theory is that a firm's activities should be undertaken in such a manner as to reduce the costs involved in administering them (Hassan & Mberia, 2017). In the context of working capital management, a firm must find an optimum balance in the costs incurred towards receivables management. A balance must be found between the cost of establishing the creditworthiness of customers and the cost of debt collection. This will ensure that the company will attain profitability due to increased sales on credit and will retain liquidity by collecting cash from its debtors in good time.

### **2.2.3 Agency Theory**

Jensen and Meckling (1976) discussed the concept of agency where they state that agency arises where the owner (principal), appoints an agent to undertake tasks on their behalf. However, an agency problem arises because there is a divergence in the interests, risk preference and goals of the principal and agent. According to Wang (2010) agency theory rests on three premises; first, management's self-interest motivates waste and inefficiency in the presence of available cash flows. Second, the aim of management is to maximize their individual wealth at the expense of that of shareholder and finally, agency costs are incurred at the expense of shareholders because of weak governance structures. In order to reduce instances of agency conflicts, strategies such as linking manager pay to firm performance and shareholders obtaining information to monitor manager performance can be put in place (Young & Buchholtz, 2002).

Ying (2010) found that by increasing the pay of a manager, he was motivated to improve firm performance. Wang (2010) proposes an approach, termed as an encouraging approach to reducing agency costs which entails that managers are made shareholders of the firm and this will motivate them to invest in profitable ventures that better utilize free cash flows as this will in turn benefit them as shareholders. This theory, in relation to working capital management, could be viewed from the perspective of a manager, an agent of the shareholders (principal), who is tasked with the responsibility of managing a company's short-term assets and liabilities. In order for the manager to be sufficiently motivated, to adopt the most efficient strategies around managing receivables, payables and inventory,

incentives to reduce the agency conflict such as adequate remuneration and share options must be put in place.

### **2.3 Empirical Review**

A number of studies have explored the relationship between working capital management and company profitability in various sectors with mixed results. The studies used various methodologies such as descriptive analysis and linear regression to assess the relationship. Below is a chronology of the empirical review of variables so as to assess the research gap.

Babatunde and Akeju (2016) assessed the effect of working capital management on the profitability of 100 companies listed at Nigeria stock exchange (NSE) from 2005 to 2015. The study applied weighted least square (WLS) regression analysis at a significance level of 0.05. The results showed a significant direct relationship between working capital company profitability as measured by the gross operating profit.

Lyngstadaas (2016) explored the effect of working capital management on profitability, measured by return on assets of 21,075 small and medium sized Norwegian firms for a period of three years: 2010 and 2013. The findings indicated that decreasing the length of the cash conversion cycle will yield increased profitability.

Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015) sought to explore the effect of managing working capital on the profits of listed food product firms in the Nigerian Stock Exchange. The period of review for the target population was between the years 2008 and 2012. The data were analyzed using descriptive statistics and regression analysis. The study indicated that there was a direct relationship between current ratio, debtor days and company size with profitability (as measured by return on assets) and an inverse relationship between creditor days and inventory turnover in days with profitability.

Malik and Bukhari (2014) analysed the impact of working capital on profitability in cement, and engineering companies in Pakistan over a period of five years: 2007 – 2011 using data obtained from the companies annual reports. Least squares regression method was used to estimate the relationship between working capital and performance. The researchers found that that average payment period had a negative and significant

relationship while cash conversion cycle had a positive and significant relationship with return on equity. Debtor days and operating cycle had a direct and insignificant relation whereas inventory days had an inverse and insignificant relationship with the return on equity.

Gull and Arshad (2013) assessed the effect of working capital management and liquidity with company performance. For the purpose of the study, inventory turnover, accounts receivable turnover, current and quick ratio were taken to be the components of working capital management and liquidity. Data was analysed for a sample of 19 listed cement companies over a 10 year period, between 2005 and 2010. The data was analysed using univariate and multivariate analysis. The findings of the analysis suggested that efficient management of working capital and liquidity results in financial success. That is, there was an inverse relationship between inventory holding period and accounts receivable turnover ratio in days to ROCE.

Makori and Jagongo (2013) analysed the effect of working capital management on company profits in 5 manufacturing and construction firms listed in the NSE, Kenya, between 2003 and 2012. Ordinary least squares regression models were used to establish the impact of WCM on profitability, as measured by return on assets. The research found an inverse relationship between profitability and the cash conversion cycle and debtor days but a direct impact to profitability by inventory days and the number of days payable.

Gul et al (2013) assessed the influence of working capital (WCM) on profitability, as measured by the Return on Assets (ROA), among Pakistani SMEs from 2006 to 2012. The study made use of data from the Karachi Stock Exchange, tax offices and the company itself. Panel data technique was used to study the influence of WCM comprising debtor days, inventory days, cash conversion cycle and supplier days on profitability. The study used debt ratio, firm size, and growth as moderating variables. The study found that supplier days has a positive correlation with profitability whereas receivables days, cash conversion cycle and inventory days have a negative correlation with profitability. In terms of moderating variables, size and growth in sales have a positive influence on profitability whereas debt ratio has negative impact on profitability.

Oladipupo and Okafor (2013) analysed the association between working capital with dividend payout ratio and profitability. The study reviewed twelve listed companies involved in manufacture at the Stock Exchange of Nigeria for a period of 5 years covering the years 2002 to 2006. The study made use of ordinary least square regression to analyse data. The researchers established that when the cash conversion cycle was reduced and debt ratio increased, an increase in profitability was noted. The researchers also noted that leverage levels had a negative but insignificant impact on profitability. Additionally, they noted that dividend payout ratio was positively influenced by working capital management.

Almazari (2013) assessed the relationship between profit and the management of working capital for sample cement companies listed in the Saudi Stock Exchange over a 5 year period from 2008 – 2012. The findings of the research indicated that, liquidity was the main contributor of profitability. The researcher also noted an inverse relationship between the debt levels and working capital with profitability and a direct correlation of the size of the firm with profitability. Data was analysed using linear regression.

Akoto, Awunyo-Vitor and Angmor (2013) explored the relationship of profitability with working capital management among Ghanaian manufacturing companies. Data for thirteen companies from 2005 to 2009 was analysed using regression analysis. The study found that receivables collection period negatively affected profitability while the cash conversion cycle, current asset ratio, size, and debtors' turnover positively impacted profitability.

Maniagi, Omesa, Musiega and Makori (2013) explored the impact of managing working capital on the profit levels of manufacturing companies quoted at the NSE, Kenya. The study reviewed the performance of 20 companies between the years 2007 to 2011. The researchers analyzed the data using principal components analysis (PCA). Their findings indicated that average collection period (ACP), cash conversion cycle (CCC), and the control variables Current liability to total asset ratio (CLTA) and fixed financial ratio (FATA) have a significant impact on profitability as measured by return of Equity (ROE). Cash Conversion Cycle (CCC) was noted as having a positive correlation while Average Collection Period (ACP) had a negative correlation with performance. The control variable

current liability to total asset ratio (CLTA) had a positive correlation while fixed financial ratio (FATA) had a negative correlation with firm ROE.

Tauringana and Afrifa (2013) analysed the importance of the cash conversion cycle to the profitability of SME's in the United Kingdom. Panel data regression analysis was applied and a questionnaire survey was administered on a sample of 133 SME's registered in the Alternative Investment Market. The panel data analysis was utilized to analyse the financial information between 2005 and 2009 while the questionnaire survey results were reviewed for the companies that responded. The findings indicated: in order of relative importance, that debtor management is ranks first followed by creditors management, stock management then cash conversion cycle respectively.

Gakure, Cheluget, Onyango and Keraro (2012) studied the impact of WCM on company profitability modelled using the net operating ratio. The target population was manufacturing firms listed at the Nairobi Securities Exchange between 2006 and 2010. Data was analysed using regression analysis. The findings indicate that liquidity has a negative relationship with profitability.

Abuzayed (2012) analysed sample listed firms in Jordan between 2000 and 2008 to examine whether increasing efforts in managing working capital improves company profitability, as measured using gross operating profit and value. The study used panel data analysis, generalized methods of moments and fixed and random effects to analyse the data. The findings suggested a positive relationship between profitability and the cash conversion cycle. They concluded that the more profitable a firm, the less likely they are to manage their working capital.

Bagchi, Chakrabarti and Roy (2012) assessed the relationship between the profitability of FMCG firms in India with the various working capital components; cash conversion cycle, inventory holding period, debtor days, payable days, debt equity ratio and debt asset ratio. The researchers measured profitability using ROA and ROI. The study covered a ten-year period between 2000/2001 and 2009/2010. Data was analysed using panel data regression analysis. The research found that there was an inverse and significant relationship between WCM and a firms' profitability.

Raheman, Afza, Qayyum and Bodla (2010) explored the impact of working capital management on the performance of listed Pakistani manufacturing firms. Their study measured performance through net operating profit from the annual reports of the companies. The study covered a ten-year period from the 1998 to 2007. Panel data analysis was used to analyse the performance of the selected 204 manufacturing firms. The findings showed that: cash conversion cycle, stock turnover in days negatively influence performance. Further findings indicate that debt levels, company size and sales levels have a direct and significant impact on company profit.

Mathuva (2010) analysed the influence of working capital management components on firm profitability as measured by net operating profit. The researcher collected data for 30 entities quoted on the NSE, Kenya during the years 1993 to 2008. Data was analysed using Pooled Ordinary least square and fixed effects regression models. The study found the existence of a significant but inverse correlation between the debtor days and profitability. The study also noted a significant direct correlation between the inventory holding period and creditor days with profitability.

Gill, Biger and Mathur (2010) analysed the influence that working capital has on profitability by reviewing the performance of eighty eight listed firms in American from 2005 to 2007. Data collected during study was analysed using Pearson bivariate correlation analysis and weighted least squares regression. The study found a statistically significant and positive relationship between the cash conversion cycle and profitability as measured using gross operating profit and an inverse but insignificant relationship between debtor's days, inventory days and creditor's days with profitability. The study also found that there was no significant impact on firm size to profitability.

#### **2.4 Summary of Literature and Research Gap**

Numerous research reviews have been conducted on the relationship between working capital and profitability. In terms of the sectors covered, research has been carried out on companies operating in the cement, manufacturing, construction, food industries and SMEs. In terms of regions and time frame covered, the research studies have covered countries such as the United States of America, Jordan, United Kingdom, Nigeria, Pakistan

and Kenya between the years 2003 and 2015. In terms of measures of profitability, profitability has been measured using the return on assets, gross operating profit, return on equity, return on capital employed and net operating profit. Empirical evidence however gives conflicting conclusions on the relationship between working capital and profitability. Several studies indicate a negative relationship between the accounts collection period, inventory holding period and the cash conversion cycle and a positive relationship between accounts payment period and profitability. Other studies indicate however that there exists a positive relationship between the cash conversion cycle, Inventory holding period, accounts payment period and profitability.

From the above review, we note that the study carried out in Kenya assessed the impact of working capital management on the profitability of listed construction and manufacturing firms during the period 2003 to 2012 and measured profitability using the return on assets. The empirical contradictions on the nature of the relationship between working capital and profitability and a contextual time gap formed a basis for the current study. This study therefore aimed to explore the relationship between working capital management and profitability of construction and allied firms listed at the Nairobi Securities Exchange by assessing their profitability between the years 2010 and 2016 and measure profitability using two measures: return on assets and net income.



**Table 2.1: Summary of literature review and research gaps**

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
Babatunde and Akeju (2016)	To assess the effect of working capital management on the profitability of companies listed at Nigeria stock exchange (NSE) from 2005 to 2015.	A significant positive relationship between working capital management and firm profitability as measured by the gross operating profit.	Contextual gap in the study as it was conducted in a foreign setting; Nigeria whose conditions may not apply to local conditions.	The study filled the gap by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.
Lyngstandas (2016)	Focused on effect of WCM on profitability of 21,075 SMES in Norway (2010 -2013).	The findings indicated that reducing the cash conversion cycle will increase profitability.	Limited its scope to cash conversion cycle leaving out the other aspects of working capital.	The study filled the gap by focusing all the aspects of working capital management comprising accounts receivable days, accounts payable days, inventory holding period and cash

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
				conversion cycle and their impact on profitability.
Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015)	Relationship between WCM and performance of food product firms in the Nigerian Stock Exchange from 2008 to 2012.	There is a positive relationship between : current ratio ,debtor days , and firm size with profitability (as measured by return on assets) and a negative relationship between inventory days and creditor days with profitability.	Contextual gap in the study as it was conducted in a foreign setting; Nigeria and among food industries whose conditions may not apply to local conditions (country and industry).	The study filled the gap by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.
Malik and Bukhari (2014).	Impact of working capital management (WCM) on corporate performance for companies in Pakistan over a period of five years: 2007 – 2011.	The average payment period had a negative and significant relationship while cash conversion cycle had a positive and significant relationship with return on equity. Average collection period and operating cycle	The research findings contradict previous studies that indicate a positive relationship between the accounts payable days and profitability.	The gap was filled by conducting an analysis of the relationship between WCM and profitability of listed construction and allied firms in Kenya.

Author (s)	Focus/ Objectives of the study	Findings	Research Gaps	Focus of the current study
		had a positive but insignificant whereas average age of inventory had a negative but insignificant relationship with the return on equity.		
Gull and Arshad (2013)	The relationship between working capital management and liquidity with a firms' performance as measured by the return on capital employed for a sample of 19 cement companies listed in the Karachi Stock exchange over a 10 year period, 2005 and 2010.	There was an inverse relationship between inventory holding period and accounts receivable turnover ratio in days to ROCE.	Contextual gap in the study as it was conducted in a foreign setting; Pakistan whose conditions may not apply to local conditions.	The study filled the gap by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
Makori and Jagongo (2013)	The effect of working capital management on entity profits (measured by ROA) in 5 manufacturing and construction firms listed in the Nairobi securities exchange, Kenya, for the period 2003 to 2012.	There exists inverse relationship between profitability and the cash conversion cycle and the debtor days but a direct impact to profitability by inventory days and the number of days payable.	Contextual gap in the study as the review covered manufacturing and construction industries and their performance between 2003 and 2012. The findings may not apply to the performance of construction and allied firms in recent years.	The study filled the gap by extending the review of the relationship between WCM and profitability of construction and allied firms between 2010 and 2016. The study was enriched by measuring Profitability using ROA and NI.
Gul et al (2013).	The influence of working capital management (WCM) on performance of small medium enterprises (SMEs) in Pakistan over a seven year period from 2006 to 2012.	Supplier days had a positive correlation with profitability whereas receivables days, cash conversion cycle and inventory days had a negative correlation with profitability.	Contextual gap in the study as it was conducted in a foreign setting; Pakistan and covering SMEs whose conditions may not apply to local conditions.	The study filled the gap by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
Oladipupo and Okafor (2013)	The association between entity working capital management practices with dividend payout ratio and profitability for 12 manufacturing companies quoted on the Nigeria Stock Exchange for a period of 5 years covering from year 2002 to 2006.	When the cash conversion cycle was reduced and debt ratio increased an increase in profitability was noted. Further, dividend payout ratio was positively influenced by working capital management.	Contextual gap in the study as it was conducted in a foreign setting; Nigeria whose conditions may not apply to local conditions.	The study filled the gap by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.
Almazari (2013)	The relationship between working capital and company profitability, as measured by the gross operating profit, for 8 listed Saudi cement manufacturing companies for a period	There was an inverse relationship between the debt levels and working capital with profitability and a direct relation between the size of the firm and profitability.	The research findings contradict previous studies that indicate a positive relationship between the accounts payable days and profitability.	The gap was filled by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
	of 5 years covering 2008 to 2012.			
Akoto, Awunyo-Vitor and Angmor (2013)	The relationship between working capital and company profitability of 13 firms in Ghana for the period 2005 to 2009.	Receivables collection period negatively affected profitability while the cash conversion cycle, current asset ratio, size and debtors turnover positively impacted profitability.	The research findings contradict previous studies that indicated an inverse relationship between the average collection period debtor days with profitability.	The gap was filled by exploring the relationship between WCM and profitability of listed construction and allied firms in Kenya.
Omesa, Maniagi, Musiega and Makori (2013)	The relationship between working capital and financial performance of 20 manufacturing firms listed on the Nairobi securities exchange between the years 2007 to 2011.	Cash Conversion Cycle (CCC) was noted as having a positive relation while Average Collection Period (ACP) had a negative relation with performance.	The research findings contradict previous studies that indicate a negative relationship between the cash conversion and profitability.	The gap was filled by conducting an empirical analysis of the relationship between WCM and profitability of listed construction and allied firms in Kenya.

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
Tauringana and Afrifa (2013)	The importance of cash conversion cycle to the profitability of SMEs in the United Kingdom.	The findings indicated in order of relative importance, that debtor management is ranks first followed by creditors management, stock management then cash conversion cycle respectively in affecting firm profitability.	Contextual gap in the study as it was conducted in a foreign setting; United Kingdom and covering SMEs whose conditions may not apply to local conditions.	The gap was filled by exploring the relationship between working capital and profitability of listed construction and allied firms in Kenya
Gakure, Cheluget, Onyango and Keraro (2012)	Impact of WCM to a company profitability modelled using the net operating ratio among manufacturing firms listed at the Nairobi Securities exchange between 2006 and 2010.	The findings indicate that liquidity has a negative relationship with profitability.	The research findings contradict previous studies that indicate a direct relationship between the creditor days and profitability.	The gap was filled by exploring the relationship between working capital and profitability of listed construction and allied firms in at the NSE Kenya.
Abuzayed (2012)	The relationship between working capital and company performance	The findings suggested a positive relationship	Contextual gap in the study as it was conducted in a foreign setting; Jordan	The study filled the gap by conducting an empirical analysis of the relationship

<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
	among sample listed firms in Jordan between 2000 and 2008.	between profitability and the cash conversion cycle.	whose conditions may not apply to local conditions.	between WCM and profitability of listed construction and allied firms in Kenya.
Bagchi, Chakrabarti and Roy (2012)	The effect of working capital on company performance of FMCG firms in India over a 10 year period - 2000/2001 to 2009/2010.	The research found that there was an inverse and significant relationship between WCM and firms' profitability.	The research findings contradict previous studies that indicate a positive relationship between the accounts payable days and profitability.	The study filled the gap by conducting an empirical analysis of the relationship between WCM and profitability of listed construction and allied firms in Kenya.
Raheman, Afza, Qayyum and Bodla (2010).	The impact of working capital management on the performance of manufacturing firms listed on the Karachi Stock exchange (KSE) for a period of 10 years	The results from the study indicated that cash conversion cycle, net trade cycle and inventory turnover in days have a negative impact on performance. Further finding on financial	Contextual gap in the study as it was conducted in a foreign setting; Pakistan whose conditions may not apply to local conditions.	The study filled the gap by conducting an empirical analysis of the relationship between WCM and profitability of listed construction and allied firms in Kenya.



<b>Author (s)</b>	<b>Focus/ Objectives of the study</b>	<b>Findings</b>	<b>Research Gaps</b>	<b>Focus of the current study</b>
	from the year 1998 to 2007.	leverage, sales growth and firm size also indicated significant positive effect on firm profitability.		
Mathuva (2010)	The influence of working capital management components on firm profitability as measured by net operating profit for 30 entities listed on the Nairobi Securities Exchange (NSE) between the years 1993 and 2008.	The study found the existence of a significant but inverse correlation between the debtor days and profitability. The study also noted a significant direct correlation between the inventory holding period and creditor days with profitability.	Contextual gap in the study as the review covered manufacturing and construction industries and their performance between 1993 and 2008. The findings may not apply to the performance of construction and allied firms in recent years.	The study filled the gap by extending the review of the relationship between WCM and profitability of construction and allied firms between 2010 and 2016. The study will be enriched by measuring Profitability will using ROA and NI.
Gill, Biger and Mathur (2010)	The impact of working capital management on profitability for 88 American firms listed on	The study found a statistically significant and positive relationship between the cash conversion	Contextual gap in the study as it was conducted in a foreign setting; The United States of America whose	The study filled the gap by conducting an empirical analysis of the relationship between WCM and

Author (s)	Focus/ Objectives of the study	Findings	Research Gaps	Focus of the current study
	New York Stock Exchange over a period of 3 years from 2005 to 2007.	cycle and profitability as measured using gross operating profit and an inverse but insignificant relationship between debtor's days, inventory days and creditor's days with profitability. The study also found that there was no significant impact on firm size to profitability.	conditions may not apply to local conditions.	profitability of listed construction and allied firms in Kenya

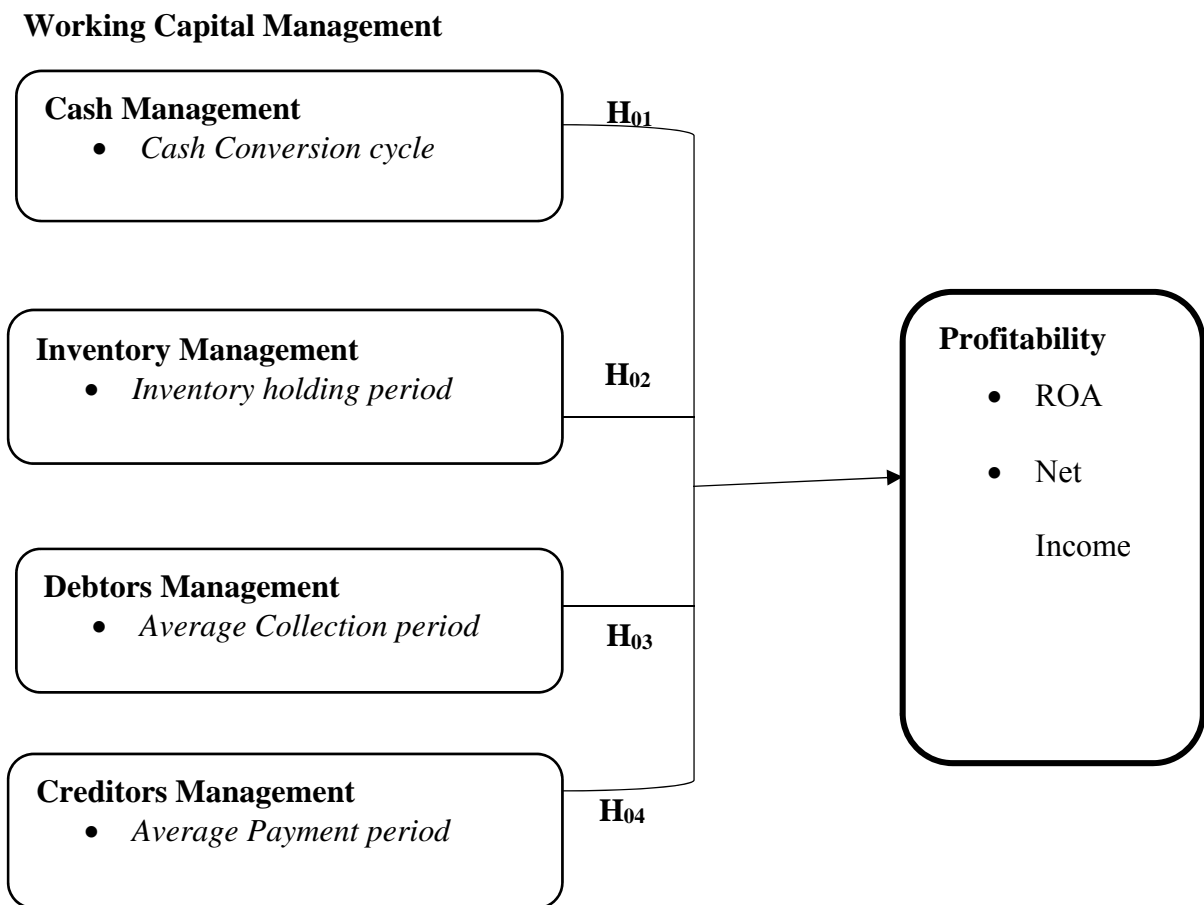
**Source:** (various empirical literature reviewed, 2018)

## **2.5 Conceptual Framework**

Different working capital variables have been found to affect the profitability of non-financial firms. These are the cash management, inventory management, debtors' management and creditor's management. Figure 2.1 below illustrates the conceptual framework of the relationship between working capital management (as measured by cash conversion cycle, inventory holding period, debtors' collection period and the payables collection period) and profitability. A conceptual framework refers to a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Kothari, 2004). The conceptual framework demonstrates that the independent variables under analysis have a direct impact on profitability as measured by the return on assets and net income. The researcher expected that when a company optimizes its management of cash, inventory, debtors and creditors, an increase in profitability would be achieved.

**Independent Variable**

**Dependent Variable**



**Figure 2.1** Conceptual Framework

**Source :**( *Researcher, 2018*)

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter sets out the research method adopted so as to achieve the research objectives. It comprised a discussion of the rationale for the research design adopted to collect the data of interest, target population selected for analysis and the required data elements to achieve research objective. The chapter also highlights the instrument selected for data collection and the methods adopted for analysis of data and presentation of the findings. Finally, the section sets out the ethical considerations before embarking on the research.

#### **3.2 Research Design**

A research design is the arrangement of elements for review and analysis of data in so as to achieve the research objective economically (Kothari, 2004). This study adopted a descriptive longitudinal design that incorporated panel data. A descriptive design describes the attributes of the data under review. It was deemed appropriate as it set out the key characteristics of the population under review. Panel data is data that comprises observations of various phenomena across time periods. Panel data analysis was deemed to be an appropriate method as it provides more information on the study variables and enabled the researcher to study the changes across time for the variables of interest (Baltagi, 2005).

#### **3.3 Study Population**

A population refers to all the items in any field of inquiry (Kothari ,2004).The target population of the research was made up of the companies listed under the construction and allied category at the Nairobi Securities Exchange, Kenya as at January 2017 which comprised five companies (See appendix IV ). The analysis was carried out on the profitability of the selected companies between 2010 and 2016. The information of interest was: revenue, cost of sales, profit after tax, average inventory, value of trade debtors, and value of trade creditors for the companies under review.

### **3.4 Sampling Design**

The study conducted a census review of target firms that is, all the firms listed in the construction and allied sector. This was because the number of companies listed under the sector was small and hence manageable. A census design enabled collection of deeper information on the elements under review and this enhanced the validity of the data collected (Saunders, Lewis & Thornhill 2009). Consequently, sampling did not apply to the study.

### **3.5 Data Collection Instrument**

A data collection instrument refers to the tool to be used to gather the research data (Kothari, 2004). The research used secondary data collection procedures via a document review guide (secondary data collection form). Validity and reliability tests were carried out to ensure that the instrument measured the parameters it was designed to measure and that the instrument was consistent.

#### **3.5.1 Validity**

The validity of a data collection instrument refers to the degree that the instrument measures that which it is intended to measure (Kothari, 2004). The researcher incorporated all the variables that needed to be collected so as to establish the independent variables in the research. In addition, the researcher engaged the supervisor and other lecturers to make the necessary improvements to the instrument so as to enhance its validity.

#### **3.5.2 Reliability**

According to Kothari (2004) the reliability of a research instrument is the extent to which the findings it collects are repeatable by another researcher. This study collected information from annual reports which contained financial statements that had been prepared and presented as per International Financial Reporting Standards (IFRS). The information had been audited by registered certified public accountants and was therefore assessed as reliable.

### 3.6 Data Collection Procedure

The study was based on secondary data which was extracted from the audited accounts of the Construction and Allied companies. The financial statements were obtained from the CMA website and the respective company websites. The information of interest comprised; revenue, cost of sales, net profit, inventory, total assets, account receivables and account payables of these companies for the following years 2010 to 2016. The data was adjusted for any exceptional /one-off items such as one-off expenses.

### 3.7 Data Analysis and Presentation

Data was analysed using descriptive analysis. In addition, the researcher conducted regression analysis and correlation analysis on the data. Descriptive statistics were used to summarize and profile the status of working capital management and profitability for construction and allied firms listed at the NSE. Panel regression analysis was then performed. The study used the Variance Inflation Factor (VIF) statistic to rule out multicollinearity (Jagongo & Makori, 2013). Consistent with previous studies (Jagongo and Makori, 2013; Gull and Arshad, 2013), working capital was modelled as a function of: inventory holding period, Cash conversion cycle, average collection period and average payments period.

$$P = B_0 + B_1 (CCC_{it}) + B_2 (APP_{it}) + B_3 (IHP_{it}) + B_4 (ACP_{it}) + e$$

*Where:*

P=Profitability which was measured by net income and return on assets

$NI_{it}$  = Earnings after interest and tax ( $i$  at time  $t$ ;  $t = (1, 2 \dots n)$  firms)

$ROA_{it}$  = Return on Assets ( $i$  at time  $t$ ;  $t = (1, 2 \dots n)$  firms)

$B_0$  = Constant

$B_{1-4}$  = Coefficients

CCC = Cash Conversion Cycle

ACP = Average collection period

APP = Average payments period

IHP = Inventory Holding Period

e = Error term

### 3.8 Measurement of Study Variables

The study variables were operationalised and measured as shown below in table 3.1

**Table 3.1: Operationalization and Measurement of Variables**

<b>Variable</b>	<b>Measurement</b>
<b>Dependent variables</b>	
Return on assets	(Net operating income/ total assets)
Net income	Total revenue – Total expenses (including interest and tax)
<b>Independent variables</b>	
Cash conversion cycle	Inventory holding period + Average collection period - Average payments period
Average collection period	(Trade receivables/ credit sales) *365
Inventory holding period	(Inventory/ cost of sales) *365
Average payments period	(creditors / cost of sales) *365

**Source:** (Author, 2018)

### 3.9 Ethical Considerations

Ethics in research refers to the measures undertaken to ensure that the study is conducted in a manner that upholds the confidentiality of data whilst ensuring its accurate presentation (Greener, 2008). All researchers were expected to conform to ethical principles and professional standards. Misconducts such as fabrications, misrepresentation of research work, falsifications of the research data were avoided in the course of carrying out this research. As the target population was a listed entity, the researcher only made use of the publicly available information in carrying out the research so as not to make public any confidential information that may distort market prices. Further, the research was



commenced after obtaining research permits from the National Commission for Science and Technology (NACOSTI) and Kenyatta University.

## **CHAPTER FOUR**

### **DATA ANALYSIS PRESENTATION AND INTERPRETATION**

#### **4.1 Introduction**

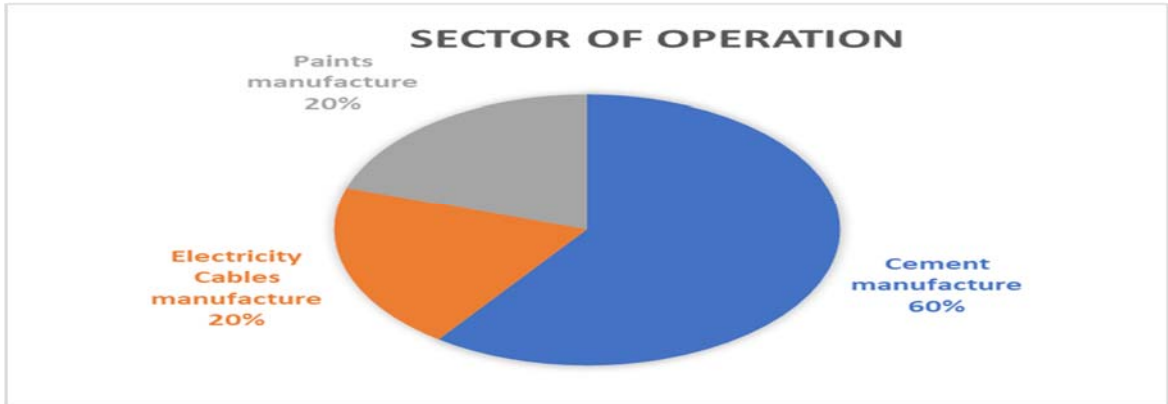
This chapter presents data analysis of the findings of the research. It presents the background information of the companies under review and the findings of the analysis in relation to the objectives of the study. Descriptive statistics, diagnostic tests and inferential analysis were performed on the data. Finally, the chapter links the findings of the research with other research studies carried out.

#### **4.2 Background Information**

##### **4.2.1 Sector of Operation**

The study sought to establish the sector of operation of the various companies categorized under the construction and allied sector at the Nairobi Securities Exchange (NSE). Below is a representation of the sector distribution of the companies. Figure 4.1 below indicates that 60% of the companies reviewed are involved in the manufacture and sale of cement, 20% in the manufacture and sale of wires and electricity cables and 20% in the manufacture of paints. The sector distribution was appropriate for the study as the companies included represent fairly the various participants in the construction and allied industry.

**Figure4.1: Company Sector of Operation**

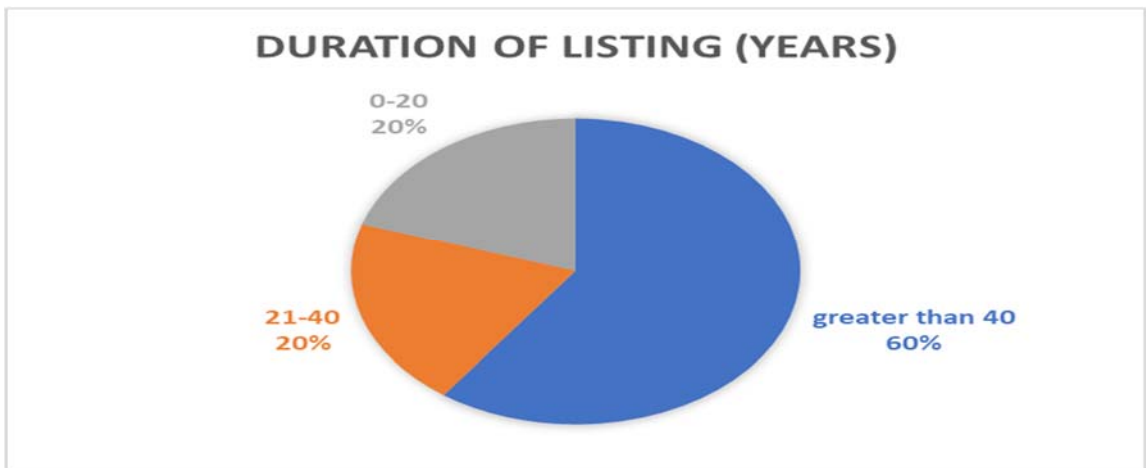


Source: Research data (2018)

#### **4.2.2. Years of Listing at NSE**

Figure 4.2 below illustrates the duration of listing for the companies under review. The reference year is 2017. The findings indicate that the 60% of the companies have been listed at the Nairobi Securities Exchange for more than 40 years, 20% for between 21 and 40 years and 20% of population has been listed for less than 20 years. The distribution of age of listing was appropriate for the study as the companies included represented fairly the various maturity profiles of participants in the construction and allied industry.

**Figure 4.2: Duration of Listing at NSE**



Source: Research data (2018)

### 4.3 Descriptive Analysis

The below section presents the descriptive statistics of profitability and working capital components for the firms under review between the years 2010 and 2016. The summary statistics encapsulate the mean, standard deviation, minimum and maximum of the observations. Table 4.1 below presents the findings.

**Table 4.1: Variables Summary Statistics (overall)**

Variable	Obs	Mean	Std.Dev	Minimum	Maximum
CCC	35	167.07	99.40	57.99	481.79
IHP	35	112.78	79.82	58.86	419.53
ACP	35	59.43	52.70	1.65	194.52
APP	35	82.44	32.06	21.70	157.51
ROA	35	0.095	0.27	-0.088	1.60
Net Income	27	13.53	1.50	9.89	15.59

Source: Research data (2018)

The table above indicates that the companies, over the seven year period, had long cash conversion cycles averaging 167 days (5 months) the longest cash conversation cycle reaching 481 days. This indicates that the firms' duration from the purchase of stock to the collection of cash from credit sales was approximately five months. The statistics indicate that it takes an average of 112 days (4 months) to convert inventory to sales with a standard deviation of 80 days. Accounts collection period has an average of 59 days with a standard deviation of 52 days. This means that construction and allied companies grant their customers an average credit period of 59 days.

The table above further shows that the average Return on Assets (ROA) was 9.5% with a standard deviation of 27%. The ROA has fluctuated between -8.8% and 160% indicating erratic performance over the period. A low ROA indicates an inefficient the use of firm assets to generate returns (Al-Matari, Al-Swidi, & Fadzil, 2014). The mean profit was 13.53 units with a standard deviation of 1.5. The above statistics, when compared to the industry performance over the period 2003 to 2012 as presented by Jagongo & Makori

(2013) indicate a decline in the efficiency of the companies in collecting cash from debtors, conversion of inventory to sales, managing the overall cash conversion cycle and the efficiency of utilizing assets in the generation of revenue.

#### 4.4 Diagnostic Tests

In order to determine the suitability of the panel data for statistical analysis, various diagnostic tests were carried out. The tests aimed at establishing whether the panel data met the cardinal requirements of classical linear regression analysis. The tests included: normality test, unit root test, multi-collinearity test, panel-level heteroscedasticity test as well as correlation test. This section presents the results of tests carried out.

**\*Null hypotheses were tested (at a significance level of 0.05) in regards to each specific objective.**

##### 4.4.1 Normality Test

One of the assumptions of liner regression is that data is required to be normally distributed (Gujarati, 2004). The objective of the test was to find out whether or not the data is normally distributed. The test statistic is a chi-square distribution for both individual and joint measures of skewness and kurtosis. The test was carried out against the null hypothesis of normal distribution. Table 4.2 below indicates the findings of skewness and normality of the data.

**Table 4.2 Results of Skewness/Kurtosis test**

Variable	Obs	Pr (Skewness)	Pr(Kurtosis)	Joint	
				Adj chi <sup>2</sup> (2)	Prob>chi <sup>2</sup>
ROA	35	0.0000	0.0000	50.07	0.0000
Net Income	35	0.4452	0.7826	0.69	0.7073
ACP	35	0.0065	0.3347	7.36	0.0252
IHP	35	0.0000	0.0000	33.97	0.0000
APP	35	0.1750	0.7895	2.05	0.3583
CCC	35	0.0002	0.0046	16.46	0.0003

H<sub>0</sub>: Data is normally distributed; Significance level: 5%

Source: Research data (2018)

Table 4.2 illustrates the results of skewedness/kurtosis test on the panel data. The results indicate that the chi-square statistic for all variables except net income and average payments period had corresponding *p*-values equal to 0.0000. This means that the alternative hypothesis of normality is rejected at 0.05 significance level. Consequently, the data can be largely considered to be normal.

#### 4.4.2 Unit Root Test

Unit root test was applied on all variables used in the analysis in order to determine whether or not the panel data was stationary. Data is deemed to be stationary when its mean and variance do not vary systematically over time. It is necessary to test stationarity of data before conducting regression so as to avoid spurious regression (Gujarati, 2004). The findings are illustrated below.

**Table 4. 3: Unit Root Test Results**

Variable			Statistic	p-value
ROA	Inverse chi-squared(142)	p	230.5787	0.0000
	Inverse normal	Z	-0.9396	0.1737
	Inverse logit t(349)	L*	-2.1379	0.0166
	Modified inv. chi-squared	Pm	5.2562	0.0000
Net Income	Inverse chi-squared(142)	p	251.7770	0.0000
	Inverse normal	Z	-1.0476	0.1474
	Inverse logit t(349)	L*	-2.4478	0.0074
	Modified inv. chi-squared	Pm	6.5141	0.0000
ACP	Inverse chi-squared(142)	p	171.3070	0.0474
	Inverse normal	Z	0.6756	0.7503
	Inverse logit t(349)	L*	0.3935	0.6529
	Modified inv. chi-squared	Pm	1.7391	0.0410
IHP	Inverse chi-squared(142)	p	438.0271	0.0000

Variable		Statistic	p-value	
APP	Inverse normal	Z	-3.0619	0.0011
	Inverse logit t(349)	L*	-8.4996	0.0000
	Modified inv. chi-squared	Pm	17.5660	0.0000
	Inverse chi-squared(142)	p	529.9478	0.0000
	Inverse normal	Z	-7.1009	0.0000
	Inverse logit t(349)	L*	-13.6532	0.0000
CCC	Modified inv. chi-squared	Pm	23.0205	0.0000
	Inverse chi-squared(142)	p	234.9478	0.0000
	Inverse normal	Z	-6.1009	0.0000
	Inverse logit t(349)	L*	-12.6532	0.0000
	Modified inv. chi-squared	Pm	22.0205	0.0000

*The p-values for the Augmented Dickey Fuller (ADF) test were based on asymptotic Chi-square distribution.*

#### **Source: Research data (2018)**

Augmented Dickey Fuller (ADF) test was conducted for this purpose through Stata version 14, software. The result of the unit root test for all variables is presented in Table 4.3. above. Given the test results, the output indicates that all the variables were stationary and significant at 1%, 5% or 10% since the p-values associated with the respective test statistics were less than 0.01, 0.05 and 0.1.

#### **4.4.3 Multi-collinearity Test**

The data was tested for the presence of multicollinearity to establish the extent to which the changes in the dependent variable are as a result of changes in the independent variable. Table 4.4 below presents the findings of the analysis.

**Table 4.4 : Tolerance and Variation Inflation Factor**

Variable	Tolerance (1/VIF)	VIF
ROA	0.288	3.47
Net income	0.308	3.25
ACP	0.327	3.05

<b>Variable</b>	<b>Tolerance (1/VIF)</b>	<b>VIF</b>
IHP	0.537	1.86
APP	0.947	1.06
CCC	0.235	1.04
Mean		2.29

Source: Research data (2018)

As shown in Table 4.4 all the variance inflation factor (VIF) were less than the threshold limit of 10 and tolerance values were greater than 0.1. This is in line with the findings of Gujarati (2004) who states that the VIF of a variable should be below 10. Alauddin & Nghiemb (2010) further suggest that the tolerance (the inverse of VIF) should be greater than 0.1 to conclude that a variable is not collinear. The variables above are therefore not collinear.

#### **4.4.4 Heteroscedasticity Test**

Heteroscedasticity refers to a situation where the variance of the residual-term is not constant but varies with changes in explanatory variables (Gujarati, 2004). The assumption of classical linear regression model is that the error-term variance should be constant. To test for panel level heteroscedasticity, the study adopted the Breusch-Pagan/Cook-Welsberg test method. This involved first estimating the specified empirical models for fixed effects with robust-standard errors (see section 4.5.2) and then running the Pagan/Cook-Welsberg test against the null hypothesis of constant error variance. The results are presented in Table 4.5.

**Table 4.5: Breusch-Pagan/Cook-Welsberg test Results for Panel-level Heteroscedasticity**

<b>Fixed effects</b>	<b>Chi<sup>2</sup></b>	<b>Prob &gt; Chi<sup>2</sup></b>
Panel model 1a	854.37	0.000
Panel model 1b	1122.14	0.000

H0: Constant error variance (homoscedasticity)



Source: Research data (2018)

*Panel model 1a: dependent variable is represented by Return on Assets*

*Panel model 1b: dependent variable is represented by Net income*

The test results for the two models provide chi-square distribution values of 854.37 and 1122.14 with corresponding *p*-values of 0.0000 in each case. The results show that the chi-square statistics were all significant at 5 percent level and hence the null hypothesis of constant variance was rejected. This signified existence of panel-level heteroscedasticity in panel data. Baltagi (2004) states that heteroscedasticity is to be expected in cross sectional units which may be of varying size and exhibit different variation. The use of OLS regression would not be efficient in estimating the regression relationship when heteroscedasticity is noted and other estimation techniques should be used.

#### 4.5 Inferential Analysis

##### 4.5 .1 Correlation Analysis

Pearson Correlation coefficient was used to gauge the relationship (strength and degree of linear association) between the various components of working capital: average collection period, inventory holding period, average payments period and cash conversion cycle with profitability as measured by net income (NI) and the return on assets (ROA) for companies listed at the construction and allied sector at the NSE, Kenya at a 0.05 level of significance. Table 4.6 shows the correlation coefficient matrix of the study variables.

**Table 4. 6: Pearson Correlation Coefficient Matrix**

		<b>ACP</b>	<b>IHP</b>	<b>APP</b>	<b>CCC</b>	<b>ROA</b>	<b>NI</b>
<b>ACP</b>	Coefficient r	1					
	sig						
	N						
<b>IHP</b>	Coefficient r	0.0671	1				
	sig	0.7017					
	N	35	35				
<b>APP</b>	Coefficient r	0.6869	0.4495	1			
	sig	0.000	0.0068				
	N	35	35				

		<b>ACP</b>	<b>IHP</b>	<b>APP</b>	<b>CCC</b>	<b>ROA</b>	<b>NI</b>
<b>CCC</b>	Coefficient r	0.5956	0.8405	0.7212	1		
	sig	0.0002	0.0000	0.0000			
	N	35	35	35			
<b>ROA</b>	Coefficient r	-0.2412	-0.0085	0.1475	0.1301	1	
	sig	0.1627	0.9614	0.3978	0.4564		
	N	35	35	35	35		
<b>NI</b>	Coefficient r	-0.4911	-0.2529	0.134	0.016	-0.172	1
	sig	0.0093	0.2031	0.1025	0.0125	0.0959	
	N	27	27	27	27	27	27

Source: Research data (2018)

According to Cohen (1988) an absolute value of r of 0.1 is denotes as weak correlation, an absolute value of 0.3 a medium correlation and values greater than 0.5 denote strong correlation. The findings of the research carried out indicated that the elements of working capital that is; ACP and IHP had a weak and negative correlation with the two measures of profitability that is return on assets (ROA) and net income, while APP and CCC had a low but positive correlation with profitability. The positive correlation between CCC and ROA indicates that when there is a large time lag between the purchase of raw materials and the collection of cash from the sale of finished goods, profits will be expected to increase. A negative and weak correlation was observed between IHP and ROA. Such a correlation indicates that companies with high stock levels are not able to remain profitable as they in have their cash investment held up in slow moving inventory (Deloof, 2003). In comparison to the two measures of profitability, the matrix indicates that there is a significant correlation at 0.05 level of the working capital components of: ACP and CCC with profitability but when compared with return on assets, the relation is insignificant.

## **4.5.2 Regression Analysis**

### **4.5.2.1 The Hausman Test for Model Effects Estimation**

In order to establish which estimation effects (between fixed and random) provided superior results for the study, Hausman test was carried out for each of the specified panel regression models. The test was conducted against the null hypothesis that random effect

model was the preferred model. The test results were rejected if the chi-square statistic was significant at 5% significance level (p value is small) otherwise, the null was accepted (Baltagi, 2005).

#### 4.5.2.1.1 The Hausman Test for Model Effects Estimation – Return on Assets and Net Income (full model)

Table 4.7a and 4.7 b below indicate the chi square and p values as a result of using fixed effects and random effects models to model the full equation.

**Table 4.7a: The Hausman Test for Model Effects Estimation – Working Capital Management and Return on assets (ROA)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
ACP	-.0477477	.0145273	-.0622749	.0250851
IHP	-.0460589	.0152336	-.0612925	.0254615
APP	.0047088	-.0013714	.0060802	.0019983
CCC	.045965	-.0149047	.0608697	.0254454

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi}^2(4) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 10.25 \end{aligned}$$

$$\text{Prob}>\text{chi}^2 = 0.0364$$

**Table 4.7 b: The Hausman Test for Model Effects Estimation– Working Capital Management and Net Income (NI)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
ACP	-110145	412004.8	-522149.8	87854.99
IHP	-98423.31	404983.6	-503406.9	91332.88

APP	-10184.92	-62529.43	52344.51	0.00
CCC	102617.2	-398191.4	500808.6	91882.02

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi}^2(4) &= (b-B)'[(V_b - V_B)^{-1}](b-B) \\ &= 56.78 \end{aligned}$$

$$\text{Prob} > \text{chi}^2 = 0.0000$$

Table 4.7 (a) and 4.7 (b) display the Hausman specification test results for panel regression equations 1 and 2. The test results show that the chi-square statistics for panel equation 1 and 2 was statistically significant at 5% level as supported by the p-values of 0.0364 and 0.000. The study therefore failed to reject the null hypothesis that the fixed effects estimation was appropriate for equation 1 and 2 at 0.05 significance level. Effectively, the study estimated the panel models for fixed effect.

#### **4.5.2.1.2 The Hausman Test for Model Effects Estimation – Average collection period (ACP) and Net income and ROA**

Table 4.7c and 4.7 d below indicate the chi square and p values as a result of using fixed effects and random effects models to model the relationship between ACP with net income (NI) and Return on Assets (ROA).

**Table 4.7 c The Hausman Test for Model Effects Estimation – Average collection period (ACP) and Net income (NI)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
ACP	-17780.94	-18242.73	461.7951	3680.902

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2 (1)} &= (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}] (\mathbf{b}-\mathbf{B}) \\ &= 0.02 \\ \text{Prob}>\chi^2 &= 0.9002 \end{aligned}$$

**Table 4.7 d The Hausman Test for Model Effects Estimation – Average collection period (ACP) and Return on Assets (ROA)**

Coefficients -	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
ACP	-0.000912	-0.0011967	.0002848	.0017655

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2 (1)} &= (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}] (\mathbf{b}-\mathbf{B}) \\ &= 0.03 \\ \text{Prob}>\chi^2 &= 0.8719 \end{aligned}$$

Table 4.7(c) and 4.7 (d) display the Hausman specification test results for panel regression equations 1 and 2. The test results show that the chi-square statistics for panel equation 1 and 2 were statistically insignificant at 5% level as supported by the p-values of 0.9002 and 0.8719. The study therefore accepted the hypothesis that the random effects estimation was appropriate for equation 1 and 2 at 0.05 significance level. Effectively, the study estimated the panel models for random effect.

**4.5.2.1.3 The Hausman Test for Model Effects Estimation – Inventory Holding Period (IHP) and Net income (NI) and Return on Assets (ROA)**

Table 4.7e and 4.7 f below indicate the chi square and p values as a result of using fixed effects and random effects models to model the relationship between IHP with and net income and Return on Assets (ROA).

**Table4.7 e: The Hausman Test for Model Effects Estimation – Inventory Holding period (IHP) and ROA**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
IHP	.0002992	.0001705	.0001287	.0002541

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2 (1)} &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 0.26 \\ \text{Prob>chi2} &= 0.6126 \end{aligned}$$

**4.7 f: The Hausman Test for Model Effects Estimation – Inventory Holding period (IHP) and Net income (NI)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
IHP	865.5079	584.0894	281.4185	457.568

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2 (1)} &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 0.38 \end{aligned}$$

$$\text{Prob}>\chi^2 = 0.5385$$

Table 4.7 (e) and 4.7 (f) display the Hausman specification test results for panel regression equations 1 and 2. The test results show that the chi-square statistics for panel equation 1 and 2 were statistically insignificant at 5% level as supported by the p-values of 0.6126 and 0.5385. The study therefore accepted the hypothesis that the random effects estimation was appropriate for equation 1 and 2 at 0.05 significance level. Effectively, the study estimated the panel models for random effect.

**4.5.2.1.4 The Hausman Test for Model Effects Estimation – Average Payments period (APP) with Net income (NI) and Return on Assets (ROA)**

Table 4.7g and 4.7 h below indicate the chi square and p values as a result of using fixed effects and random effects models to model the relationship between APP with and net income and Return on Assets (ROA).

**Table 4.7 g: The Hausman Test for Model Effects Estimation – APP and Net income**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
APP	-14915.29	-16345.54	1430.247	1069.937

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2 (1)} &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 1.79 \\ \text{Prob}>\chi^2 &= 0.1813 \end{aligned}$$

**Table 4.7 h: The Hausman Test for Model Effects Estimation – Average Payments Period (APP) and Return on Assets (ROA)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
APP	.0004946	-.0007968	.0012914	.0009207

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2 (1)} &= (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}](\mathbf{b}-\mathbf{B}) \\ &= 1.79 \\ \text{Prob}>\chi^2 &= 0.1607 \end{aligned}$$

Table 4.7 (g) and 4.7 (h) display the Hausman specification test results for panel regression equations 1 and 2. The test results show that the chi-square statistics for panel equation 1 and 2 were statistically insignificant at 0.05 significance level as supported by the p-values of 0.1813 and 0.1607. The study therefore accepted the hypothesis that the random effects estimation was appropriate for equation 1 and 2 at 0.05 significance level. Effectively, the study estimated the panel models for random effect.

**4.5.2.1. 5 the Hausman Test for Model Effects Estimation – Cash Conversion Cycle (CCC) and Net Income (NI) and ROA**

Table 4.7i and 4.7 j below indicate the chi square and p values as a result of using fixed effects and random effects models to model the relationship between CCC with and net income and Return on Assets (ROA).

**Table 4.7 i: The Hausman Test for Model Effects Estimation – Cash Conversion Cycle (CCC) and Net income (NI)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E



Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
CCC	-0.002944	-0.0029201	-0.000024	.0005024

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(1) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 0.00 \end{aligned}$$

$$\text{Prob}>\text{chi2} = 0.9620$$

**Table 4.7 j: The Hausman Test for Model Effects Estimation – Cash Conversion Cycle (CCC) and Return on Assets (ROA)**

Coefficients	(b)	(B)	(b-B)	Sqrt(diag(V-b-V_B))
	Fixed	Random	Difference	S.E
CCC	-0.0004839	-0.0004703	-0.0000136	.0000567

Source: Research data (2018)

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{Chi2}(1) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 0.06 \end{aligned}$$

$$\text{chi}^2 < 0 \implies 0.8102$$

Table 4.7 (i) and 4.7 (j) display the Hausman specification test results for panel regression equations 1 and 2. The test results show that the chi-square statistics for panel equation 1 and 2 were statistically insignificant at 5% level as supported by the p-values of 0.9620 and 0.8102. The study therefore accepted the hypothesis that the random effects estimation was appropriate for equation 1 and 2 at 0.05 significance level. Effectively, the study estimated the panel models for random effect.

#### 4.5.2.2 Significance of Predictor Variables

Based the findings of section 4.5.2.1, the researcher conducted a regression estimation of the individual components of working capital with profitability as measured by ROA and NI to establish the Wald chi square of each of the components of working capital. A Wald test examines the significance or a particular variable in explaining the dependent variable in a statistical model (Baltagi, 2005). Where a Wald test is greater than zero, then the variable should be included in the model as it has an explanatory power in the model that is its removal would distort the overall fit of the model (Wiley, 2016).

##### 4.5.2.2.1 Effect of Average Collection Period (ACP) on Profitability

The research sought to establish the effect of ACP on the performance of firms listed under construction and allied sector at the NSE, Kenya. The results are shown in Table 4.8.

**Table 4.8: Regression Results of Average Collection Period (ACP) as Independent Variable-Random Effects Model**

	ACP	Coefficient	Std. Err.	z	P> z	Model
Model 1a	Net Income	-18242.73	7,987.044	-2.28	0.022	RE
	_cons	2,169,704	1,087,433	2.00	0.046	
Model 1b	ROA	-.0011967	.0010887	-1.10	0.272	RE
	_cons	0.1657147	.0889349	1.86	0.062	
<b>Statistics</b>	<b>Model 1a</b>	<b>Model1b</b>				
Wald chi2(1)	5.22	1.21				
Prob > chi2	0.0224	0.2717				
R-Squared	0.2485	0.2511				
Rho	0.79676656	0.12371825				

Source: Research data (2018)

*Model 1a= the dependent variable is Net income*

*Model 1b= the dependent variable is Return on Assets*

As shown in Table 4.8 above, results on the effect of ACP on Return on Assets (ROA) and Net Income (NI) indicate that Wald Chi output is greater than zero in both cases and this indicates that the Accounts Collection Period (ACP) should be included in modelling profitability. In addition, the R<sup>2</sup> values indicate that ACP contributes 25% of the changes in net income and return on assets.

#### 4.5.2.2.2 Effect of Inventory Holding Period (IHP) on Profitability

The results the effect of IHP on the performance of firms listed under construction and allied sector at the NSE, Kenya are shown in Table 4.9.

**Table 4. 9: Regression Results of IHP as Independent Variable-Random Effects Model**

	<b>IHP</b>	<b>Coefficient</b>	<b>Std. Err.</b>	<b>z</b>	<b>P&gt; z </b>	<b>Model</b>
Model 1a	ROA	-.0004923	.0005607	-0.88	0.380	RE
	_cons	.1283072	.0580303	2.21	0.027	
Model 1b	Net Income	-.0033381	.0048693	-0.69	0.493	RE
	_cons	13.21651	.792226	16.68	0.000	
<b>Statistics</b>	<b>Model 1a</b>	<b>Model1b</b>				
Wald chi <sup>2</sup> (1)	0.77	0.47				
Prob > chi <sup>2</sup>	0.3799	0.4930				
R-Squared	0.1345	0.2282				
Rho	.1287088	.86461655				

Source: Research data (2018)

*Model 1a= the dependent variable is Return on Assets*

*Model 1b= the dependent variable is Net income*

Table 4.9 above indicates the findings of estimating the effect of Inventory Holding Period (IHP) on profitability using random effects as established through the Hausman tests in section 4.5.2.1. The results indicate that IHP is a weak predictor of profitability. The Wald statistic is greater than zero and this indicates that IHP should be included in the model estimating profitability (ROA and NI) and R<sup>2</sup> value of the two models indicates that IHP contributes to 13% and 23 % of the change in the return on assets and net income respectively.

#### 4.5.2.2.3 Effect of Average Payments Period (APP) on profitability

The research sought to establish the effect of APP on the performance of firms listed under construction and allied sector at the NSE, Kenya. The results are shown in Table 4.10.

**Table 4.10: Regression Results of Average Payments Period (APP) as Independent Variable-Random Effects Model**

	APP	Coefficient	Std. Err.	z	P> z	Model
Model 1a	ROA	.0007968	.0015215	0.52	0.601	RE
	_cons	.1602787	.1373244	1.17	0.243	
Model 1b	Net Income	16345.54	7469.836	2.19	0.029	RE
	_cons	2433114	1069383	2.28	0.023	
<b>Statistics</b>	<b>Model 1a</b>	<b>Model1b</b>				
Wald chi <sup>2</sup> (1)	0.27	4.79				
Prob > chi <sup>2</sup>	0.6005	0.0287				
R-Squared	0.4055	0.4226				
Rho	0.07554921	0.74761161				

*Model 1a= the dependent variable is Return on Assets*

*Model 1b= the dependent variable is Net income*

Source: Research data (2018)

The results of model estimation of APP with profitability using random effects are presented in table 4.10 above. The Wald chi<sup>2</sup> statistic for model 1a and model 1b indicate an amount greater than zero indicating that IHP is a predictor of profitability and the variable should be included in predicting profitability in both models. The coefficient of determination further indicates that APP explains 41% and 42% of the changes in the return on assets and net income respectively.

#### 4.5.2.2.4 Effect of Cash Conversion Cycle (CCC) on Profitability – Random effect

The research sought to establish the effect of CCC on the performance of firms listed under construction and allied sector at the NSE, Kenya. The results are shown in Table 4.11.

**Table 4.11: Regression Results of Cash Conversion Cycle (CCC) as Independent Variable- Random effect**

	CCC	Coefficient	Std. Err.	z	P> z	Model
Model 1a	ROA	.0004703	.0003116	1.51	0.131	RE
	_cons	.1134923	.0296028	3.83	0.000	
Model 1b	Net Income	.0029201	.0026048	1.12	0.262	RE
	_cons	13.75929	.7237686	19.01	0.000	
Statistics	Model 1a	Model1b				
Wald chi <sup>2</sup> (1)	2.28	1.26				
Prob > chi <sup>2</sup>	0.1312	0.2623				
R-Squared	0.0745	0.0554				
Rho	.16784731	.89317823				

Source: Research data (2018)

The results of model estimation of CCC with profitability using random effects are presented in table 4.11 above. The Wald chi<sup>2</sup> statistic for model 1a and model 1b indicate an amount greater than zero indicating that CCC is a predictor of profitability and the variable should be included in predicting profitability in both models. The coefficient of

determination further indicates that CCC explains 7% and 5% of the changes in the return on assets and net income respectively.

#### 4.5.2.3 Model Summary and Coefficients Table

In order to shed light on the effect of working capital on profitability, the researcher applied regression analysis in all the components of working capital with profitability for the firms listed under construction and allied sector at the NSE, Kenya. The results are shown in Table 4.16.

**Table 4. 12: Regression coefficients and model summary**

	<b>ROA</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t</b>	<b>P&gt; z </b>	<b>Model</b>
Model 1a	ACP	-.0477477	0.0294106	-1.62	0.117	FE
	IHP	-.0460589	0.0293809	-1.57	0.129	
	APP	0.0047088	0.0034963	1.35	0.190	
	CCC	0.045965	0.0292266	1.57	0.128	
	_cons	0.0594471	0.1623198	0.37	0.717	
	<b>Net income</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t</b>	<b>P&gt; z </b>	<b>Model</b>
Model 1b	ACP	-110145	123036	-0.90	0.379	FE
	IHP	-98423.31	122911.7	-0.80	0.431	
	APP	10184.92	14626.34	0.70	0.492	
	CCC	102617.2	122266.4	0.84	0.409	
	_cons	2427636	679047.3	3.58	0.001	
Statistics	Model 1a	Model1b				
Prob > F	0.5527	0.1292				
R-Squared	0.7844	0.2324				
Rho	0.57130104	0.82312551				

Source: *Research data (2018)*

*Model 1a= the dependent variable is Return on Assets*

*Model 1b= the dependent variable is Net income*

#### 4.5.2.3.1 Model summary

As indicated in Table 4.16 (model 1a), indicates that the variables of working capital explain up to 78% of variations in the ROA of firms listed under construction and allied at the NSE, Kenya. This is based on the resultant determinant coefficient ( $R^2$ ) value equivalent to 0.7844. This indicates a good measure of predictive strength of the variables included in the model. Model 1b demonstrates the relationship between the various working capital components and profitability as measured by net income. The findings of the study indicate that the model has a coefficient of determination of 23% which indicates a weak predictive strength of the variables included in the model.

#### 4.5.2.3.2 Regression coefficients- Model 1a and Model 1 b

The working capital management and profitability relationship was presented as follows:

$$\text{Model 1a} \quad Y = 0.059 - 0.048ACP - 0.0461IHP + 0.005APP + 0.046CCC$$

$$\text{Model 1 b} \quad Y = 2,427,636 - 110,145ACP - 98,423.31IHP + 10,184.92APP + 102,617.2CCC$$

*Model 1a= the dependent variable is Return on Assets*

*Model 1b= the dependent variable is Net income*

In the models above, average collection period and inventory holding period had an inverse relation with profitability while average payments period (APP) and cash conversion cycle (CCC) had a positive relation with profitability as measured using return on assets and net income. The p values associated with both models were greater than 0.05 thus the overall regression results suggest that all the four elements of working capital: ACP, IHP, APP and CCC have an insignificant effect on profitability. The findings of an insignificant relationship between WCM and profitability are consistent with the findings of Abuzayed (2012) who noted that the cash conversion cycle and its components do not significantly affect the profit levels of SMEs in Jordan. Empirical evidence by Shah, Gujar and Sohu (2018) also noted that the cash conversion cycle and its components did not significantly affect the profit levels of pharmaceutical firms in Pakistan. The Wald tests carried out in

the previous section, however, indicate that the components of working capital should be incorporated in modelling the WCM relationship with profitability as they contain predictive strength.

#### **4.6 Key Findings and Discussion**

The findings of the data analysis in section 4.5 indicated that working capital management is a strong predictor of profitability as modelled by the return on assets. However, the components of working capital are weak predictors of profitability as modelled by net income. Under multiple regression, all elements of working capital do not significantly affect profitability at 0.05 significance level. The findings of an insignificant relationship between working capital management and profitability are consistent with the findings of Abuzayed (2012), Iqbal & Zhuquan (2014) and Shah, Gujar and Sohu (2018). The research findings are however contrary to empirical evidence by Gakure, Cheluget, Onyango and Keraro (2012) and Malik and Bukhari (2014) who found a significant effect of working capital components on profitability. When regression was carried out on the individual components of working capital, it was noted that average payment period contributes the highest percentage in explaining the impact of working capital management on profitability. Our findings are consistent with the findings of Mbawuni, Mbawuni, & Nimako, (2016) who noted that creditor days is the key driver of profitability. The following section details the findings of the various components of working capital with profitability.



#### **4.6.1 Effect of Average payment Period on Profitability**

The results of the research analysis established that listed construction and allied companies in Kenya had relatively long payment days that averaged three months. In addition, it was noted that APP has a positive correlation with the return on assets and with net income. When individually regressed against profitability, the variable explains 41% of ROA and 42% of net income and was thus deemed to be an important input in modelling the WCM – profitability relationship. The research noted a direct and insignificant relation between APP and profitability as measured by the return on assets and net income. When companies delay paying their suppliers, they are able to increase their profitability. A long payment period is an inexpensive source of financing in cases where companies are facing challenges in accessing external credit. The null hypothesis that creditor's management did not have a significant effect on profitability was not rejected. The findings of a direct relationship between creditor days and profitability are consistent with the findings of Malik and Bukhari (2014) and Makori and Jagongo (2013). The findings however contradict the findings of Mbawuni, Mbawuni, and Nimako (2016), Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015) and Tauringana and Afrifa (2013).

#### **4.6.2 Effect of Average collection period on Profitability**

With regards to debtor's management, the research findings indicate that companies in the construction and allied industry grant their customers an average credit period of 59 days. A negative correlation was noted between the average collection period and profitability as measured by the return on assets and net income. Further, the study found an inverse relationship between debtor days and profitability. This relationship was noted as not significant at a significant level of 0.05. The null hypothesis that receivables management did not have a significant effect on profitability was accepted. The review of the prediction strength of ACP on profitability on individual regression indicated that ACP predicts 25% of the change in profitability. In sectors facing great competition, a relaxed credit policy may result in an increase in sales however, the risk of loss due to customer default increases. The findings of the regression analysis indicate however that organizations should reduce their debtor days so as to increase their profitability. The inverse relation between the collection period and profitability is consistent with the findings of Gull and

Arshad (2013) and Makori and Jagongo (2013). The study however contradicts the findings of Babatunde and Akeju (2016) and Mathuva (2010).

#### **4.6.3 Effect of Inventory Holding Period on Profitability**

The results of multiple regression indicated an inverse relationship between inventory turnover in days and profitability. The relationship was found to be insignificant at 0.05. This means that companies should ensure quick turnover of their inventory so as to realise an increase in profits. The null hypothesis that inventory management did not have a significant effect on profitability was thus supported. The results of the individual regression of IHP with profitability indicated that inventory days predicts 13% of the change in profit as measured by net income and 23% of the change in WCM as measured by the return on assets. This indicates a low predictive power on working capital. The findings of the research are consistent with the findings of Gul et al (2013) , Raheman, Afza, Qayyum and Bodla (2010) , Bagchi, Chakrabarti and Roy (2012) and inconsistent with the findings of Mathuva (2010).

#### **4.6.4 Effect of Cash Conversion Cycle on Profitability**

The research observed that companies had long cash conversion cycles. The cash conversion cycle was noted to have a positive but weak correlation with return on assets and net income. The regression coefficient indicated a positive but insignificant relation (at 5% significance level) between CCC and the two measures of profitability. We thus did not reject the null hypothesis that cash management does not have a significant effect on profitability. The results of the individual regression of CCC with profitability indicated that inventory days explains 5% of the change in profit as measured by net income and 7 % of the change in WCM as measured by the return on assets. The Wald statistic in relation to modelling the predictive power of CCC on profitability was low indicating that it may not be a key consideration in predicting company profitability. This suggests that many of the construction and allied firms manage the elements of cash management, debtor management, payables management and inventory management independent of each other and thus the changes in the elements did not result in CCC having a significant impact on profitability. Our findings of the positive relation between cash conversion cycle and profitability are consistent with the findings of Babatunde and Akeju (2016) and Akoto,

Awunyo-Vitor and Angmor (2013). The findings however contradict the empirical evidence by Malik and Bukhari (2014) and Oladipupo and Okafor (2013).

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

The chapter presents a summary of the research carried out in terms of the objectives, methodology and the findings of the data analysis carried out. The conclusions of the research based on the data analysis and literature review carried out are presented. The section further sets out the recommendations to the stakeholders, limitations to the study and the contributions to knowledge. Based on the research findings, suggestions for further research have been made.

#### **5.2 Summary**

The objective of the research was to determine the effect of working capital management on the profitability of construction and allied firms listed at the Nairobi Securities Exchange, Kenya. More specifically, the research sought to determine the effect of cash management, inventory management, debtors management and creditors management on the profitability of construction and allied firms listed at the NSE, Kenya. This is because construction and allied firms are a key industry in the achievement of Kenya's vision 2030. In addition, the sector had been facing challenges in terms on increased competition from imported products, erratic profits and reduced access to credit. The researcher thus sought to find out if the companies could achieve profitability by managing their internally generated resources in the form of working capital.

The study employed a descriptive research design. The researcher used secondary data from the audited financial statements of the target companies to conduct the analysis. Data was collected using a document review guide. The research adopted a census approach where the financial data over a seven year period, 2010 to 2016, was reviewed. Data analysis involved qualitative and quantitative procedures. Descriptive analysis presented the sector distribution and duration of listing at NSE of the companies by means of charts. Quantitative panel data analysis was undertaken using STATA software where diagnostic

tests and inferential analysis were carried out. Diagnostic tests entailed tests of normality, multicollinearity and heteroscedasticity. Inferential analysis involved conducting regression analysis on the data. The analysis indicated that the data was stationary and normally distributed. The presence of multicollinearity in the data was ruled out but the presence of heteroscedasticity was noted in the data. According to previous literature, this was an expected phenomenon in panel data. Consequently model estimation was by use of fixed effects as opposed to ordinary least square regression.

On cash management, the research found that for the period under review, the companies had long cash conversion cycles averaging five months and with a standard deviation of approximately three months. The cash conversion cycle was noted to have a weak correlation with Return on Assets and net income. The regression coefficient indicated a positive but insignificant relation (at 5% significance level) between CCC and the two measures of profitability; net income and return on assets. We thus did not reject the null hypothesis that cash management does not have a significant effect on profitability. The Wald statistic in relation to modelling the predictive power of CCC on profitability was low indicating that it may not be a key consideration in predicting company profitability.

Our investigation of the effect of inventory management on profitability indicated that inventory days had a negative and weak correlation with profitability as measured by Return on Assets (ROA) and Net Income (NI). This relationship was noted as not significant at 0.05 significance level. The research noted that inventory conversion days were relatively long and averaged approximately four months with a standard deviation of 3.5 months. The findings of fixed effects estimation also indicated that inventory days had a negative relation with profitability as measured by ROA and net income and this relationship was noted as not significant at 0.05 significance level. The null hypothesis that inventory management did not have a significant effect on profitability was thus supported. The findings of the Wald test, however, indicated that the IHP is a relevant estimator of relationship between working capital management and profitability and its exclusion in the profitability models may distort the output.

On the effect of debtor management on profitability, the study noted that the companies under review had moderate collection periods that averaged three months. A negative correlation but weak correlation was noted between the collection period with profitability as measured by the return on assets and net income. Debtor days was noted to have inverse relationship with profitability as demonstrated by the negative coefficient in the regression analysis. This relationship was noted as not significant at 0.05. The null hypothesis that receivables management did not have a significant effect on profitability was accepted. The findings of the Wald test however indicate that the ACP should be included in estimating the relationship between working capital and profitability for both models.

Our findings on the effect of creditor management on profitability, indicated that the payments period for construction and allied firms had a positive and weak correlation with profitability as measured by Return on assets and Net income. In addition, creditor days was noted to have a positive but insignificant relation with profitability in the two regression models. The null hypothesis that creditors management did not have a significant effect on profitability was not rejected. The findings of the Wald test however indicate that the APP should be included in estimating the relationship between working capital and profitability for both models. When individually regressed against profitability, the variable explains 40% of ROA and 42% of Net income.

### **5.3 Conclusion**

The study makes several conclusions based on the findings on each specific objective as captured in this section. Regression model 1a that models the relationship between ROA and WCM has a strong predictive value. It indicates that the model explains up to 78% of the relationship between WCM and ROA. On the other hand, Model 1b indicates that that working capital explains a small portion of profitability (28%). When the individual components of working capital are regressed against the two measures of profitability, the research found that accounts payable days and accounts collection period are the strongest determinants of profitability while CCC is a weak determinant of profitability. The weak explanatory power of WCM components on profitability as noted in the multiple regression model 1b, indicates that other elements that make up net income such as interest and taxes,

greatly affect the profitability model. In addition, the low significance factor for the various inputs in jointly influencing the profitability in the construction and allied sector indicates that managers of companies in this industry have been inefficient in managing the components of working capital to improve profitability.

Our findings also suggest that the relationship between working capital and profitability varies across industries based on the prevailing economic situations. Jagongo and Makori in (2013) carried out a research of the effect of working capital on the profitability of manufacturing sectors between the years 2003 and 2012. Their study found a significant influence of WCM on profitability. This is in contrast to the findings of this study which, indicate an insignificant influence (at 0.05) of working capital on profitability.

With regards to assessment of the effect of inventory management on profitability indicated that inventory days has a negative relationship with profitability as measured by ROA and Net. A negative relationship between the inventory days and profitability indicates that the companies are required to convert inventory to sales quickly and to avoid high levels of stock that result in high storage and ordering costs. In addition organizations should optimize their ordering quantity and time to avoid stock build up. Organizations should thus focus on optimizing inventory levels in the organization.

An inverse relation between the accounts collection period and profitability as measured by ROA and net income indicates that a delay in collecting cash from debtors will result in a decrease in profits due to the increased risk of default of debtors. Due to an increase in competition from imported products in the Kenyan market, companies operating in this industry have challenges converting inventory to sales and collecting cash from debtors and thus lengthen the payment period to ensure that working capital is on hand to settle day to day expenses. A long payment period also points to challenges in obtaining cash from other sources. This is in line with the findings in the Kenya market where credit access was reduced after the introduction of the interest rate cap in the year 2016 (CBK ,2017). Managers should thus find an optimum accounts payment period that balances the benefits on internal liquidity with the negative implications of delaying payments to suppliers.

The study found a positive but insignificant relationship between profitability and the cash conversion cycle. This indicates that in many of the construction and allied firms manage the elements of cash management, debtor management, payables management and inventory management independent of each other and thus the changes in the elements have not resulted in CCC having a significant impact on profitability.

#### **5.4 Recommendations**

The study recommends that managers of construction and allied forms should monitor the duration of sales credit and work towards reducing it so as to ensure profitability. Procurement managers should monitor inventory levels and reorder inventory based on demand to avoid tying up cash resources in stock so as to increase company profitability. The study further recommends that managers of such firms should undergo training to improve their skills on the management of working capital. The Kenyan government should put in place laws and policies to create a better operating environment for local construction and allied companies. Such policies may include protectionist laws and easing the cost of credit to enable the companies return to profitability.

#### **5.5 Limitations of the study**

The study faced a few limitations which are worth noting. The study focused on the performance of listed construction and allied companies at the NSE, Kenya between the years 2010 and 2016. Due to the sector specific characteristics such as heavy investment in inventory, the findings of our research may not be easily generalized to industries operating in other sectors. The study made use of secondary data. Failure to use primary data implied that information rich data that could have been obtained from primary sources in relation to the companies was not included in the study.

#### **5.6 Contributions to Knowledge**

The study contributes to knowledge by providing the findings on the impact of working capital management on profitability specific to the construction and allied sector in Kenya. Empirical evidence (on working capital management in Kenya) focused more on banks and manufacturing industries unlike firms in Construction and Allied Sector at NSE,



Kenya. The study further contributes to finance theory and practice by introducing a different perspective to the relationship between the working capital components and profitability. The study found that the average payments period and cash conversion cycle have a positive and insignificant relation with profitability while the inventory holding period and average collection period have a negative relation with profitability.

### **5.7 Areas for Further Research**

Unique findings of the study present a basis for further studies to be carried out. Empirical research highlights the importance of working capital management in increasing profitability especially in cases where companies operate in challenging economic environments such as competition and low access to credit. The findings of our study indicate that companies in the construction and allied sector have been inefficient in managing working capital despite operating under tough economic conditions. The researcher recommends that future research should be carried out across other sectors in Kenya to assess their efficiency of working capital management when operating under tough economic conditions

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## Appendix I: Letter from Graduate School



KENYATTA UNIVERSITY  
GRADUATE SCHOOL

E-mail: [dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 810901 Ext. 4150

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

Internal Memo

FROM: Dean, Graduate School

DATE: 21<sup>st</sup> May, 2018

TO: Christine Andisi  
C/o Accounting and Finance Dept.

REF: D53/OL/CTY/26682/2015

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL

This is to inform you that Graduate School Board at its meeting of 9<sup>th</sup> May, 2018 approved your Research Project Proposal for the M.B.A Degree Entitled, "Working capital management and profitability of firms listed under construction and allied sector at the Nairobi Securities exchange, Kenya".

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

A handwritten signature in blue ink, appearing to read 'Elijah Mutua'.

ELIJAH MUTUA  
FOR: DEAN, GRADUATE SCHOOL

c.c. Chairman, Accounting and Finance Department.

Supervisor: Dr. Job Omagwa  
C/o Department of Business Administration  
Kenyatta University

EM/jm

## Appendix II: Letter from NACOSTI



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,  
2241349,3310571,2219420  
Fax: +254-20-318245,318249  
Email: dg@nacosti.go.ke  
Website : www.nacosti.go.ke  
When replying please quote

NACOSTI, Upper Kabete  
Oit'Waiyaki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/18/62201/23165**

Date: **20<sup>th</sup> June, 2018**

Christine Andisi Lungaho  
Kenyatta University  
P.O. Box 43844-00100  
**NAIROBI.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Working capital management and profitability of firms listed under construction and allied sector at the Nairobi Securities Exchange, Kenya”* I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **19<sup>th</sup> June, 2019.**

You are advised to report to **the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

  
**BONIFACE WANYAMA**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Nairobi County.

The County Director of Education  
Nairobi County.

*National Commission for Science, Technology and Innovation is ISO9001:2008 Certified*

**Appendix III: Document Review Guide**

Company Name:.....

<b>Year/ Variables</b>	2010	2011	2012	2013	2013	2015	2016
	KShs '000'	KShs '000'	KShs '000'	KShs '000'	KShs '000'	KShs '000'	KShs '000'
Sales							
Cost of sales							
Profit after tax							
Inventory							
Total Assets							
Debtors							
Creditors							

**Source** :( *Researcher, 2018*)

#### **Appendix IV: List of Construction and Allied Firms**

1. Athi River Mining
2. Bamburi Cement Limited
3. Crown Berger Limited
4. East Arica Cables limited
5. East Africa Portland Cement

**Source** :( *NSE, 2017*)