

**IMPACT OF WORKING CAPITAL MANAGEMENT ON THE PROFITABILITY  
OF KENYA SUGAR FIRMS**

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requirements of the Degree of Master of Business Administration (Finance) of  
Kabarak University**

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**DECLARATION**

This research project is my original work and to the best of my knowledge it has not been presented for a degree award in any other university.

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*15.07.2014*  
.....  
**Date**

## **DEDICATION**

This research project is dedicated to my entire family, Lucy, Stacy, Oscar and Nicole. Your patience and encouragement, understanding, support and co-operation has enabled me to successfully reach this far in my academic life.

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## ABSTRACT

Working capital management is a key issue in financial decision making since its overall goal is to ensure that a firm is able to continue its operations and that it has sufficient ability to satisfy both maturing short-term debt and upcoming operational expenses which directly affects the liquidity and eventual profitability of the company. Companies can thus use working capital management as an approach to influence their profitability. This project studied the impact of working capital management on the profitability of sugar firms in Kenya for a period of 10 years; financial years 2003-2012. Using quantitative method approach and based on panel data set, the study targeted sample of eleven (11) Kenya sugar firms and obtained data from seven (7) firms representing 63.6% response. The different variables of working capital management studied include, the accounts collection period, inventory turnover in days, accounts payment period, cash conversion cycle and current ratio, debt ratio, size of the firm and financial assets to total assets ratio on the net operating profitability of these firms. Secondary data from the sampled sugar firms was reviewed and analyzed to show the relationship between the variables. Data was then analyzed on quantitative basis using Pearson's correlation and OLS regression analysis. The results showed that there is statistical significant relationship between profitability and working capital management implying that firm managers can create profits or value for their companies and share holders by correctly handling the cash conversion cycle and by keeping each different component of working capital to a possible optimum level. The results of this study generally support most of the findings of previous studies done on this subject matter. Additional modeling by ownership shows that privately owned sugar firms had a much stronger linear relationship between profitability and working capital management. Finally, the study identified the need for further research on the relationship between working capital management and profitability of Kenya sugar firms through to the earlier periods before liberalization when these firms had little competition and were subjected to massive political patronage with little accountability.

**Key words:** Accounts Collection Period, Accounts Payable Period, Cash Conversion Cycle, Inventory Turnover, Profitability and Working Capital Management.

## TABLE OF CONTENTS

ITEM	PAGE
DECLARATION.....	i
DEDICATION.....	ii
ACKNOWLEDGEMENT.....	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES.....	viii
LIST OF FIGURES.....	x
LIST OF ABBREVIATIONS.....	xi
<b>CHAPTER ONE: INTRODUCTION.....</b>	<b>1</b>
1.0 Introduction.....	1
1.1 Background Information.....	1
1.2 Working Capital Management.....	3
1.3 Statement of the Problem.....	6
1.4 General Objective of the Study.....	6
1.4.1 Specific Objectives of the Study.....	6
1.5 Research Hypothesis.....	7
1.6 Significance of the Study.....	7
1.7 Relevance of the Study.....	8
1.8 The Scope and Limitations of the Study.....	8
1.9 Definition of key Terms and Concepts.....	9
1.9.1 Accounts Collection Period (ACP).....	9
1.9.2 Accounts Payable Period (APP).....	10
1.9.3 Cash Conversion Cycle (CCC).....	11
1.9.4 Inventory Turnover in Days (ITO).....	12
1.9.5 Profitability (GOP).....	14
1.9.6 Profitability and Liquidity.....	16
<b>CHAPTER TWO: THE LITERATURE REVIEW.....</b>	<b>18</b>
2.0 Introduction.....	18
2.1 Theoretical Framework.....	18

2.1.1 Working Capital Management Cycle.....	18
2.1.2 Working Capital Policy.....	22
2.2 Empirical Review.....	23
2.3 Research Gaps.....	28
2.4 Conceptual Framework.....	28
2.4.1 Dependent Variable.....	29
2.4.2 Independent Variables.....	29
2.4.3 Control Variables.....	30
<b>CHAPTER THREE: RESEARCH METHODOLOGY.....</b>	<b>31</b>
3.0 Introduction .....	31
3.1 Research Design.....	31
3.2 Population.....	32
3.3 Sampling Frame.....	32
3.3.1 Sample and Sampling Technique.....	32
3.4 Data Collection Procedure.....	34
3.5 Data Analysis and Presentation.....	35
<b>CHAPTER FOUR: DATA ANALYSIS, PRESENTATION &amp; INTERPRETATION... 36</b>	
4.0 Introduction.....	36
4.1 Data Analysis.....	36
4.2 Descriptive Analysis.....	37
4.3 Correlation Analysis.....	38
4.3.1 Effect of Accounts Collection Period on Profitability.....	38
4.3.2 Effect of Accounts Payable Period on Profitability.....	39
4.3.3 Effect of Cash Conversion Cycle on Profitability.....	39
4.3.4 Effect of Inventory Turnover on Profitability.....	39
4.4 Regression Models.....	41
4.4.1 Regression Modeling by Accounts Collection Period (Model I).....	44
4.4.2 Regression Modeling by Inventory Turnover in days (Model II).....	46
4.4.3 Regression Modeling by Accounts Payable Period (Model III).....	47
4.4.4 Regression Modeling by Cash Conversion Cycle (Model IV).....	49
4.4.5 Regression Modeling by zones.....	51

4.4.6 Regression Modeling by ownership.....	55
<b>CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATION.....</b>	<b>58</b>
5.0 Introduction.....	58
5.1 Conclusions.....	58
5.2 Recommendations.....	59
5.2.1 Accounts Collection Period.....	59
5.2.2 Accounts Payables Period.....	59
5.2.3 Cash Conversion Cycle.....	59
5.2.4 Inventory Turnover in days.....	60
5.3 Areas for further research.....	60
<b>REFERENCES.....</b>	<b>61</b>
<b>APPENDICES.....</b>	<b>68</b>



## LIST OF TABLES

<b>TABLE</b>	<b>PAGE</b>
Table 3.1 Sugar firms classified in different zones.....	33
Table 4.1 Descriptive Statistics.....	37
Table 4.2 Correlation Matrix.....	40
Table 4.3 Regression Coefficients.....	42
Table 4.4 Regression Modeling by ACP (Model I) Summary.....	44
Table 4.5 Regression Modeling by ACP (Model I) ANOVA .....	44
Table 4.6 Regression Modeling by ACP (Model I) Coefficients.....	45
Table 4.7 Regression Modeling by ITO (Model II) Summary .....	46
Table 4.8 Regression Modeling by ITO (Model II) ANOVA .....	46
Table 4.9 Regression Modeling by ITO (Model II) Coefficients.....	46
Table 4.10 Regression Modeling by APP (Model III) Summary .....	47
Table 4.11 Regression Modeling by APP (Model III) ANOVA.....	48
Table 4.12 Regression Modeling by APP (Model III) Coefficients.....	48
Table 4.13 Regression Modeling by CCC (Model IV) Summary.....	49
Table 4.14 Regression Modeling by CCC (Model IV) ANOVA.....	49
Table 4.15 Regression Modeling by CCC (Model IV) Coefficients.....	50
Table 4.16 Regression Modeling by Zones.....	51
Table 4.17 Kakamega Zone Model Summary.....	52
Table 4.18 Kakamega Zone Model ANOVA .....	52
Table 4.19 Kakamega Zone Model Coefficients.....	52
Table 4.20 Nyando Zone Model Summary.....	53
Table 4.21 Nyando Zone Model ANOVA .....	53
Table 4.22 Nyando Zone Model Coefficients.....	53
Table 4.23 Southern Nyanza Zone Model Summary.....	54
Table 4.24 Southern Nyanza Zone Model ANOVA .....	54
Table 4.25 Southern Nyanza Zone Model Coefficients.....	54
Table 4.26 Regression Modeling by Ownership.....	55
Table 4.27 Categorization by Government Ownership Model Summary .....	56
Table 4.28 Categorization by Government Ownership Model ANOVA .....	56

Table 4.29 Categorization by Government Ownership Model Coefficients .....	56
Table 4.30 Categorization by Private Ownership Model Summary .....	57
Table 4.31 Categorization by Private Ownership Model ANOVA .....	57
Table 4.32 Categorization by Private Ownership Model Coefficients .....	57

## LIST OF FIGURES

<b>FIGURES</b>	<b>PAGE</b>
Figure 2.1 Typical working capital cycle.....	19
Figure 2.2 Conceptual framework.....	29

## **LIST OF ABBREVIATIONS**

<b>ACP</b>	Accounts Collection Period
<b>ANOVA</b>	Analysis of Variances
<b>APP</b>	Account Payable Period
<b>CCC</b>	Cash Conversion Cycle
<b>CFO</b>	Chief Financial Officer
<b>COGS</b>	Cost of Goods Sold
<b>COMESA</b>	Common Market for Eastern and Southern Africa
<b>EOQ</b>	Economic Order Quantity
<b>GOP</b>	Gross Operating Profit
<b>GAIN</b>	Global Agricultural Information Network
<b>GOK</b>	Government of Kenya
<b>ITO</b>	Inventory Turnover in Days
<b>KSB</b>	Kenya Sugar Board
<b>KSI</b>	Kenya Sugar Industry
<b>LAPSSET</b>	Lamu Port and South Sudan Ethiopia Transport
<b>NPM</b>	Net Profit Margin
<b>NSE</b>	Nairobi Securities Exchange
<b>OLS</b>	Ordinary Least Squares
<b>PASW</b>	Predicative Analytic Software
<b>ROA</b>	Return on Assets
<b>ROCE</b>	Return on Capital Employed
<b>SEA</b>	Strategic Environmental Assessment
<b>SONY</b>	South Nyanza Sugar Factory
<b>US</b>	United States
<b>USDA</b>	United States Department of Agriculture
<b>VIF</b>	Variable Inflation Factor
<b>WC</b>	Working Capital
<b>WCM</b>	Working Capital Management
<b>WCP</b>	Working Capital Policy

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Introduction**

This chapter includes the background information, overview of the working capital management, statement of the problem, objectives, hypothesis, significance, justification, the scope and limitations of the study and finally, definition of the key concepts.

#### **1.1 Background Information**

Working capital management has become a very widely discussed topic since the financial turmoil of the late 2000's. Firms search for liquidity and operational efficiency through minimizing their investment in working capital. Working capital can be used to smooth out liquidity when companies try to keep a certain level of fixed investments (Fazzari and Petersen 1993).

The sugar industry is both strategic and political. The industry ensures for food security, improves rural lives and provides sustainable livelihoods for millions of Kenyans but it has also suffered heavy government intervention (Kenya Sugar Board, 2010). The Kenyan sugarcane industry is a major employer and contributor to the national economy. It is one of the most important crops alongside tea, coffee, horticulture and maize. The industry directly supports approximately 250,000 small-scale farmers who supply over 92% of the cane milled by the sugar companies. An estimated six million Kenyans derive their livelihoods directly or indirectly from the industry (Kenya Sugar Board, 2010).

In 2008, the industry employed about 500,000 people directly or indirectly in the sugarcane business chain from production to consumption. In addition, the industry saves Kenya in excess of USD 250 million in foreign exchange annually and contributes tax revenues to the exchequer (VAT, Corporate Tax, personal income taxes, cess). In the sugar-belt zones, the sugar industry contributes to infrastructure development through road construction and maintenance, construction of bridges, and to social amenities such as education, health, sports and recreation facilities (Kenya Sugar Board, 2010).

The sugar industry provides raw materials for other industries such as bagasse for power cogeneration and molasses for a wide range of industrial products including ethanol. Molasses is also a key ingredient in the manufacturing of various industrial products such as beverages, confectionery and pharmaceuticals. By far, the largest contribution of the industry is its silent contributions to the fabric of communities and rural economies in the sugar belt. Farm households and rural businesses depend on the injection of cash derived from sugarcane. The survival of small towns and market places is also dependent on the incomes from the same. The industry is intricately weaved into the rural economies of most areas in Western Kenya.

Millers are a critical node in the sugar industry because of the role they play in value addition. The profitability and hence strength of the industry depends on how effectively and efficiently the millers operate. The Kenya sugar industry is under constant threat of collapsing due to perennial challenges. According to the Kenya sugar industry strategic plan 2010 – 2014, the sugar sub sector is facing several challenges including capacity underutilization, lack of regular factory maintenance, poor transport infrastructure and weak corporate governance that has resulted in mismanagement of the industry.

Consequently, most factories have accumulated large debts amounting Kenya shillings 58 billion. The Kenya sugar industry, just like the sugar sector in Pakistan suffer severe liquidity problems as most of the millers do not have enough cash to pay a good price to suppliers on a timely basis. This problem gets worse when millers are not able to pay their legal liabilities and the banks are not willing to advance any further loans to them (Malik and Athar, 2012). Sugar processing is capital intensive requiring large fixed investments and the mills must acquire adequate working capital to cover the period between the harvest when mills buy cane, and the eventual sales of processed sugar (World Bank, 1996).

Despite the huge debts accumulated by most millers in the sugar sub sector, the Kenya's sugar industry needs to become more efficient in order to remain competitive after the lapse of COMESA safeguard (Kenya's LAPSSET Corridor Sugarcane Production and

Processing Investment Opportunity, 2012). However, as it is clearly noted, local millers appear unprepared to compete with other sugar producers in the region due to a myriad of additional problems such as high cost of production and taxation compared to the largest sugar producers within COMESA trade bloc such as Mauritius, Egypt, Malawi, and Zambia (GAIN Report; Kenya Annual Sugar Report, 2013).

It is against this gloomy background about Kenya Sugar Industry that this project sought to examine the impacts that working capital management might have on the profitability of all the operational firms under this sector listed in Appendix II.

## **1.2 Working Capital Management**

Working capital refers to the firm's investment in short-term assets like cash, marketable securities, inventory, accounts payable and accounts receivable (Brigham and Ehrhardt, 2008). Working capital is the life blood of every business concern (Kurfi, 2003). Business firm cannot make progress without adequate working capital. Inadequate working capital means shortage of inputs, whereas excess of it leads to extra cost. So the quantum of working capital in every business firm should be neither more nor less than what is actually required. The management has to see that funds invested as working capital in their organization earn return at least as much as they would have earned return if invested anywhere else (Patel, 2011).

Working capital management is concerned with problem that arises in attempting to manage the current liabilities and current assets and the interrelationship that exists between them. The goal of working capital management is to manage a current asset in such a manner so that the satisfactory level should be maintained. Working capital management that aims at maintaining an optimal balance between each of the working capital components, that is, cash, receivables, inventory and payables must form the fundamental part of the any corporate strategy aimed at value creation. Management of working capital is a financial term that aims at maintaining a *Pareto Optimality* between the variables that constitute working capital components (Dumbu and Musingafi, 2010).

Working capital management has become one of the most important issues in firms and yet many financial executives struggle to identify the basic working capital drivers and the appropriate level of working capital to hold so as to minimize risk, effectively prepare for uncertainty and improve the overall performance of their businesses. The existence of efficient working capital management practices can make a substantial difference between the success and failure of a company. According to Deloof, (2003), it is also an important source of competitive advantage in businesses.

In any business, the ability to exploit every opportunity and to continually seek for more practical business tools and techniques that aims to improve the financial performance of a firm is of importance. Accounting reports will provide different measures of a firm's financial performance like net income, return on asset or return on equity and although not all business activities are for profit, business needs resources to support all its activities. Good business practice dictates that business resources should be managed efficiently. Working capital, for most firms, constitutes a big part of their investment. 'Tying up cash in working capital is as much as an investment as is tying up cash in plant and equipment', Louderback, et.al. (2000).

Business managers cannot therefore overlook working capital management and its effect on profitability of the firm. Working capital management is the administration of the whole aspects of both current assets and current liabilities Smith (1980). Cash maintenance at acceptable levels is critical for the purposes of settling liabilities on maturity and using the investment opportunities that are indicative of the flexibility of the economic entity, thus the availability of material needed for production in order to enable the firm to meet the needs of its customers indicates the importance of working capital.

Previous research findings on working capital management practices indicate that if financial management practices, especially working capital management of the agribusiness firms, generally small in size, could be significantly improved, then few firms would fail. Peel and Wilson (1996) assert that these firms should adopt proper working



capital management practices in order to reduce the probability of business closure, and enhance business performance.

In order to improve the working capital management practices, it is essential for the finance managers to adopt a proper approach of working capital decisions making to drive their respective firms towards success in order to generate the value for the shareholders. Ross, et al., (2008) contend that the most important job of a financial manager is to create value from the firm's capital budgeting, financing, and net working capital activities. Working capital is important to the financial health of businesses of all sizes in two folds, i.e. the amounts of money invested in working capital are often high in proportion to the total assets employed and so it is paramount that these amounts are used in an efficient way, and management of working capital affects the liquidity and the profitability of a firm and consequently its net worth.

Working capital management aims at maintaining a balance between liquidity and profitability while conducting the day-to-day operations of a business concern. Brigham and Ehrhardt, (2008) conclude that working capital management involves two basic questions; firstly, what is the appropriate amount of working capital, both in total and for each specific account, and secondly, how should working capital be financed?. The importance of working capital management is therefore not questionable nor can it be ignored.

An array of issues worth noting while discussing this subject matter in this study context includes; the importance of working capital management in general, the importance of working capital management in the sugar industry, whether firms manage working capital in an effective and efficient way in Kenya and finally, whether efficient working capital management have any effect on the profitability of the sugar firms in Kenya.

### **1.3 Statement of the Problem**

The global financial crisis of the late 2000's highlighted the importance for firms to maintain a healthy cash position in order to avoid bankruptcy. Brigham and Houston (2003) found out that finance managers spend about 60% of their time devoted to working capital management yet companies still fail due to the fact that finance directors seem unable to correctly forecast their inventory, receivables, payables and underlying cash requirements. Sugar processing is capital intensive requiring large fixed investments and the mills must acquire adequate working capital to cover the period between the harvest when mills buy cane, and the eventual sales of processed sugar (World Bank, 1996). Even though a number of studies have been conducted in Kenya and other countries on WCM and firm profitability, these studies have produced conflicting results and moreover, no study has been done on WCM in the sugar sector in Kenya. The question however is, can working capital management add to firm's profitability and shareholder value in the sugar industry? This is the critical question that formed the basis of study in this project. This study therefore seeks to fill this gap by providing comprehensive information on the relationship between WCM and profitability on sugar firms in Kenya using more recent data.

### **1.4 General Objective of the Study**

To study the impact of working capital management on the profitability of sugar firms in Kenya during the period between the years 2003 to 2012.

#### **1.4.1 Specific Objectives of the Study**

- (i) To determine the relationship between accounts collection period and sugar firm's profitability.
- (ii) To ascertain the relationship between accounts payable period and the sugar firm's profitability.
- (iii) To establish relationship between the cash conversion cycle and sugar firm's profitability.
- (iv) To establish the relationship between inventory turnover in days and sugar firm's profitability.

## **1.5 Research Hypothesis**

The following hypotheses are stated and would be tested for the study findings.

**Hypothesis 1:** The first hypothesis of this study is to find out if in-efficient accounts collection policy can decrease sugar firms' profitability

*H1: Inefficient accounts collection period has a negative impact on sugar firm's profitability.*

**Hypothesis 2:** The second hypothesis is to test whether accounts payable period and profitability have any notable relationship.

*H2: There is no relationship between accounts payable period and sugar firm's profitability of the firm.*

**Hypothesis 3:** The third hypothesis is used to test whether cash transformation cycle does influence the company profitability.

*H3: Longer cash conversion cycle decreases sugar firm's profitability.*

**Hypothesis 4:** The fourth hypothesis is testing to what extent does the average period of inventory turnover influence the company profitability

*H4: Sugar firm's profitability is negatively influenced by the inventory turnover days.*

## **1.6 Significance of the Study**

Whereas working capital management is a widely researched field of study, this study specifically focuses on Kenya's sugar sub-sector where existence of any similar published previous research does not exist. This study also seeks to validate or invalidate some of the previous studies on the relationship between working capital management and

profitability of the sample companies where previous research has been conducted. Finally, the study benefits the researcher in obtaining new knowledge about the problem area and contributing to the existing knowledge.

### **1.7 Relevance of the Study**

As the Kenyan government seeks to fully privatize the sugar industry in readiness for competition with other sugar producing countries within the COMESA region, it is hoped that the findings of this study will be beneficial for managers as it gives them more insight when they make financial decisions, especially the decision on firm liquidity by using working capital. It also gives the managers insights about how to create the firm value by efficient working capital management.

Investors can also gain greatly from this research by obtaining some knowledge about how to assess a company's financial health by looking at the working capital management thus enabling them to make correct investment decisions. Finally, the findings of this study will benefit finance and accounting students as it will help them to have a much deeper understanding on how working capital management works and the impact of working capital management on firm's value.

### **1.8 The Scope and Limitations of the Study**

The scope of this study is limited to the sugar industry firms only and is subject to the review of the sugar firm's operations for period of ten financial years between the years 2003-2012. The finding of this study can only apply to the sugar industry as the application of the result from sugar industry can be limiting to other industry.

## **1.9 Definition of Key Terms and Concepts**

### **1.9.1 Accounts Collection Period (ACP)**

Businesses have either products or services to sell to their customers. They also want to maximize their sales. So, in order to increase the level of their sales they use different policies to attract customers and one of them is offering a trade credit. Trade credit basically refers to a situation where a company sells its product now to receive the payment at a specified date in the future. Fabozzi and Peterson (2003) mentioned that when a firm allows customers to pay for goods and services at a later date, it creates accounts receivable or referred to as trade credit.

Shapiro (2002) argues that firms grant trade credit to customers, both domestically and internationally because they expect investment in receivables to be profitable either by expanding sales volume or by retaining sales that otherwise would be lost to competitors. Account receivables also have opportunity cost associated with them, because company cannot invest this money elsewhere until and unless it collects its receivables. Whereas more account receivables can raise the profit by increasing sales, it is also possible that because of high opportunity cost of invested money in account receivables and bad debts the effect of this change might turn difficult to realize. Hence calls for careful analysis and proper management is compulsory task of company's credit managers.

The goal of receivables management is therefore to maximize the value of the firm by achieving a tradeoff between risk and profitability. For this purpose, the finance manager has to obtain optimum value of sales, control the cost of receivables, cost of collection, administrative expenses, bad debts and opportunity cost of funds blocked in the receivables. Financial manager has to maintain the debtors at minimum according to the credit policy offered to customers, offer cash discounts suitably depending on the cost of receivables and opportunity cost of funds blocked in the receivables (Gallagher and Joseph, 2000). Indeed trade credit management has to look through cost and benefit analysis including credit and collection policies of companies in maintaining receivable.

Companies can monitor how well accounts receivable are managed using aging schedules and financial ratios. In aging analysis, a company's account receivables are classified into different categories based on number of days they are past due after sales such as 1 to 30 days, 31 to 60 days, 61 to 90 days and so on and it helps managers to get a more detailed picture of collection efforts. The schedule can represent the receivables according to how many there are in each age group or according to the total dollars the receivables represent in each age group. The higher the number of accounts in the shortest term groups the faster the collection or efforts are made (Fabozzi and Peterson, 2003).

Financial ratio can be used to get an overall picture of how fast credit manager collect accounts receivable. Therefore, the average collection period (ACP) represents the average number of days for which a firm has to wait before its debtors are converted into cash. It is calculated by dividing accounts receivable by sales and multiplying the result by 365 and written as:  $\text{Accounts collection period (ACP)} = (\text{Receivables} / \text{Sales}) * 365$

This ratio measures the quality of debtors. A short collection period implies prompt payment by debtors and reduces the chances of bad debts. Similarly, a longer collection period implies too liberal and inefficient credit collection performance. It is difficult to provide a standard collection period of debtors (Brigham and Houston, 2003).

### **1.9.2 Accounts Payable Period (APP)**

Account payable is defined as a debt arising from credit sales and recorded as an account receivable by the seller and as an account payable by the buyer. Firms generally make purchases from other firms on credit, recording the debt as an account payable. Accounts payable is the largest single category of short-term debt, representing about 40% of the current liabilities of the average nonfinancial corporation (Brigham and Houston, 2003)

Arnold (2008) describes account payable as the cheapest and simplest way of financing an organization. Accounts payable are generated when a company purchases some products for which payment has to be made no later than a specified date in the future. Accounts payable are a part of all the businesses and have some advantages associated with it e.g. it

is available to all the companies regardless of the size of the company and earlier payment can bring cash discount with it. Companies not only need to manage their account payables in a good way but they should also have the ability to generate enough cash to pay the mature account payables.

When a company fails to generate enough cash to fulfill the mature account payables then such a situation will pass the negative signal to the market and it will directly affect the share price, relationship with creditors and suppliers. Hence, in this situation it will be difficult for the company to raise more funds by borrowing money or get more supplies from the suppliers. One way of monitoring accounts payables is by the Accounts payment period (APP) or day's payables outstanding ratio which measures the average length of time between the purchase of materials or labor and the payment of cash for supplies (Brigham and Houston 2003). APP is calculated as:  $\text{Accounts payment period (APP)} = (\text{Payables} / \text{purchases}) * 365$

In general, if a company has a small number of accounts payable days, it could mean that the company is paying the bills very early or is taking advantage of purchase discounts (requiring early payment). On the other hand, if a company has a large number of accounts payable days, it could mean that it has low cash flows not sufficient to pay bills on time.

### **1.9.3 Cash Conversion Cycle (CCC)**

Cash conversion cycle is a time span between the payment for raw material and the receipt from the sale of goods. Weston and Brigham (1977) mentioned that firms typically follow a cycle in which companies purchase inventory, sell goods on credit, and then collect accounts receivable. For a manufacturing company it can be defined more precisely as, a time for which raw material is kept for the processing plus the time taken by the production process. And plus the time for which finished goods are kept and sold, including the time taken by the debtors to pay their liability, minus the maturity period of account payable. By this definition it is quite clear that longer cash conversion cycle requires more investment in the current assets.

Good cash conversion cycle is helpful for the organization to pay its obligations at a right time which will enhance the goodwill of a company. On the other hand, company with poor cash conversion cycle will not be able to meet its current financial obligations and will face financial distress. Cash conversion cycle is also used as a gauge to measure the aggressiveness of working capital policy. It is believed that longer cash conversion cycle corresponds to defensive working capital policy and shorter cash conversion cycle corresponds to aggressive working capital policy (Arnold, 2008).

Depending on the company policy, lowering CCC without increasing cost and reducing sales may be preferable for the firm to have a good position of liquidity. According to Brigham and Ehrhardt, (2008), 'the cash conversion cycle can be shortened by reducing the inventory conversion period by processing and selling goods more quickly, by reducing the receivables collection period by speeding up collections or by lengthening the payables deferral period by slowing down the firm's own payment'. In order to calculate the CCC one has to first calculate average collection period, inventory turnover in day and average payment period. The formula used to compute cash conversion cycle is represented as follows:  $CCC = \text{Average collection period} + \text{Inventory Turnover in day} - \text{Average Payment Period}$

#### **1.9.4 Inventory Turnover in Days (ITO)**

Inventory is an important component of current assets. It is the stock of physical goods for eventual sale and consists of raw material, work-in-process, and finished goods available for sale. Like with accounts receivable, inventory levels depend heavily upon sales. However, whereas receivables build up after sales have been made, inventory must be acquired ahead of sales. This is a critical difference, and the necessity of forecasting sales before establishing target inventory levels makes inventory management a difficult task (Brigham and Houston, 2003).

Inventory management refers to an optimum investment in inventories. It should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. Excess investment in inventories is unprofitable for the business and both



excess and inadequate investments in inventories are not desirable (Fabozzi and Peterson, 2003). The firm should operate within these two points. Additionally, proper inventory management requires close coordination among the sales, purchasing, production, and finance departments. The sales and marketing department is generally the first to spot changes in demand. These changes must be worked into the company's purchasing and manufacturing schedules, and the financial manager must arrange any financing needed to support the inventory buildup. Lack of coordination among departments, poor sales forecasts, or both, can lead to disaster (Brigham and Houston, 2003).

In general, the purpose of inventory management is to determine and maintain the optimum level of firm's investment on inventory. It also helps to hold the costs of ordering and carrying inventories to the lowest possible level. Other advantages of maintaining an ideal level of inventory includes; economies of scale to be gained through quantity and trade discounts, less risk of deterioration and obsolescence and reduced cost of insurance, Saleemi (1993). It is therefore not necessary for a firm to hold high level of raw material inventory if in fact a firm can order raw material on the daily basis, however they may be high ordering cost associated with such policy. Moreover, the delay in supply might stop the production. Similarly, firm can reduce its finished goods inventory by reducing the production and by producing the goods only to meet the current demand however such a strategy can also create trouble for the company if the demand for the product rises suddenly.

Furthermore, such a situation might cause the customer dissatisfaction and even a loyal customer can switch to the competitors brand. Therefore, the firm should have enough inventories to meet the unexpected rise in demand but the cost of holding this inventory should not exceed its benefit (Brealey and Myers, 2003). Companies want to keep the inventory at a level which maximizes the profit and this level is known as optimal level. Finance managers must therefore analyze the cost associated with inventory by carrying cost and ordering cost using economic order quantity.

Firm can monitor its inventory by interrogating through its financial ratios just like that of monitoring receivables. Inventory turnover ratio in days (ITO) indicates the number of time the stock has been turned over sales during the period and evaluates the efficiency with which a firm is able to manage its inventory. This ratio indicates whether investment in stock is within proper limit or not (Brigham and Houston, 2003). The ratio is calculated by dividing inventory by cost of goods sold and multiplying with 365 days. Inventory Turnover in Day (ITO) =  $(\text{Inventory} / \text{Cost of sales}) * 365$

In general there is no rule of thumb or standard for interpreting the inventory turnover ratio. The norms may be different for different firms depending upon the nature of industry and business conditions. However the study of the comparative or trend analysis of inventory turnover is still useful for financial analysis.

### **1.9.5 Profitability and Liquidity**

Saleemi (1993) lists four profitability ratios developed by financial experts that are used to measure the ability of the firm to convert sale into profit and earn profits on assets employed. These ratios include return on capital employed (ROCE), return on investments (ROI), profit margin and asset turnover. These ratios indicate the degree of success in achieving profit levels. ROCE or return on assets (ROA) is a superior measure of performance over the other tools since it relates to the profitability of the firm to the asset base. ROCE thus captures the efficiency with which a company uses its capital resources.

Profitability ratio is a measure of profit generated from the business and is measured in percentage terms e.g. percentage of sales, percentage of investments or percentage of assets. High percentage of profitability plays a vital role to bring external finance in the business since creditors, investors and suppliers are willing to invest their money in such a company (Fabozzi and Peterson (2003). Several measures of profitability which a company can use include;

Net profit margin (NPM): This is calculated as the percentage of each sale that remains after deducting interest, dividend, taxes, expenses and costs. In other words it calculates the percentage of profit a company is earning against its' per dollars sale. Higher value of

return on sale shows the better performance (Gitman, 1999).  $NPM = (\text{Earnings available for common stakeholder} / \text{Net sales}) * 100$

Return on asset (ROA): This ratio explains how efficient a company utilizes its available assets to generate profit. It calculates the percentage of profit a company is earning against per dollar of assets (Weston and Brigham (1977)). The higher value of ROA shows the better performance and it can be computed as follows:  $ROA = (\text{Earnings Available for Common Stockholders} / \text{Total Asset}) * 100$

Gross operation profit (GOP): This ratio explains that how efficient a company utilizes its operating assets. This ratio calculates the percentage of profit earned against the operating assets of the company (Weston and Brigham, 1977).  $\text{Gross operating profit} = (\text{Sales} - \text{COGS}) / (\text{Total asset} - \text{financial asset})$

**1.9.5.1 Liquidity ratio:** Liquidity ratio measures the short term solvency of financial position of a firm. These ratios are calculated to help comment upon the short term paying capacity of a concern or the firm's ability to meet its current obligations (Fabozzi and Peterson, 2003) and include the following:

Current ratio: This is defined as the relationship between current assets and current liabilities. It is a measure of general liquidity and it is the most widely used to make the analysis for short term financial position or liquidity of a firm (Fabozzi and Peterson (2003)). Current ratio can be calculated by dividing the total current assets by total current liability. Ideal level is 2:1 for current ratio.  $\text{Current ratio} = \text{current asset} / \text{current liability}$

Acid test ratio or quick ratio: This ratio tests the ability of a firm to pay its short term obligations as and when they become due. It is a very useful ratio used while measuring the liquidity position of a firm as it measures the firm's capacity to pay off current obligations immediately and is more rigorous test of liquidity than the current ratio. It is the ratio of liquid assets to current liabilities. Ideal level is 1:1 for acid test ratio.  $\text{Quick ratio} = \text{Current asset} - \text{inventory} / \text{Current Liabilities}$ .

Debt Ratio: This is a financial ratio that indicates the percentage of a company's assets that are provided via debt and is largely used for debt management by firms. The measure gives an idea to the leverage of the company along with the potential risks the company faces in terms of its debt-load (Fabozzi and Peterson, 2003). It can be calculated as dividing total debt by total assets. Debt ratio = Total debt / Total assets.

### **1.9.6 Relationship between liquidity and profitability**

Finance manager has to take various types of financial decisions like investment decision, finance decision, liquidity decision and dividend decision within certain frameworks. Even though from the viewpoint of the firm as a whole, profitability emerges as the prime consideration even if a particular unit may have to make a sacrifice, (Sharan, 2009), the finance managers are still always faced with the dilemma of liquidity and profitability and they have to strike a balance between the two.

Liquidity refers to a firm's cash and marketable securities position and its ability to meet its obligations, (Brigham and Ehrhardt, 2008). This means that the firm has to have adequate cash to pay bills as and when they fall due, and it also have sufficient cash reserves to meet emergencies and unforeseen demands, in all time. Yet profitability goal requires that funds of a firm should be utilized as to yield the highest return.

Liquidity and profitability are conflicting decisions, when one increases the other decreases. More liquidity results in less profitability and vice versa. The finance manager has to face this conflict as all the financial decisions involve both liquidity and profitability (Sharan, 2009). Creditors of the company always would want to see the company keeping the level of short term assets higher than the level of short term liabilities; this is because they want to secure their money. If current assets are in excess to current liabilities then the creditors feel secure, on the other hand managers of the firm will not think in the same way.

According to Meigs and Meigs (1993), in order for a firm to operate profitably and remain solvent it must have sufficient cash to pay its debts promptly. Every manager wants to pay

the mature liabilities but they also know that excess of current assets might be costly and idle resource will not produce any return. For example, having high level of inventory will raise warehouse expense. So rather than keeping excessive current assets, managers want to keep the optimal level of current assets, to a level which is enough to fulfill current liabilities. They also want to invest the excess amount to earn some return. Managers thus have to make a choice between two extreme positions, either they will choose the long term investments, investments in non current asset such as subsidiaries (equity), with high profitability i.e. high return and low liquidity, or choose short term investment with low profitability i.e. low return and high liquidity.

Creditors prefer that managers invest in short term assets because they are easy to liquidate but it reduces the profitability because of low interest rate. If managers opt for the long term investment to enhance the profitability then in case of default, lenders or creditors have to wait longer and bear some expense to sell these assets because the liquidity of long term investment is low. In reality, none of the managers choose any of these two extremes instead they want to have a balance between profitability and liquidity which will fulfill their need of liquidity and gives required level of profitability (Arnold, 2008).

## CHAPTER TWO

### THE LITERATURE REVIEW

#### 2.0 Introduction

In this chapter the researcher provides a theoretical framework on working capital management, empirical study reviews and discusses the research gaps in the sugar sub sector as has been understood and identified by the researcher. The chapter concludes by outlining a developed conceptual framework for the study.

#### 2.1 Theoretical Framework

Working capital is an important tool for growth and profitability for corporations. If the levels of working capital are not enough, it could lead to shortages and problems with the day-to-day operations (Horne and Wachowicz, 2000). Working capital is also called net working capital and is defined as current assets less current liabilities (Hillier et al., 2010). Net working capital = Current assets – current liabilities. Working capital is a significant source to provide liquidity, which is ‘a prediction to ensure that firms are able to meet it short-term obligations and its continued flow can be guaranteed from a profitable venture’ (Padachi, 2006).

Both components of the working capital formula above can be found on the balance sheet. Current assets are those assets that generate cash within one year. Current assets are normally divided in cash and cash equivalents, short-term investments, trade and other receivables, prepaid expenses, inventories and work-in-progress. Current liabilities are obligations which have to be met within one year. Current liabilities are divided in trade payables, short-term debt and accrued liabilities.

**2.1.1 Working capital management cycle:** A typical working capital management cycle begins with the purchase of raw materials which can be found in the inventory. Later on, these raw materials are transformed into finished goods. These goods are stocked in the inventory until they are sold to a customer. The sale can be purchased by cash or by trade credit. This trade credit provides a delay until the cash is received. With every step of the

cycle there are associated costs, which are direct costs and opportunity costs. The direct costs are the cost of capital invested in each part of the cycle, for example interest on the debt finance to sustain trade creditors. The opportunity costs are represented by the possible returns forgone by investing in working capital instead of some alternative investment opportunity (Berry and Jarvis, 2006).

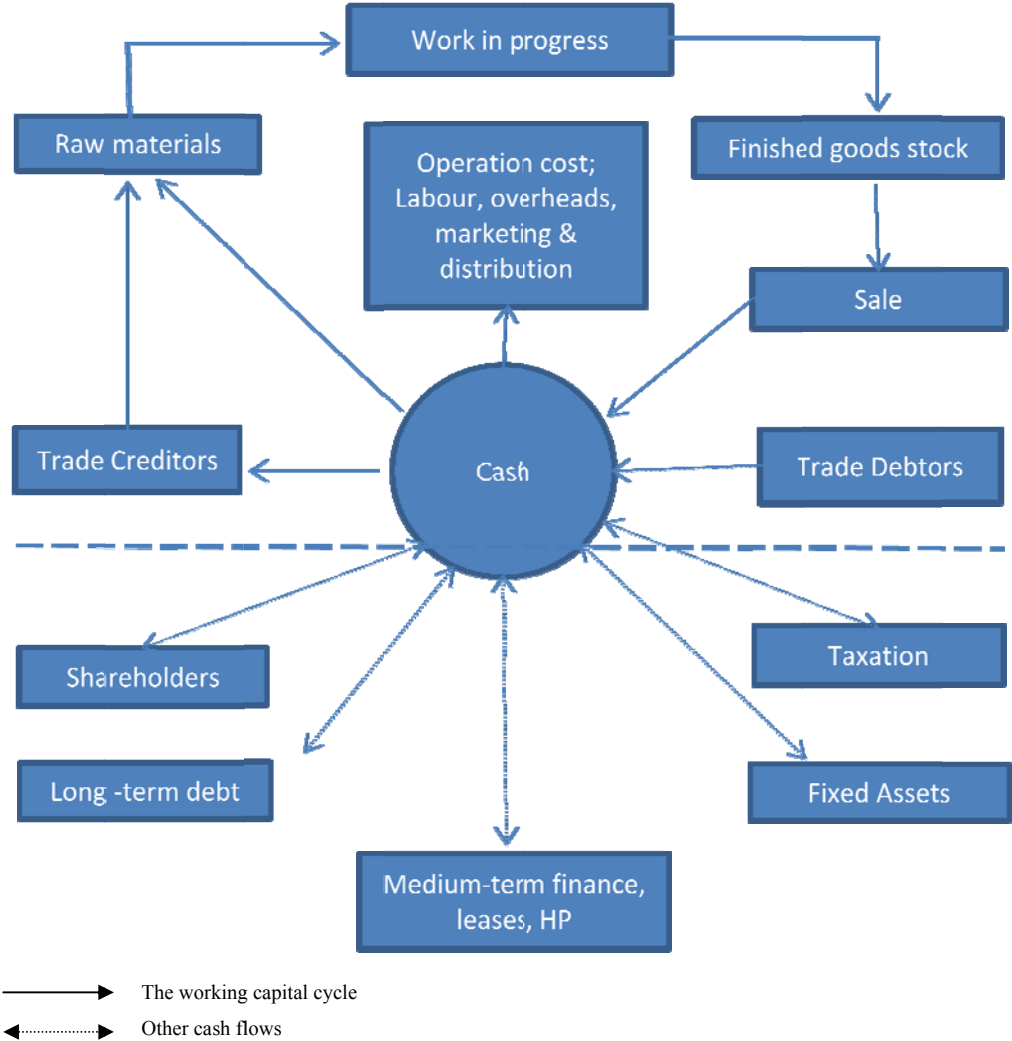


Figure 2.1: Typical working capital cycle. *Source (Adopted from Arnold, 2008:530)*

Arnold (2008) identifies working capital cycle as inclusive of all the major dimensions of business operations. Bad management of a single account in this cycle might cause a big trouble for the entire entity leading to its death. Therefore, the management of working capital and balance between components of working capital is extremely important for the smooth running of business.

The working capital and the cycle that it forms as illustrated in figure 2.1 is managed by working capital management. WCM just like capital budgeting and capital structuring is part of the financial management of a firm. The latter two are mainly focused on managing long-term investments and returns whereas WCM focuses mainly on the short-term financing and short-term investment decisions of firms (Sharma and Kumar, 2011). Working capital management is vital for a firm, especially for manufacturing, trading and distribution firms, because in these firms WCM directly affect the profitability and liquidity. This is because for these firms it accounts for over half their total assets (Raheman and Nasr, 2007).

It is possible that inefficient WCM can lead to bankruptcy, even if the profitability of a firm is constantly positive (Kargar and Bluementhal, 1994). A reason for this could be that excessive levels of current assets can easily lead to a below average return on investment for a firm (Raheman and Nasr, 2007). An efficient WCM has to manage working capital in such a way that it eliminates risks of default on payment of short-term obligations on one side and minimizes the change of excessive levels of working capital on the other side (Eljelly, 2004).

In the 1980's and prior to that period, WCM was compartmentalized (Sartoris and Hill, 1983). WCM was divided in cash, account payables and account receivables. In most firms, these compartments were managed by different managers on various different organizational layers (Sartoris and Hill, 1983). But Sartoris and Hill (1983) argued that there was a need for an integrated approach, where all the three compartments are combined. This led to the integration of the management of inventories, account payables and account receivables, called working capital management.



Accounts receivables can be seen as short-term loans to customers given by the supplying firm. Giving these credit terms to customers are an important way of securing sales (Berry and Jarvis, 2006). Although the total amount of receivables on a balance sheet of a firm could be constant over time, its components are continually shifting and therefore careful monitoring is needed (Firth, 1976). When the accounts receivables keep growing, funds are unavailable and therefore can be seen as opportunity costs. According to Berry and Jarvis (2006) a firm setting up a policy for determining the optimal amount of account receivables have to take in account the trade-off between the securing of sales and profits and the amount of opportunity cost and administrative costs of the increasing account receivables and the level of risk the firm is prepared to take when extending credit to a customer, because this customer could default when payment is due.

Account payables are the opposite of account receivables, instead of giving a credit on a sale, a firm receives a credit. Hampton and Wagner (1989) explain account payables as ‘When a firm makes a purchase on credit, it incurs an obligation to pay for the goods according to the terms given by the seller. Until the cash is paid for the goods the obligation to pay is recorded in accounts payables’. Account payables can be seen as a short term loan, or in other words, a source of funding. The typical account payable policy is “2 in 10, net 30”. This means that if a firm pays within 10 days it receives a discount of 2 percent, if not, the total bill has to be paid in thirty days. This means that a firm has to pay 2 percent for only 20 days, which is in fact a very expensive loan. It is also possible that the policy is net 30, which means that the due date is within thirty days, without any discount. (Leach and Melicher, 2009)

Instead of a source of funding, account payables or in other words using the trade credit term of a supplier can also be used to assess product quality (Deloof, 2003; Ng et al., 1999; Lee and Stowe, 1993; Long, Malitz and Ravid, 1993 and Smith, 1987). This assessment has to be done during the credit term and if the quality of the product is not satisfying, it can be sent back without paying the bill.

Inventory represents a large part of the total assets of many firms and an effective

management is needed for normal production and selling operations of the firm and for keeping the costs of holding inventory at a minimum (Firth, 1976). The goal of inventory management is to minimize the costs of storing and financing goods while maintaining a level of inventories that satisfies the amounts of sales of a firm (Hampton and Wagner, 1989). Deloof (2003) argues that with inventory management there is a trade-off between sales and costs.

**2.1.2 Working Capital Policy (WCP).** A firm has to look at each of the three parts of WCM and try to determine the optimal level based on the trade-offs. This optimal level can be reached if it maximizes the value of a firm (Howorth and Westhead 2003, Deloof 2003, Afza and Nazir 2007). Theoretically, in a Chief Financial Officer (CFO) perspective, WCM is a simple and straightforward concept, which is ensuring enough financial resources to fund the current liabilities and current assets (Harris, 2005). In practice, WCM is one of the most important issues in an organization where CFO's are struggling to reach the optimal level of each of the three parts of WCM (Lamberson, 1995).

How WCM determines the level of working capital depends on the working capital policy (WCP) of a firm. According to Arnold (2008) there are two extreme opposite WCP's. The first is a *relatively relaxed approach* with large cash reserves, more generous customer credit and high inventories. This approach is adopted by companies which operate in an uncertain environment where buffers are needed to avoid production stoppages (Arnold, 2008). The advantages of this approach are reduced supply costs, protection against price fluctuations and an increase in sales, profit and goodwill due to high inventories and high accounts receivables (Garcia-Ternuel and Martinez-Solano, 2007). However there are several disadvantages, which are for example higher costs due to the high inventory level, decrease in goodwill due to using large amount of trade credit and increase in risk of default of payment of a customer.

The opposite of this approach is the *aggressive WCM policy*. This is stance taken by companies who operate in a stable and certain environment where working capital is to be

kept at a minimum. Firms hold a minimal inventory level, cash buffers and force customers to pay at the earliest moment possible. But this policy is criticized by Wang (2002), who argues that lowering the inventory level can decrease sales. Advantages of this approach are mainly the reduction in costs due to the low levels of inventories and account receivables. The risks taken by a firm is also low, because of the low levels of accounts receivables used with this approach. The disadvantages of this approach are mainly the reduction of sales, goodwill and profit due to the lack of inventories and trade extension to a firm's customers.

When a firm is determining a WCM policy, its faces a dilemma of achieving the optimal level of working capital where the desired trade-off between liquidity and profitability is reached (Nazir and Afza, 2009; Hill et al., 2010; Smith, 1980 and Nasr, 2007). This trade-off is a choice between risk and return. An investment with more risk will result in more return. A firm with high liquidity of working capital will have low risk and therefore low profitability whereas a firm with low liquidity of working capital results in high risk but high profitability. When determining a WCM policy, a firm has to consider both sides of the coin and try to find the right balance between risk and return.

## **2.2 Empirical Review**

The relationship between working capital management and firms' profitability has been investigated on a sample that covers different industries and periods, giving a clear and reliable result. Shin, and Soenen (1998), Deloof (2003), Gill, Biger, and Mathur (2010) test this relationship on the sample of firms listed on the New York stock exchange and report a significant positive relationship between cash conversion cycle and firm's profitability. In contrast, Falope and Ajilore (2009) examined this relationship on non-financial firms for the period 1996-2005 with the results showing a significant negative relationship between cash conversion cycle and firm's profitability, similar to those given by Shin and Soenne (1998) and Deloof (2003), in which they argue that managers can create value for firm by minimizing the number of cash conversion cycle into a reasonable level.

How working capital management affects firms' performance on small manufacturing firms is examined by Padachi (2006). Return on asset is used to measure firms' profitability in the paper. The paper gives the relationship between working capital management and firms' profitability a further look and it can be distinguished from other papers because this study gives a detailed test on how each component of working capital management impacts on firms' performance. This can give manager more insight when making decision on working capital. The results show that the higher the investment in inventories and receivables, the lower the profitability is, and that cash conversion cycle is negatively related to the firms' profitability.

Eljelly (2004) tests the relationship between firm profitability and liquidity since working capital can be considered as an indication of firms' liquidity. The study uses a sample of 929 joint stock companies in Saudi Arabia. The big difference in his paper from the previous paper is that he uses two measures, current ratio and cash conversion cycle, for liquidity. There are two significant study results found: firstly, firm's profitability has a negative relationship with its liquidity level, which is measured by current ratio. Second, cash conversion cycle is more important than current ratio that affects profitability as a measure of liquidity. Two study results stay stable over time in the study sample.

Ding, Guariglia and Knight (2012) asks whether good working capital management can make a difference in keeping fixed investment for firms even if when firms have cash flow fluctuation and financial constraints. They expound this question by using panel data of a sample of 116,000 Chinese firms of different ownership for the period 2000-2007. The study exhibits that those non-state owned firms have sensitivity of investment to cash flow, indicating that firms suffer from financial constraints. They also found out that even though with financial constraints, firm with high working capital has lower sensitive of fixed capital investment to cash flow, suggesting an efficient WCM can help firms to relieve the pressure of financing constraints.

Garcia-Teruel and Marinez-Solano (2007) affirmed in their study the importance of working capital management to corporate profitability by providing empirical evidence on the effects of working capital management on the profitability of Spanish firms. They demonstrated in their study how managers can improve profitability by shortening the cash conversion cycle through inventory reduction and reduction in the outstanding number of day's receivables.

Can holding cash in a reasonable level also affect the management of working capital and a firm's value? Autukaite and Molay (2011) try to find out the relationship between cash holding and working capital and firm value separately. They take French listed companies as sample in their paper. The test shows that for an extra one Euro company holds is less than one Euro for investors. The similar methodology is applied in the relationship of working capital and firm value. It shows that one Euro invested in cash or working capital is valued less than one Euro. The importance of cash holding and working capital management should not be underestimated by managers. However, the relationship between working capital management and firm value is not shown directly.

Shin and Soenen (1998) took a sample of United States firms to analyze the relationship between profitability and working capital using net trading cycle as a measure of working capital management. The result suggested that net trading cycle is indirectly related to profitability while in previous research on specific industry, the result was not that significant (Shin and Soenen, 1993). The general thought which prevails is that profitability can be increased by decreasing the working capital investment, i.e. it can be done by decreasing the portion of current assets.

Wang (2002) took a sample of Taiwanese and Japanese firms and Deloof (2003) took a sample of Belgium Firms while studying WCM and profitability. The results suggested that profitability depends on how the working capital management is handled by the management. Deloof (2003) stated that no of days of inventory and no of days on accounts receivable is indirectly related to profitability. He also stated that if the cash conversion cycle is shorter then, the profitability will be increased. Thus efficient working capital

management is very important to increasing the value of the shareholders (Wang, 2002; Deloof, 2003).

Tryfonidis and Lazaridis (2006) carried out a research for the companies listed in Athens Stock Exchange. They analyzed the relationship between working capital management and profitability of the firms. The variable for the measurement of profitability was gross operating profit in their research. Significant relationship between the cash conversion cycle and profitability was reported. They stated that the profit can be maximized by taking care of every component of working capital at individual level.

Uyar (2009) evaluate the relationship between the firm size, profitability and the cash conversion cycle by using correlation and annova techniques for the companies enlisted in Istanbul Stock Exchange. The outcome was that that the cash conversion cycle of manufacturing sector was greater as compared to the whole sale industry. In addition to that it was analyzed that the size of the firm and profitability has significant negative relation with cash conversion cycle.

Contradicting evidence is found by Gill et al. (2010), who did research in the USA and found a positive relation between CCC and a firm's profitability. But they did find a highly significant negative relation between accounts receivables and a firm's profitability. They suggest that firm can enhance their profitability by keeping their working capital to a minimum. This is because they argue that less profitable firms will pursue a decrease of their accounts receivables in an attempt to reduce their cash gap in the CCC (Gill et al., 2010).

Zubairi (2011) took a sample of Pakistan's automobile sector and concluded that the growth and current ratio of the firms in automobile sector have direct relation with the profitability of the firms. Alipour (2011) took a sample of 1063 top firms listed in Tehran stock exchange and found a negative significant relationship between number of day's accounts receivable, inventory turnover and cash conversion cycle whereas a positive significant relation with no of days accounts payables with profitability is noted and hence

concluded that working capital management significantly affects the profitability of the firms.

Enqvist, Graham, Nikkinen (2012) worked on the sample of Finland firms and studied the relationship of working capital management and profitability on different business cycles and concluded that there is a significant negative relationship between cash conversion cycle and profitability of firms. The results suggested that efficient management of inventory and accounts receivable days significantly affects the corporate profitability of the firms.

Other studies on working capital management that have mainly focused on emerging market include; studies by Raheman and Nasr (2007), Zariyawati et al. (2009), Falope and Ajilore (2009), Dong and Su (2010), Mathuva (2010) and Quayyum (2012) who did research in Pakistan, Malaysia, Nigeria, Vietnam, Kenya and Bangladesh respectively. All these studies have found a significant negative relation between the cash conversion cycle and a firm's profitability. This means that managers can create value for their firms, by keeping their working capital to a reasonable minimum.

Mathuva (2010) studied the influence of working capital management components upon corporate profitability by using a sample of 30 companies listed at the NSE from 1993 to 2008. He used Pearson and Spearman's correlations and the fixed effects regression models to conduct data analysis. The findings of his study were that there is a highly significant negative relationship between accounts collection period and profitability. In regard to the relationship between profitability and the inventory conversion period or the average payment period, the results were positive and significant.

In summary, all the above studies reviewed indicate that working capital management has an impact on a firm's profitability in the various sectors that each study was conducted. The literature on working capital management practices identifies efficiency of cash management, efficiency of receivables and payables management and efficiency of inventory management as determinants of financial performance model. This paper also

studied the relationship between working capital management and its effects upon profitability but in a different sector and economic environment i.e. Kenya's sugar sub-sector. The model variables inter-relationship has been conceptualized as shown in Figure 2.2.

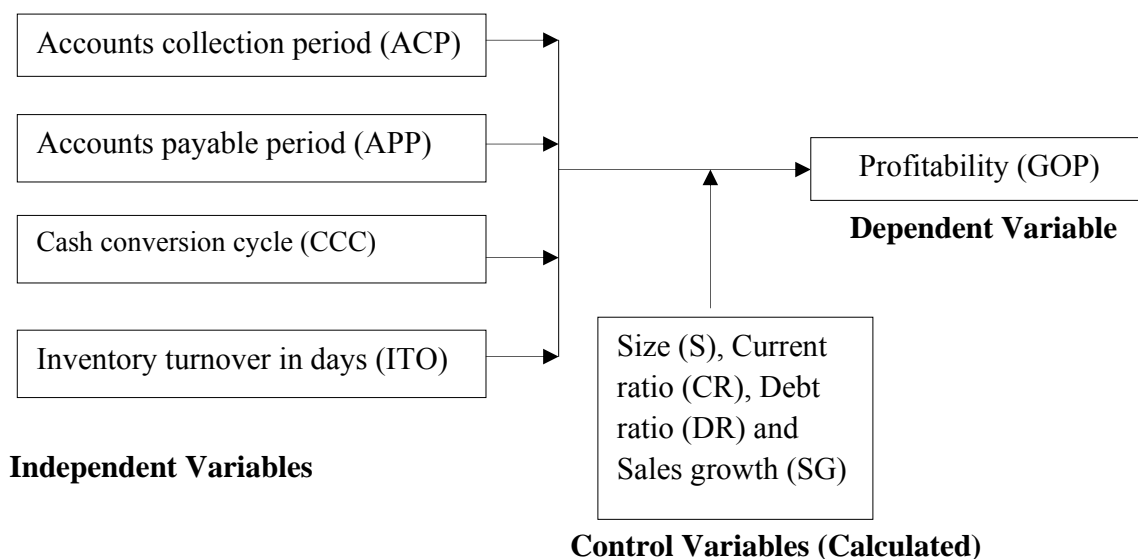
### **2.3 Research Gaps**

It is observed that, whereas there is a lot of literature in studies relating to liquidity and working capital in relationship with profitability, most of it is however based on the foreign economies. A few studies on working capital management exist in Kenya such as Mathuva (2010), who studied the influence of working capital management component on corporate profit on a sample of 30 companies listed at the NSE. His study covered firms in all sectors excluding financial institutions represented at the NSE. However there are hardly any studies identified that have studied the relationship between accounts collection period, accounts payable period, cash conversion cycle and inventory turnover on sugar firms profitability to substantially address their impact on firm's profitability in the Kenyan sugar sub-sector, which this study eventually addresses.

### **2.4 Conceptual Framework**

Conceptual framework is the descriptive list of concepts and their interrelatedness that is used as basis for further development of theory (Rossiter, 2001). The major aim of research should be either to relate data to a theory or generate a theory from data, (Henderson 1994). For this study, the conceptual framework developed consisted of four independent variables which are the exploratory variables that are presumed to influence the dependent variable, and one dependent variable which is the variable the researcher attempted to explain.





**Figure 2.2 Conceptual framework**

Figure 2.2 gives a conceptualized view of all the variables identified for this study. This study identified nine (9) variables (one dependent, four independent and four control variables).

### **2.4.1 Dependent variable**

Gross operating profitability (GOP) that is a measure of profitability of firm is used as dependent variable. It is defined as sales minus cost of goods sold, and divided by total assets minus financial assets. The dependent variable profitability is measured by the return on capital employed (ROCE). According to Greenley (1995), ROCE also known as return on assets (ROA) has been found to give consistency between subjective and objective approaches to measuring performance.

### **2.4.2 Independent variables**

The independent variables including accounts collection period, accounts payable period, cash conversion cycle and the inventory turnover are the statistics used to measure effects of working capital management. The first independent variable, average collection period (ACP) is used as a proxy for the collection policy of the firm, the second variable, average

payment period (APP) is used as proxy for the payment policy of the firm, the third variable, cash conversion cycle (CCC) which is used as a comprehensive measure of working capital management and finally, the fourth variable inventory turnover in days (ITO) is used as a measure for the inventory policy of the firm.

### **2.4.3 Control variables**

The control variables identified as firm size, current ratio, debt ratio and sales growth may also have some effect on the firm's profitability. Current ratio (CR) is used as a traditional measure of firm's liquidity, size also used as the other control variable is calculated as (Natural logarithm of sales), debt ratio (DR) is used as a proxy for leverage and is computed by dividing total debt by total assets, and finally, sales growth (SG) is used as a measure of sales growth and calculated as  $((\text{this year's sales} - \text{previous year's sales}) / \text{previous year's sales})$ .

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 Introduction**

This chapter begins by describing the research design used in carrying out the study. It then provides description of target population, sample frame, sample and sampling technique. Finally, data collection procedures, data processing and analysis methods used are also discussed within this chapter.

#### **3.1 Research Design**

Quantitative method approach was used to gather data that helped the researcher to investigate cause-effect relationships. In this particular case, the effect being the company's profitability and the research is targeted at identifying significant causes, i.e. determinants on profitability related to working capital management. Quantitative research methods entail the use of systematic and sophisticated procedures to test, prove and verify hypotheses (Glaser and Strauss, 1968). The main focus in quantitative research is on matters pertaining to structural rather than on more complex issues of the process (Van Maanen, 1983).

Quantitative method, it is suggested, is applicable where the aim of the research is to ascertain how many, what and where. In seeking such answers, a quantitative approach relies on the use of predetermined response categories by means of standardized data collection instruments such as mail survey, or structured, semi-structured interviews enabling statistical techniques to be used to assist in the interpretation of data (Demirbag, 1994).

Creswell (1994) has given a very concise definition of quantitative research as a type of research that is 'explaining phenomena by collecting numerical data that are analyzed using mathematically based methods (in particular statistics).' This definition provided by Creswell clearly captures the core design of this study and therefore justifies the researches decision to adopt a quantitative method as it correctly suits the study on

working capital management practices on profitability.

Out of the sources of data collection for the study, archival records and the audited (as much as it is possible) financial statements of the firms for ten financial years 2003 to 2012 has been collected and used in this research. Taking audited financial data of ten consecutive years has the advantage of retrievability, unbiased selectivity (by both researcher and provider) and accessibility. Data analysis of working capital decisions has been done using financial performance ratios.

### **3.2 Population**

Population is any set of persons or objects that possesses at least one common characteristic (Busha and Harter, 1980). Population is also defined as a complete set of individuals, cases or objects with some common observable characteristics (Mugenda and Mugenda, 2003). The population for this study consists of all the 11 sugar firms in Kenya.

### **3.3 Sampling Frame**

A sampling frame is a list, directory or index of cases from which a sample can be selected. It is important to note that the degree of generalization of a study depends on the accuracy of the sampling frame (Mugenda and Mugenda, 1999). For this study the sampling frame has been derived from the list of 11 operational sugar firms registered by and licensed by Kenya Sugar Board, (*SEA Scoping Report April – May 2012*).

#### **3.3.1 Sample and Sampling Technique**

Determining a sample size is a matter of methodology. The standardized measurement and sampling procedures are intended to enhance the reliability of observation, facilitate replication studies, and allow generalization to a larger population (McClintock et al. 1983). In cases where the target population is small, taking the whole population in such cases is advisable (Mugenda and Mugenda, 1999). Therefore a sample of 11 sugar firms was selected for study.

The 11 operational sugar firms were analyzed into zones i.e. Kakamega, Nyando and Southern Nyanza as presented in Table 3.1.

<b>Zone &amp; Millers</b>	<b>No of firms</b>	<b>No of firms selected from each zone</b>	<b>Percentage proportion of the sample (%)</b>
<b>Kakamega Zone</b> <i>Mumias</i> <i>Nzoia</i> <i>Butali</i> <i>Western sugar</i>	4	4	36.4
<b>Nyando Zone</b> <i>Chemelil</i> <i>Muhoroni</i> <i>Soin</i> <i>Kibos</i>	4	4	36.4
<b>Southern Nyanza</b> <i>Sony</i> <i>Transmara</i> <i>Sukari</i>	3	3	27.2
<b>TOTAL</b>		11	100

**Table 3.1: Sugar firms classified in different zones (Source KSI strategic plan 2010-2014)**

This determined sample size is also in accordance to Krejcie and Morgan (1970) sample table developed from the following formula.

$$s = \chi^2 NP (1 - P) \div d^2 (N - 1) + \chi^2 P (1 - P).$$

**Whereby;**  $s$  = required sample size.

$\chi^2$  = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

$N$  = the population size.

$P$  = the population proportion (assumed to be .50 since this would provide the

maximum sample size).

$d$  = the degree of accuracy expressed as a proportion (.05).

From the above formula sample is calculated as follows;

$$s = (3.841 * 11 * 0.50(1-0.50)) \div (((0.05 * 0.05(11-1) + 3.841 * 0.5(1-0.5)));$$

$$s = 11 \text{ (Sample Size)}$$

### **3.4 Data Collection Procedure**

Secondary data collected for this study was mainly from the Nairobi Securities Exchange, KSB, the internet, and from the offices of the sampled firms. To gather data on working capital component and profitability, it is also necessary perform structured documentary review. Accordingly, to achieve the study objective, companies audited financial statement especially balance sheet, income statement and cash flow statements were reviewed. The choice of secondary data was informed because data from such a source is free from bias, accurate and provides opportunity for replication.

The data collection has been limited to only ten year period covering the company's financial years 2003 through to 2012. Data was collected in a balanced panel data set whereby each firm contributed ten years of figures. The panel data methodology used has certain benefits like using the assumption that companies are heterogeneous, more variability, less co-linearity between variables, more informative data, greater degree of freedom and more efficiency (Baltagi, 2001).

The different accounting variables needed for the study was extracted from each financial year of the company. The data set included yearly data on sales, cost of goods sold, accounts receivable, accounts payable, inventories, current assets, total assets, financial assets, current liabilities, and total debt. This data was then used to calculate the desired ratios and accounts collection period, the inventory turnover in days, the accounts payables period and the cash conversion cycle.

### **3.5 Data Analysis and Presentation**

Data analysis is the process of bringing order, structure and meaning to the mass of information collected (Mugenda and Mugenda, 2003). Quantitative data based on panel data sets collected were coded and entered into the computer program for computation of descriptive statistics. Data entry, processing and analysis were done using Predictive Analytic Software, (PASW). Regression analysis was done on the operationalized data to show the relationships of variables in the study thereby enabling the researcher to draw conclusions. Data was presented in tables and figures to enable ease of use, understanding and interpretation.

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.0 Introduction

This chapter presents the key findings of the research based on the methodology as identified in chapter three. The chapter is structured into data analysis, presentation and interpretation of descriptive statistics, correlation matrix and regression models.

#### 4.1 Data Analysis

The main objective of the study was to investigate the impact of working capital management on Kenya sugar firms' profitability. Similarly, the data presented has been analyzed in line with the specific objectives of the study. The study targeted 11 sugar companies in Kenya and obtained data from 7 out of the 11 firms making 63.6% which is considered as a good response rate. For generalization, a response rate of 50% is adequate for analysis and reporting, 60% is good and a response rate of 70% and over is excellent (Mugenda and Mugenda, 2003)

To achieve better analysis, the study used descriptive and inferential analytical techniques to analyze the data obtained. The study used Ordinary Least Squares (OLS) regression models. However, before running the regressions, descriptive statistics and correlation analysis were calculated. Descriptive analysis was used to describe patterns of behavior or relevant aspects of phenomena and detailed information about each variable. Correlation analysis shows the relationships between the different variables considered in the study. The correlation matrix presented simple bivariate correlations not taking into account other variables that may influence the results.

Finally, multiple linear regressions were also done to know more about the relationship between many independent variable or predictor variables and a dependent or criterion variable. Using multiple linear regressions, the four hypothesis of the study were tested at 1%, 5% and 10% level of significance using the *t*-tests. The *t* calculated values were derived from the PASW program and compared against the *t* table values. Where the



calculated  $t$  values were found to lie within the accepted region, the researcher accepted the test and concluded that the variables have effect on the profitability of the firm and vice versa.

#### 4.2 Descriptive Analysis

Table 4.1 presents the descriptive statistics and the distribution of the variables considered in this research: net operating income, natural logarithms of sales, sales growth, current ratio, debt ratio, accounts collection period (ACP), accounts payable period (APP), inventory turnover in days (ITO) and cash conversion cycle (CCC). The descriptive statistic considered were minimum, maximum, mean, standard deviation, skewness and kurtosis.

**Table 4.1: Descriptive Statistics**

	Min	Max	Mean	Std. Deviation	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
GOP	.01	.73	.2250	.15750	.900	.289	.787	.570
Ln(Sales)	16.45	23.48	21.3024	1.60114	-1.492	.289	2.105	.570
Sales Growth	-.38	1.97	.1597	.36099	2.520	.304	10.109	.599
Current Ratio	.27	3.85	1.2707	.65285	1.451	.289	3.779	.570
Debt Ratio	.17	2.41	1.0456	.55042	.366	.289	-.565	.570
ACP	21.88	378.68	106.7328	.7992	1.529	.289	5.615	.570
APP	78.01	472.39	248.4347	.6421	-.183	.289	-1.022	.570
ITO	28.13	435.08	144.3934	.8211	1.378	.289	1.755	.570
CCC	-240.82	390.94	2.6915	1.5342	1.060	.289	1.627	.570

Table 4.1 shows that net operating income had a mean of 0.225 and standard deviation of 0.157. That is, net operating income is, on average, 22.5% of the sugar companies' (total assets – financial assets). However, the value went as high as 73% and as low as 1%. Accounts collection period was on average 106.7. That is, it took 107 days to collect account receivables while in some companies it took as long as 379 days and as short as 22 days.

Mean value of accounts payable period was 248.4 which denotes that it, averagely took the sugar companies 248 days to pay up their financial obligations. However, it took some companies as short as 78 days or as long as 472 days to honor their financial obligations to other entities; in this case, most sugar cane farmers. On inventory turnover in days, the sugar companies took, on average, 144 days to sell their sugar but this could be as short as 28 days and as long as 435 days.

On average the sugar firms have a 3 days cash conversion cycle, the minimum being -241 days with a maximum of 391 days. Assets were used as control variables; CR and DR. CR, a traditional measure of liquidity is on average 1.27, with standard deviation of 0.65. The Mean DR, which is used to verify the relationship between debt financing and profitability, is 1.05 with a standard deviation of 0.55.

### **4.3 Correlation Analysis**

The study sought to establish the relationship between the WCM and its moderating factors on sugar companies' profitability. Pearson Correlation analysis was used to achieve this end at 99%, 95% and 90% confidence levels. The correlation analysis enabled the testing of study's hypothesis that working capital has a significant effect on sugar companies' profitability. Table 4.2 illustrates significant, negative but low linear relationships between sugar company performance and: accounts collection period ( $R = -0.298$ ,  $p = .013$ ); accounts payable period ( $R = -0.261$ ,  $p = .030$ ); inventory turnover period in days ( $R = -0.301$ ,  $p = .012$ ); and, cash conversion cycle ( $R = -0.169$ ,  $p = .016$ ).

#### **4.3.1 Effect of Accounts Collection Period on Profitability**

The first objective of this study was to determine the relationship between accounts collection period and sugar firm's profitability. This objective was tested using the first hypothesis *H1* which stated that inefficient accounts collection period has a negative impact on sugar firm's profitability. The study's established negative coefficient between accounts collection period and profitability ( $p = 0.013$ ) points at rejection of the null hypothesis of insignificant relationship. This depicts that sugar companies that are not

efficient in collecting debts from sales are less profitable suggesting that an increase in ACP will have negative impact upon profitability.

#### **4.3.2 Effect of Accounts Payable Period on Profitability**

The second objective of this study was to ascertain the relationship between accounts payable period and the sugar firm's profitability. This objective was tested using the second hypothesis *H2* which stated that there is no relationship between accounts payable period and sugar firm's profitability. The study established a significant negative coefficient ( $p = 0.030$ ) between accounts payable period and profitability. Thus, the null hypothesis is rejected and alternative hypothesis of significant relationship accepted. This depicts that less profitable companies wait longer to pay their bills.

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

In order to establish the relationship between cash conversion cycle and sugar firm's profitability as per the third objective of the study, the third hypothesis *H3* was tested. *H3* stated that longer cash conversion cycle has insignificant decrease on sugar firm's profitability. The study established a negative coefficient significant ( $p = .016$ ) at  $\alpha=5\%$ . Thus, the null hypothesis is also rejected. This implies that if the sugar companies are able to decrease their cash conversion cycle (sale of finished goods, collection of debts and deferred payment of financial obligations), it can improve its operating profitability.

#### **4.3.4 Effect of Inventory Turnover in days on Profitability**

The last objective of the study was to establish the relationship between inventory turnover in days and sugar firm's profitability and was tested by the fourth hypothesis. *H4* stated that sugar firm's profitability is insignificantly negatively influenced by the inventory turnover days. The study established a negative coefficient between inventory turnover period in days and profitability ( $p = .012$ ). The null hypothesis is, thus, rejected and alternative hypothesis of significant relationship accepted. This suggests sugar companies that hold much inventory are less profitable. That is, when the time span during which inventories remain within the sugar companies increases, profitability decreases.

**Table 4.2: Correlation Matrix**

Variables		GOP	S	SG	CR	DR	ACP	APP	ITO
GOP	Correlation	1							
	Sig	---							
Sales	Correlation	.593***	1						
	Sig.	.000							
Sales Growth	Correlation	.023	-.235*	1					
	Sig.	.861	.066						
Current Ratio	Correlation	.100	.007	.384***	1				
	Sig.	.413	.953	.002					
Debt Ratio	Correlation	-.119	-.404***	.121	-.322***	1			
	Sig.	.332	.001	.350	.007				
ACP	Correlation	-.298**	-.013	-.380***	-.349***	-.068	1		
	Sig.	.013	.917	.002	.003	.577			
APP	Correlation	-.261**	-.283**	.048	-.352***	.117	.345***	1	
	Sig.	.030	.019	.713	.003	.339	.004		
ITO	Correlation	-.301**	-.500***	-.137	-.200*	.243**	.432***	.486***	1
	Sig.	.012	.000	.287	.099	.045	.000	.000	
CCC	Correlation	-.169**	-.175	-.343***	-.035	.066	.544***	-.282**	.613***
	Sig.	.016	.150	.006	.778	.590	.000	.019	.000

\*\*\*. Correlation is significant at the 0.01 level (2-tailed); \*\*. Correlation is significant at the 0.05 level (2-tailed).

\*. Correlation is significant at the 0.10 level (2-tailed).

#### 4.4 Regression Models

Regression analysis was used to measure the relationship between individual independent (accounts collection period, accounts payable period, inventory turnover in days and cash conversion cycle, debt ratio, sales growth, sales and current ratio) and dependent variable (profitability). To find the effect of working capital management on profitability on sugar firms, regression model was developed using empirical framework used by Padachi (2006) and Deloof (2003). The regression analysis was of the form:

$$GOP = \beta_0 + \beta_1 (\ln(S)) + \beta_2 (SG) + \beta_3 (CR) + \beta_4 (DR) + \beta_5 (ACP, ITO, APP, CCC) + \epsilon_i$$

Whereby;

GOP - Net operating income is (sales –cost of goods sold)/ (total assets-financial assets). This is the value of the dependent variable that is being predicted or explained.

S – (Size,  $\ln(S)$ ) Sales are expressed in millions of Kenya Shillings. Natural log of Sales are included in the research to measure the size of the firms. It is assumed that bigger the size more the profit.

SG - Sales growth is (current year's sales - last year's sales)/last year's sales. Sales growth is added in the research to measure the investment growth opportunity in the industry.

CR - Current ratio is current asset/current liabilities. Current ratio is the measure of liquidity in the firm. More liquidity of the firm implies less will be invested in working capital and the firm will easily pay its immediate liabilities and creditors, less investment in inventory and fewer sales as well.

DR – Debt ratio is total debt/total asset employed. Debt ratio is used to measure the leverage of the firm.

ACP - No of days accounts receivable is (A/R x 365)/sales. No of days accounts receivable is included as a component of working capital management.

ITO - No of days inventory is (inventory x 365)/cost of goods sold. Firms will have different optimal level of investing in working capital.

APP - No of days accounts payable is (A/P x 365)/purchases. Delayed payments means a firm will enjoy more liquidity but may also miss out on the discounts offered by the suppliers

for making prompt payment, a phenomenon that might have some effect on the profitability of the firm.

CCC = Cash conversion cycle is (ACP + ITO – APP)

$\beta_0$  – Beta; this is the constant where the regression line intercepts the y- axis. It is the value of the dependent variable when the value of all other independent variable = 0.

$\beta_1:\beta_5$  – Represents the co-efficient of the variables i.e. the slope of the regression line. How much GOP changes for each one-unit change in the independent variable?

$\epsilon_i$  – Represents the error term i.e. the error in predicting the value of dependent variable, given the value of independent variable.

**Table 4.3: Regression Coefficients**

	<b>Dependent Variable: Net Operating Income</b>			
	<b>I(ACP)</b>	<b>II(ITO)</b>	<b>III(APP)</b>	<b>IV(CCC)</b>
Constant	-1.234***	-1.484***	-1.322***	-1.396***
Accounts Collection Period	-.00074**			
Inventory Turnover in Days		9.613E-005***		
Accounts Payable Period			-1.017.E-04*	
Cash Conversion Cycle				-4.922E-05**
Ln(Sales)	.069***	0.074***	.069***	.071***
Sales Growth	.022	.057	.057	.045
Current Ratio	.005	.030	0.0202*	.029
Debt Ratio	.041	.057	.053	.058
R	0.679	0.636	0.636	0.635
R-squared	.460	.404	.405	.403
Adjusted R-squared	.412	.351	.352	.349
Durbin-Watson	1.792	1.960	1.915	1.969
F-Value	9.558***	7.593***	7.616***	7.552***
N	62	62	62	62

\*\*\*. Significant at the 0.01 level; \*\*. Significant at the 0.05 level; \*. Significant at the 0.1 level

Dependent Variable: Net Operating Income

Predictors: (Constant), Debt Ratio, Sales Growth, Accounts Collection Period (ACP), Accounts Payable Period (APP), Inventory Turnover In Days (ITO), Cash Conversion Cycle (CCC), Ln(Sales), Current Ratio

R value in Table 4.3 denotes the correlation coefficient between dependent and independent variables; that is, if there is a linear relationship and the nature of the relationship if at all exists. Coefficient values 0.679, 0.636, 0.636 and 0.635 were established in first to fourth regression models respectively. This illustrates a good linear relationship between profitability and working capital management especially in the case of account collection period.

R-square values present the strength of the relationship between profitability and independent variables. From the adjusted determination coefficients, generally moderately strong linear relationships were established between dependent and independent variables. Adjusted R-square values between 0.349 and 0.412 were established. This depicts that the regression analyses explain between 34.9% and 41.2% of the changes in sugar firms' profitability. Thus, working capital management components have a high explanatory power of model

The study used Durbin Watson (DW) test to check that the residuals of the models were not auto-correlated since independence of the residuals is one of the basic hypotheses of regression analysis. Being that the DW statistics were close to the prescribed value of 2.0 for residual independence, it can be concluded that there was no autocorrelation.

The study also conducted a multicollinearity test to determine if two or more predictor (independent) variables in the multiple regression models are highly correlated. The study used tolerance and variance inflation factor (VIF) values for the predictors as a check for multicollinearity. Tolerance indicates the percent of variance in the independent variable that cannot be accounted for by the other independent variable while VIF is the inverse of tolerance. A value of 10 has been recommended as the maximum level of VIF (Hair, Anderson, Tatham, & Black, 1995). Since tolerance values established were above 0.1 and with the corresponding VIF values being below 10, then there was no multicollinearity in the models.

Analysis of Variance's (ANOVA) f-test was used to make simultaneous comparisons between two or more means; thus, testing whether a significant relation exists between variables (dependent and independent variables); thus, helping in bringing out the significance of the regression model. Since the values were below 0.05, it can be concluded that the regression models were significant.

Table 4.3 shows the regression coefficients of independent variables. Observing the table, it is clear that GOP is negatively related to ACP, APP and CCC and positively related to ITO. In this case ACP and CCC were significant at 95% confidence level, ITO in days at 99% confidence while APP is at 90% confidence level. Natural log of sales, CR, SG and DR all show positive coefficient, however only the first two, that is, Natural log of sales and CR are significant at 99% and 90% level respectively whereas SG and DR are positive but insignificant.

#### 4.4.1 Regression Modeling by Accounts Collection Period (Model I)

**Table 4.4: Model I Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.679 <sup>a</sup>	.460	.412	.12288	1.792

a. Predictors: (Constant), Debt Ratio , Accounts Collection Period , Sales Growth , Ln(Sales), Current Ratio

b. Dependent Variable: Net Operating Income

**Table 4.5: Model I ANOVA**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.722	5	.144	9.558	.000 <sup>b</sup>
	Residual	.846	56	.015		
	Total	1.567	61			

a. Dependent Variable: Net Operating Income

b. Predictors: (Constant), Debt Ratio , Accounts Collection Period , Sales Growth , Ln(Sales), Current Ratio



**Table 4.6: Model I Coefficients**

Model	Coefficients <sup>a</sup>						
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-1.234	.275		-4.484	.000		
Accounts Collection Period	-.00074	.000	-.277	-2.472	.017	.765	1.307
<sup>1</sup> Ln(Sales)	.069	.011	.674	6.080	.000	.783	1.277
Sales Growth	.022	.051	.051	.437	.664	.721	1.387
Current Ratio	.005	.029	.021	.170	.865	.639	1.566
Debt Ratio	.041	.034	.142	1.191	.239	.674	1.484

a. Dependent Variable: Net Operating Income

In Model I, the accounts collection period in days is regressed against GOP. The R-square presented in Table 4.4, which represents the proportion of the overall variance explained by the variables included in the equation model is at 46%. Table 4.5 shows the F-value for this model at 9.558 and is highly significant  $\alpha = 1\%$ . Since the significance value of the F statistics is less than 0.05, the variation explained by the model is not due to chance and therefore the model is effective. The results shown in Table 4.6 confirm that all the coefficients for all the other variables considered are not significant except for ln(sales). The coefficient of the accounts collection period is negative and highly significant at  $\alpha = 5\%$ , indicating that an increase or decrease in the number of days of accounts receivable will significantly affect profitability.

Similar evidence is found by Gill et al. (2010), who did research in the USA and found a highly significant negative relation between accounts receivables and a firm's profitability in which they suggest that firm can enhance their profitability by keeping their working capital to a minimum. They argue that less profitable firms will pursue a decrease of their accounts receivables in an attempt to reduce their cash gap in the cash conversion cycle. This result can therefore be interpreted to imply that the less the time it takes for customers to pay their bills, the more cash is available to replenish inventory, hence the higher the sales realized leading to higher corporate profitability.

#### 4.4.2 Regression Modeling by Inventory Turnover in days (Model II)

**Table 4.7: Model II Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.636 <sup>a</sup>	.404	.351	.12914	1.960

a. Predictors: (Constant), Debt Ratio , Sales Growth , Inventory Turnover in Days , Current Ratio , Ln(Sales)

**Table 4.8: Model II ANNOVA**

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	.633	5	.127	7.593	.000 <sup>b</sup>
Residual	.934	56	.017		
Total	1.567	61			

a. Dependent Variable: Net Operating Income

b. Predictors: (Constant), Debt Ratio , Sales Growth , Inventory Turnover in Days , Current Ratio , Ln(Sales)

**Table 4.9: Model II Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	-1.484	.324		-4.587	.000		
Inventory Turnover in Days	9.613E-005	.000	.058	.479	.634	.726	1.377
Ln(Sales)	.074	.013	.722	5.569	.000	.633	1.579
Sales Growth	.057	.053	.128	1.060	.294	.735	1.360
Current Ratio	.030	.030	.127	1.024	.310	.693	1.444
Debt Ratio	.057	.035	.198	1.604	.114	.699	1.431

a. Dependent Variable: Net Operating Income

The second regression (Model II) was run by using the inventory turnover in days as an independent variable instead of ACP. The R-square as shown in Table 4.7, which represents the proportion of the overall variance explained by the variables included in the equation model is at 40% with the adjusted R-square being 35%. Table 4.8 presents the F-statistics for this model at 7.593 which reflects the significance of the model  $\alpha < 0.1\%$ . Table 4.9 depicts the ITO's coefficient as positive and significant  $\alpha = 1\%$ . This means that firms tend to keep higher levels of inventory to minimize the risk of possible production stoppages or when a firm has temporarily no access to raw materials which might adversely affect their profitability. Current ratio debt ratio and sales growth affect profitability and have positive coefficients. However, like in model I and as is presented in Table 4.9 only one control variable  $\ln(\text{sales})$  has a positive significant coefficient.

This finding is consistent with that of Mathuva (2010) who found out positive evidence in Kenya. This finding however differs with the result of a negative relationship found in articles, such as Alipour (2011) and Garcia-Teruel and Martinez-Solano (2007) who argued that companies that hold much inventory are less profitable. That is, when the time span during which inventories remain within the company increases, profitability decreases owing to opportunity costs incurred in deferred sales and decreased liquidity. Similarly, Fabozzi and Peterson (2003) established that stock of physical goods for eventual sale and its value depend on sales thus a short ITO would positively influence firms' performance.

#### 4.4.3 Regression Modeling by Accounts Payable Period (Model III)

**Table 4.10: Model III Summary**

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.636 <sup>a</sup>	.405	.352	.12906	1.915

a. Predictors: (Constant), Debt Ratio , Accounts Payable Period , Sales Growth ,  $\ln(\text{Sales})$ , Current Ratio

b. Dependent Variable: Net Operating Income

**Table 4.11: Model III ANOVA**

ANOVA <sup>a</sup>					
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	.634	5	.127	7.616	.000 <sup>b</sup>
Residual	.933	56	.017		
Total	1.567	61			

a. Dependent Variable: Net Operating Income

b. Predictors: (Constant), Debt Ratio , Accounts Payable Period , Sales Growth , Ln(Sales), Current Ratio

**Table 4.12: Model III Coefficients**

Coefficients <sup>a</sup>							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-1.322	.320		-4.137	.000		
1 Accounts Payable Period	-1.017.E-04	.000	-.066	3.468	.058	.735	1.361
Ln(Sales)	.069	.013	.674	5.509	.000	.711	1.407
Sales Growth	.057	.053	.129	1.075	.287	.734	1.363
Current Ratio	.020	.033	.084	3.371	.053	.570	1.754
Debt Ratio	.053	.036	.184	1.459	.150	.669	1.495

a. Dependent Variable: Net Operating Income

The third column of Table 4.3 presents the estimation results from model III with Accounts Payables Period used as a measure of working capital management (independent variable). The other variables are the control variables used in previous regressions model I and II. The coefficient of APP is negative and significant at  $\alpha = 10\%$ . Table 4.10 shows the R-square figure of 40% with the corresponding adjusted R-square at 35%. The F-value in Table 4.11 is 7.616, with the significance value of the F statistics being less than 0.05 indicating that the model is effective.

The negative relationship between the APP and profitability is consistent with studies conducted on working capital management and profitability by Eljelly (2004), Deloof,

(2003), Lazaridis and Tryfonidis, (2006), and Garcia-Teruel and Martinez-Solano (2007) and Raheman and Nasr (2007) in which they have made an interpretation to the effect that the firms who pay their bills earlier receive a discount, which in turn affects profitability whereas less profitable companies wait longer to pay their bills.

This finding however differs with that of Alipour (2011) and Mathuva (2010) who found a positive relation between accounts payables and firm's profitability in Kenya. According to Mathuva (2010), he argued that this is because profitable firms wait longer to pay their bills and firms use these short-term loans as a source of funds to increase their working capital investment and thus increasing their profitability.

#### 4.4.4 Regression Modeling by Cash Conversion Cycle (Model IV)

**Table 4.13: Model IV Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.635 <sup>a</sup>	.403	.349	.12928	1.969

a. Predictors: (Constant), Debt Ratio , Cash Conversion Cycle , Current Ratio Ln(Sales), Sales Growth

b. Dependent Variable: Net Operating Income

**Table 4.14: Model IV ANOVA**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.631	5	.126	7.552	.000 <sup>b</sup>
	Residual	.936	56	.017		
	Total	1.567	61			

a. Dependent Variable: Net Operating Income

b. Predictors: (Constant), Debt Ratio , Cash Conversion Cycle , Current Ratio , Ln(Sales), Sales Growth

**Table 4.15: Model IV Coefficients**

Coefficients <sup>a</sup>							
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-1.396	.282		-4.954	.000		
Cash Conversion Cycle	-4.922E-005	.000	-.037	-4.103	.045	.843	1.186
1 Ln(Sales)	.071	.012	.689	5.864	.000	.772	1.295
Sales Growth	.045	.057	.101	.786	.435	.650	1.540
Current Ratio	.029	.030	.122	.992	.326	.701	1.427
Debt Ratio	.058	.035	.201	1.624	.110	.694	1.440

a. Dependent Variable: Net Operating Income

In the fourth model, we used the same control variables as in the previous models, and Cash Conversion Cycle as an independent variable. Results in Table 4.3 and Table 4.15 for this model shows that the relationship between the Cash Conversion Cycle and the Gross Operating Profitability is negative and statistically significant at the level of  $\alpha = 5\%$ . Table 4.13 presents the R-square and the adjusted R-square figures at 40% and 35% respectively. The F-statistics is 7.552 as shown in Table 4.14 with a significance value of less than 0.05 indicating the effectiveness of the model

The results of this model are in line with previous research studies on working capital management conducted by Raheman and Nasr (2007), Zariyawati et al. (2009), Falope and Ajilore (2009), Dong and Su (2010), Mathuva (2010) and Quayyum (2012) who did research in Pakistan, Malaysia, Nigeria, Vietnam, Kenya and Bangladesh respectively. All these studies found a significant negative relationship between the cash conversion cycle and a firm's profitability. Deloof (2003) established that poor cash conversion cycle, prioritizing cash payables to receivables/receipts, will make a firm not to meet its current financial obligations hence face financial distress.

This finding implies that decreasing the cash conversion cycle will positively affect profitability owing to the consequent increased liquidity. This result can be interpreted to

mean that managers can create value for their firms, by keeping their working capital to a reasonable minimum. The other variables in the model have almost the same signals as in previous regressions.

#### 4.5 Regression Modeling by Zones

Table 4.16 shows that the regression coefficients of independent variables categorizing the linear relationship between working capital and profitability by zones. Looking at linear relationship diagnostics, the relationship between profitability and working capital management was more pronounced in Nyando Zone (70.6%) followed by South Nyanza (47.8%) then Kakamega Zone (40.9%). A unit change in cash conversion cycle influenced profitability by -0.000014 among firms from Nyando zones, -0.0016 among firms in Kakamega and 0.000086 from firms in South Nyanza Zone.

**Table 4.16: Regression Modeling by Zones**

	<b>Kakamega</b>	<b>Nyando</b>	<b>Southern Nyanza</b>
Constant	.433	-1.098***	-6.429
Cash Conversion Cycle	-.002**	-1.401E-05*	8.611E-05*
Ln(Sales)	-.009	.063***	.255
Sales Growth	.050	.120*	-.041
Current Ratio	.085*	-.099*	.476
Debt Ratio	-.032	.065	.697
R	0.640	0.840	0.692
R-squared	.409	.706	.478
Adjusted R-squared	.261	.636	-.391
Durbin-Watson	2.444	2.240	1.951
F-Value	2.770**	10.088***	.550**
N	26	27	9

\*\*\*. Significant at the 0.01 level; \*\*. Significant at the 0.05 level; \*. Significant at the 0.1 level.

Dependent Variable: Net Operating Income Predictors: (Constant), Debt Ratio, Sales Growth, Cash Conversion Cycle, Ln(Sales), Current Ratio

**Table 4.17: Kakamega Zone Model Summary**

**Model Summary<sup>a,c</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.640 <sup>b</sup>	.409	.261	.14467	2.444

a. Zone = Kakamega

b. Predictors: (Constant), Debt Ratio , Sales Growth , Cash Conversion Cycle , Current Ratio , Ln(Sales)

c. Dependent Variable: Net Operating Income

**Table 4.18: Kakamega Zone Model ANOVA**

**ANOVA<sup>a,b</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.290	5	.058	2.770	.047 <sup>c</sup>
	Residual	.419	20	.021		
	Total	.708	25			

a. Zone = Kakamega

b. Dependent Variable: Net Operating Income

c. Predictors: (Constant), Debt Ratio , Sales Growth , Cash Conversion Cycle , Current Ratio , Ln(Sales)

**Table 4.19: Kakamega Zone Model Coefficients**

**Coefficients<sup>a,b</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	.433	1.247		.347	.732		
	Cash Conversion Cycle	-.002	.001	-.537	-2.797	.011	.801	1.248
	Ln(Sales)	-.009	.055	-.042	-.170	.866	.487	2.052
	Sales Growth	.050	.105	.086	.475	.640	.899	1.113
	Current Ratio	.085	.042	.430	2.021	.057	.652	1.533
	Debt Ratio	-.032	.059	-.126	-.536	.598	.536	1.866

a. Zone = Kakamega

b. Dependent Variable: Net Operating Income



**Table 4.20: Nyando Zone Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.840 <sup>b</sup>	.706	.636	.08210	2.240

a. Zone = Nyando

b. Predictors: (Constant), Debt Ratio , Current Ratio , Cash Conversion Cycle , Ln(Sales), Sales Growth

c. Dependent Variable: Net Operating Income

**Table 4.21: Nyando Zone Model ANOVA**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.340	5	.068	10.088	.000 <sup>c</sup>
	Residual	.142	21	.007		
	Total	.482	26			

a. Zone = Nyando

b. Dependent Variable: Net Operating Income

c. Predictors: (Constant), Debt Ratio , Current Ratio , Cash Conversion Cycle , Ln(Sales), Sales Growth

**Table 4.22: Nyando Zone Model Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	-1.098	.351		-3.130	.005		
	Cash Conversion Cycle	-1.401E-005	.000	-.016	-3.021	.090	.777	1.287
	Ln(Sales)	.063	.013	.766	4.665	.000	.519	1.928
	Sales Growth	.120	.061	.404	1.979	.061	.336	2.979
	Current Ratio	-.099	.054	-.398	-1.839	.080	.299	3.346
	Debt Ratio	.065	.053	.198	1.220	.236	.530	1.885

a. Zone = Nyando

b. Dependent Variable: Net Operating Income

**Table 4.23: Sothern Nyanza Zone Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.692 <sup>b</sup>	.478	-.391	.09057	1.951

a. Zone = Southern Nyanza

b. Predictors: (Constant), Debt Ratio , Sales Growth , Cash Conversion Cycle , Ln(Sales), Current Ratio

c. Dependent Variable: Net Operating Income

**Table 4.24: Southern Nyanza Zone Model ANOVA**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.023	5	.005	5.550	.039 <sup>c</sup>
	Residual	.025	3	.008		
	Total	.047	8			

a. Zone = Southern Nyanza

b. Dependent Variable: Net Operating Income

c. Predictors: (Constant), Debt Ratio , Sales Growth , Cash Conversion Cycle , Ln(Sales), Current Ratio

**Table 4.25: Southern Nyanza Zone Model Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-6.429	6.844		-.939	.417	
	Cash Conversion Cycle	8.611E-005	.001	.102	4.121	.091	.246 4.065
	Ln(Sales)	.255	.299	1.041	.853	.456	.117 8.575
	Sales Growth	-.041	.210	-.109	-.194	.858	.553 1.807
	Current Ratio	.476	.366	1.603	1.299	.285	.114 8.760
	Debt Ratio	.697	1.081	.777	.644	.565	.120 8.365

a. Zone = Southern Nyanza

b. Dependent Variable: Net Operating Income

## 4.6 Regression Modeling by Ownership

**Table 4.26: Regression Modeling by Ownership**

	<b>Government</b>	<b>Private</b>
Constant	2.269**	-1.790***
Cash Conversion Cycle	-.1.064E-04*	-5.943E-05*
Ln(Sales)	-.101**	.094
Sales Growth	.205***	.025
Current Ratio	.026	-.020
Debt Ratio	.061**	.110
R	.616	.824
R-squared	.379	.679
Adjusted R-squared	.275	.599
Durbin-Watson	1.814	1.778
F-Value	3.662**	8.464***
N	36	26

\*\*\*. Significant at the 0.01 level; \*\* Significant at the 0.05 level; \*. Significant at the 0.1 level

Dependent Variable: Net Operating Income

Predictors: (Constant), Debt Ratio, Sales Growth, Cash Conversion Cycle, Ln(Sales), Current Ratio,

Table 4.26 shows that the regression coefficients of independent variables categorizing the linear relationship between working capital and profitability by ownership; whether the sugar factory is private or government-owned. Table 4.26 shows that privately owned sugar firms had a much stronger linear relationship between profitability and working capital management as shown by R-square value of 67.9% compared to government-owned that had R-square value of 37.9%. This can be attributed to the fact that government owned firms are occasionally bailed out of operating from the red by the government coupled with bad corporate governance that rarely look into its working capital. A unit change in cash conversion cycle influenced profitability by -0.00006 among privately owned sugar firms compared to -0.000106 among government owned sugar firms.

**Table 4.27: Categorization by Government Ownership Model Summary**

**Model Summary<sup>a,c</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.616 <sup>b</sup>	.379	.275	.08360	1.814

a. Ownership = Government

b. Predictors: (Constant), Debt Ratio , Sales Growth , Current Ratio , Ln(Sales), Cash Conversion Cycle

c. Dependent Variable: Net Operating Income

**Table 4.28: Categorization by Government Ownership Model ANOVA**

**ANOVA<sup>a,b</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.128	5	.026	3.662	.011 <sup>c</sup>
	Residual	.210	30	.007		
	Total	.338	35			

a. Ownership = Government

b. Dependent Variable: Net Operating Income

c. Predictors: (Constant), Debt Ratio , Sales Growth , Current Ratio , Ln(Sales), Cash Conversion Cycle

**Table 4.29: Categorization by Government Ownership Model Coefficients**

**Coefficients<sup>a,b</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.269	.844		2.689	.012	
	Cash Conversion Cycle	.000	.000	-.150	-3.002	.079	.736 1.358
	Ln(Sales)	-.101	.040	-.425	-2.547	.016	.744 1.345
	Sales Growth	.205	.066	.509	3.112	.004	.774 1.291
	Current Ratio	.026	.025	.163	1.035	.309	.832 1.202
	Debt Ratio	.061	.029	.334	2.135	.041	.847 1.181

a. Ownership = Government

b. Dependent Variable: Net Operating Income

**Table 4.30: Categorization by Private Ownership Model Summary**

**Model Summary<sup>a,c</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.824 <sup>b</sup>	.679	.599	.13649	1.778

a. Ownership = Private

b. Predictors: (Constant), Debt Ratio , Cash Conversion Cycle , Sales Growth , Ln(Sales), Current Ratio

c. Dependent Variable: Net Operating Income

**Table 4.31: Categorization by Private Ownership Model ANOVA**

**ANOVA<sup>a,b</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.788	5	.158	8.464	.000 <sup>c</sup>
	Residual	.373	20	.019		
	Total	1.161	25			

a. Ownership = Private

b. Dependent Variable: Net Operating Income

c. Predictors: (Constant), Debt Ratio , Cash Conversion Cycle , Sales Growth , Ln(Sales), Current Ratio

**Table 4.32: Categorization by Private Ownership Model Coefficients**

**Coefficients<sup>a,b</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1	(Constant)	-1.790	.425		-4.213	.000		
	Cash Conversion Cycle	-5.943E-005	.000		-3.113	-.174	.064	.803 1.245
	Ln(Sales)	.094	.016	1.010	5.674	.000	.507	1.974
	Sales Growth	.025	.086	.053	.288	.777	.469	2.131
	Current Ratio	-.020	.069	-.055	-.287	.777	.442	2.264
	Debt Ratio	.110	.073	.309	1.508	.147	.382	2.617

a. Ownership = Private

b. Dependent Variable: Net Operating Income

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATION**

#### **5.0 Introduction**

This chapter presents summary discussions of the key findings presented in chapter four and conclusions drawn based on such findings and recommendations. This chapter is thus structured into conclusion, recommendations and areas for further research.

#### **5.1 Conclusions**

From the results, possessing a lower average collection period is seen by the sugar factory as optimal, since this means that it does not take them very long to turn its receivables into cash. This owes to the fact that the sugar companies need cash to pay off its own expenses (such as operating and administrative expenses) including farmers who sell sugar cane to them. They also tend to have a longer accounts payable period so as to maintain a high current ratio and avoid operating in the red. Monitoring the working capital is important for the sugar companies' cash flow and its ability to meet its obligations when they come due. However, they optimize this to ensure that their credit worthiness is not tainted, take advantage of discounts including avoiding accruing interest rates unnecessarily.

The sugar companies also monitor their turnover ratio to ensure that it is as short as possible since turnover ratio is negatively correlated with profitability. If turnover ratio falls from one period to another, the sugar companies will take longer to pay off its suppliers and meet its financial obligation. The companies' operations will be choked owing to lack of space and too expensive logistics in storing finished sugar.

In summary, the findings from this study suggest that companies can improve their profitability by reducing their cash conversion cycle and by properly managing each of the components of working capital management. These findings are generally in line with many previous studies done on working capital management such as those of Raheman and Nasr (2007), Deloof (2003), and Mathuva (2010).

## **5.2 Recommendations**

Based on the findings and results from the analysis of the study, a general recommendation would be for the sugar firms to seriously rethink their corporate financial management practices in order to boost their growth and subsequently create value for shareholders. This can be achieved by taking specific actions in the following areas;

### **5.2.1 Accounts Collection Period**

Whereas it is observed that on average, most of the sugar firms took between 107 days to collect receivables, at certain periods, some sugar firms had to wait for as much as 379 days to realize the same, yet still others managed to achieve this in as short as 22 days. The negative relationship found between the sugar firms' profitability and accounts collection period indicates that firms will experience increased profitability if there is a decrease in collection period of account receivables. Sugar firms must therefore seek to adopt a neither liberal credit nor conservative policy so as to minimize bad debts and maximize sales in order to increase firms' profitability.

### **5.2.2 Accounts Payable Period**

Though the sugar companies were found to keep high accounts payable turnover ratio, it is not always in the best interest of the companies. Many of these companies extend the period of credit turnover to over one year. This can be used to explain the situation of insolvency that companies like Nzoia Sugar find themselves in, operating in the red to a tune of over Ksh21 billion compared to its current assets of Ksh4 billion, (Andae, 2014). Sugar firms should therefore endeavor to pay all their debts and bills on time to avoid losing goodwill with their creditors including cane suppliers and financiers in the long run.

### **5.2.3 Cash Conversion Cycle**

Since cash conversion cycle is used as measure of efficiency of working capital management, managers must appreciate the fact that, should cash conversion cycle gets prolonged, profitability gets negatively affected. Hence, the researcher recommends that sugar firm managers should seek to build their firm's value by reducing the cash conversion cycle to a reasonable level. They should also create profits for their companies by managing correctly the cash conversion cycle and by keeping each different component (accounts receivables, accounts payables, inventory) to an optimum level.

#### **5.2.4 Inventory Turnover in days**

On inventory turnover in days, the sugar companies took, on average, 144 days to sell their sugar but this could be as short as 28 days and as long as 435 days. The study found positive relation between inventory turnover in days and firms profitability. It can be noted that in as much as maintaining higher inventory ensures firm has sufficient stock that might result in more sales, the practice also attracts costs like storage, carrying, spoilages, insurance, and opportunity cost. On the other hand keeping low inventory may result in high liquidity.

As a result, sugar firm managers have to adapt proper inventory control techniques such as economic order quantity (EOQ), depending on the nature of inventory they hold. Furthermore, the firms must create stronger linkage between stores, purchasing manufacturing and marketing departments that enhances communications thereby providing each other with the relevant information that positively helps the firm in managing its inventory operations and minimizing costs.

#### **5.3 Areas for Further Research**

The researcher suggests that similar studies should be done on other firms as the relationship adduced does not conform to the rule of thumb or one-size-fits-all mantra as different industries and sector have different operational environment and this might affect the relationship between working capital and profitability. Additionally, there is need for further studies on sugar firms to carry out similar tests for a longer period of time. This will help in observing the sugar companies and the relationship between working capital management and profitability through to the earlier periods before liberalization when the sugar companies had little competition and were subjected to political patronage with little accountability.



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**APPENDIX I**  
**DESCRIPTIVE DATA**

Co.	Year	Net Income	Ln (Sales)	Sales Growth	CR	Debt Ratio	ACP	APP	ITO	CCC
Mumias Sugar Co.	2003	0.4011	22.755		1.494	0.272	33.11	85.49	82.65	30.27
Sony Sugar Co.	2003	0.1551	21.600		1.968	0.374	138.65	359.74	124.69	-96.41
Nzoia Sugar Co.	2003	0.2009	21.611		0.406	0.872	115.87	313.87	123.86	-74.14
Muhoroni Sugar Co.	2003	0.3573	20.880		1.021	0.954	153.69	350.62	57.37	-139.56
Chemelil Sugar Co.	2003	0.0896	21.264		1.222	0.542	129.02	156.57	80.22	52.68
SOIN Sugar Co.	2003	0.0080	16.453		1.663	1.156	157.63	272.45	424.78	309.97
Mumias Sugar Co.	2004	0.5282	23.005	0.2836	1.409	0.170	36.58	87.82	52.71	1.48
Sony Sugar Co.	2004	0.2790	21.830	0.2587	1.778	0.412	112.34	364.43	163.02	-89.07
Nzoia Sugar Co.	2004	0.2223	21.694	0.0862	0.434	1.086	83.57	334.95	156.83	-94.55
Muhoroni Sugar Co.	2004	0.3086	20.825	-0.0538	0.979	1.138	127.25	263.82	67.00	-69.56
Chemelil Sugar Co.	2004	0.1441	21.486	0.2487	1.154	0.647	114.19	228.17	87.45	-26.53
West Kenya Sugar	2004	0.2278	20.630		1.534	1.158	150.93	217.54	96.08	29.47
SOIN Sugar Co.	2004	0.0073	16.489	0.0370	1.172	1.152	127.09	356.78	435.08	205.39
Mumias Sugar Co.	2005	0.4517	23.034	0.0294	2.416	0.193	38.77	78.01	36.63	-2.61
Sony Sugar Co.	2005	0.1912	21.664	-0.1530	1.626	0.447	106.71	302.33	189.99	-5.63
Nzoia Sugar Co.	2005	0.1280	21.635	-0.0573	0.846	1.277	74.42	197.75	127.78	4.45
Muhoroni Sugar Co.	2005	0.2743	20.854	0.0301	0.948	1.316	79.92	420.75	163.23	-177.59
Chemelil Sugar Co.	2005	0.1947	21.598	0.1187	1.100	0.599	111.79	221.93	93.98	-16.17
West Kenya Sugar	2005	0.2209	20.990	0.4334	2.226	1.002	78.98	98.97	84.73	64.73
SOIN Sugar Co.	2005	0.0096	16.791	0.3522	0.905	1.670	98.25	297.92	334.67	135.01
Mumias Sugar Co.	2006	0.4683	23.179	0.1565	2.179	0.351	44.30	110.41	33.87	-32.24
Sony Sugar Co.	2006	0.2076	21.780	0.1233	1.394	0.471	119.01	362.05	228.05	-14.99
Nzoia Sugar Co.	2006	0.1767	21.577	-0.0562	0.385	1.596	172.22	274.75	197.16	94.63
Muhoroni Sugar Co.	2006	0.4199	21.387	0.7028	0.974	1.067	134.14	323.05	103.75	-85.16
Chemelil Sugar Co.	2006	0.2072	21.592	-0.0063	0.698	0.943	143.47	266.21	119.42	-3.32
West Kenya Sugar	2006	0.3928	21.332	0.4072	1.265	1.339	27.42	258.31	157.08	-73.80
SOIN Sugar Co.	2006	0.0136	17.880	1.9719	3.438	1.479	46.86	260.28	68.21	-145.21
Mumias Sugar Co.	2007	0.3815	23.063	-0.1095	2.279	0.300	74.34	81.98	28.13	20.50
Sony Sugar Co.	2007	0.0783	21.640	-0.1306	1.370	0.460	124.68	221.60	181.39	84.47
Nzoia Sugar Co.	2007	0.0989	21.613	0.0365	0.270	1.459	160.16	266.05	142.18	36.29
Muhoroni Sugar Co.	2007	0.1774	21.074	-0.2687	0.939	1.166	173.29	362.60	130.47	-58.85
Chemelil Sugar Co.	2007	0.1278	21.451	-0.1313	1.058	0.692	142.50	317.47	211.24	36.27
West Kenya Sugar	2007	0.2471	21.179	-0.1419	1.461	1.165	128.34	316.71	269.14	80.77
SOIN Sugar Co.	2007	0.0170	18.097	0.2427	1.481	1.315	43.36	311.06	112.58	-155.12
Mumias Sugar Co.	2008	0.3782	23.206	0.1531	1.346	0.361	80.23	133.91	51.57	-2.11
Sony Sugar Co.	2008	0.0303	21.844	0.2264	1.380	0.486	114.79	339.87	127.08	-98.01
Nzoia Sugar Co.	2008	0.1383	21.983	0.4485	0.397	1.430	128.24	245.65	104.02	-13.39
Muhoroni Sugar Co.	2008	0.2847	21.290	0.2413	0.811	1.247	149.48	340.71	206.95	15.72
Chemelil Sugar Co.	2008	0.0829	21.223	-0.2037	1.614	0.531	245.33	89.59	235.20	390.94
West Kenya Sugar	2008	0.3862	21.968	1.2020	1.785	1.249	59.36	150.41	132.25	41.20
SOIN Sugar Co.	2008	0.0356	18.591	0.6390	1.991	0.899	40.37	289.59	69.31	-179.92
Mumias Sugar Co.	2009	0.2486	23.191	-0.0149	1.356	0.426	101.00	186.01	34.48	-50.52
Sony Sugar Co.	2009	0.1724	21.944	0.1048	1.295	0.581	99.65	353.05	145.81	-107.59
Nzoia Sugar Co.	2009	0.1759	22.147	0.1779	0.332	1.903	182.02	228.41	86.72	40.32



Muhoroni Sugar Co.	2009	0.2160	21.106	-0.1682	0.857	1.303	201.75	367.45	424.49	258.78
Chemelil Sugar Co.	2009	0.1092	21.181	-0.0415	1.079	0.792	175.10	320.98	226.51	80.63
West Kenya Sugar	2009	0.2166	21.848	-0.1133	1.578	1.289	50.41	90.38	148.86	108.89
SOIN Sugar Co.	2009	0.0397	18.615	0.0236	1.153	1.614	50.79	105.36	89.99	35.42
Mumias Sugar Co.	2010	0.3659	23.472	0.3245	1.999	0.400	77.76	141.33	32.63	-30.94
Sony Sugar Co.	2010	0.1729	22.344	0.4916	1.013	0.663	105.65	279.85	83.40	-90.79
Nzoia Sugar Co.	2010	0.1290	22.096	-0.0493	0.494	2.411	97.80	195.26	49.83	-47.62
Muhoroni Sugar Co.	2010	0.4330	21.552	0.5633	0.774	1.471	111.82	332.26	415.97	195.53
Chemelil Sugar Co.	2010	0.1595	21.533	0.4217	1.041	1.001	134.07	356.35	177.84	-44.44
West Kenya Sugar	2010	0.6567	22.248	0.4927	1.420	1.454	36.79	125.11	28.74	-59.58
SOIN Sugar Co.	2010	0.0253	18.455	-0.1479	1.236	1.620	53.54	79.49	67.78	41.84
Mumias Sugar Co.	2011	0.2915	23.483	0.0114	2.199	0.375	89.28	108.07	42.04	23.24
Sony Sugar Co.	2011	0.1442	22.303	-0.0394	1.219	0.517	96.03	334.44	112.75	-125.65
Nzoia Sugar Co.	2011	0.1268	22.081	-0.0150	0.361	2.263	79.40	183.69	68.83	-35.46
Muhoroni Sugar Co.	2011	0.4454	21.722	0.1846	0.781	1.629	123.66	472.39	186.50	-162.23
Chemelil Sugar Co.	2011	0.1672	21.584	0.0523	0.891	0.937	151.43	278.51	124.74	-2.34
West Kenya Sugar	2011	0.5121	22.256	0.0077	1.392	1.711	21.88	95.59	52.88	-20.83
SOIN Sugar Co.	2011	0.0329	18.598	0.1547	1.237	1.720	39.98	311.12	213.82	-57.32
Mumias Sugar Co.	2012	0.2021	23.467	-0.0160	1.264	0.426	107.65	153.31	55.31	9.65
Sony Sugar Co.	2012	0.2397	22.480	0.1937	0.975	0.622	83.47	419.02	94.74	-240.82
Nzoia Sugar Co.	2012	0.2660	22.368	0.3317	3.851	1.877	68.24	186.75	190.10	71.58
Muhoroni Sugar Co.	2012	0.3258	21.506	-0.1940	0.648	1.750	171.68	148.93	253.65	276.41
Chemelil Sugar Co.	2012	0.1057	21.100	-0.3836	0.761	0.999	378.68	351.26	293.78	321.19
West Kenya Sugar	2012	0.7273	22.107	-0.1387	0.962	1.674	29.79	243.06	115.06	-98.21
SOIN Sugar Co.	2012	0.0673	19.051	0.5722	0.696	2.280	24.58	362.39	254.10	-83.71

## APPENDIX II

No	Mill/Distillery	Sugar Zone	Other attributes
1	Mumias Sugar	Kakamega	Private /Operational
2	Nzioia Sugar	Kakamega	Government /Operational
3	Butali Sugar	Kakamega	Private /Operational
4	Western Kenya Sugar	Kakamega	Private/ Operational
5	Sony Sugar	Southern Nyanza	Government /Operational
6	Sukari Sugar	Southern Nyanza	Private /Operational
7	Transmara	Southern Nyanza	Private /Operational
8	Kibos Sugar /Distillery	Nyando	Private/ Operational
9	Chemelil Sugar	Nyando	Government /Operational
10	Muhoroni Sugar/Distillery	Nyando	Government /Operational
11	Soin	Nyando	Private /Operational

**Location of Operational Sugarcane Millers & Distillers in Kenya (Source: SEA Scoping Report April – May 2012)**