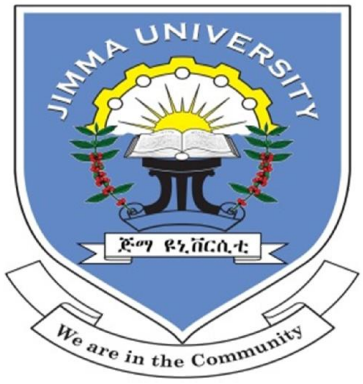
The Effect of Working Capital Management on Manufacturing Firms' Profitability

(With Special Reference to Chemical, Leather, Plastic and Nonmetallic Mineral Manufacturing Industries in Addis Ababa, Ethiopia)

A thesis Submitted to the School of Graduate Studies of Jimma University in Partial Fulfillment of the Award of the Degree of Masters of Science in Accounting and Finance

By:

HAILEKIROS NIGUS ADHANA



JIMMA UNIVERSITY

COLLEGE OF BUSINESS & ECONOMICS

DEPARTMENT OF ACCOUNTING & FINANCE

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JIMMA, ETHIOPIA

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Under the Guidance of

Dr. AREGA SEYOUM (Associate Professor)

And

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DECLARATION

I, Hailekiros Nigus, hereby declare that this thesis entitled "The effect of working capital management on manufacturing firms' profitability, with reference to chemical, leather, plastic and nonmetallic mineral manufacturing industries in Addis Ababa, Ethiopia" is my own work except where otherwise indicated and acknowledged. This thesis has been carried out by me under the guidance and supervision of Dr. Arega Seyoum (Associate professor) and Ato Mohammed Sultan.

The thesis is original and has not been submitted for the award of degree or diploma in any university or institution.

Name: Hailekiros Nigus Signature _____ June 05, 2017

CERTIFICATE

This is to certify that the thesis entities "The effect of working capital management on manufacturing firms' profitability, with reference to chemical, leather, plastic and nonmetallic mineral manufacturing industries in Addis Ababa, Ethiopia" submitted to Jimma University for the award of the Degree of Master of Science in Accounting and Finance is a record of Valuable research work carried out by Hailekiros Nigus Adhana, under our guidance and supervision.

Therefore we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.

Name of Advisors

1. Dr. Arega Seyoum Date _____ Signature _____

2. Mohammed sultan Date_____ Signature _____

Abstract

Working capital investments are essential for daily business operations of an entity. For that matter firms make huge amounts of investments in working capital that enables them to pay recurring obligations. Current asset investments are, however, the least profitable assets of an entity. Thus, in order to maintain healthy business managers involve in trade-off decisions between profitability and liquidity. In response for this, researchers from developed economies have been striving to investigate the impact of firms' working capital management on their profitability, since recent years. But, those researches have not considered the issue in underdeveloped economies and there exist a knowledge gap on the literature, with only scanty of studies available in such economies. Therefore in an attempt to fill this research gap, this study investigated the effect of working capital management on profitability of 39 large taxpayer manufacturing firms from four industries of Addis Ababa; namely, chemical, plastic and rubber, leather and nonmetallic industries by employing explanatory research design with quantitative approach. Firms' financial statements were collected for five years period from 2011 to 2015. Accounts receivable period, inventory holding period, accounts payable period and cash conversion cycle as measures of working capital management, and return on assets as a measure of firms profitability were the variables used in this study. Current ratio, firm size, debt ratio, and current assets to total assets and current liabilities to total assets ratios were also used as control variables. Data was analyzed with the help of STATA (version 13) and, correlation analysis and pooled panel data regression models of cross-sectional and time series data were employed. Results from the analysis revealed that there is statistically significant negative relationship between profitability and all working capital management measures of accounts receivable period, inventory holding period, accounts payable period and cash conversion cycle. Overall, accelerated cash collections, quick inventory turnovers, early payments to suppliers, and reduced time interval between those activities will increase corporate profitability of the chemical, plastics and rubber, leather and nonmetallic mineral manufacturing companies. Thus, by efficiently managing their working capital components managers of those firms could enhance their corporate profitability.

Keywords:, *working capital management, profitability, large tax payer, manufacturing firms, Addis Ababa*

Acknowledgement

First and foremost thanks to Almighty God, I do not know how I can state for all; I am heartily indebted to him with his mother Saint Marry, for his bright gifts throughout my life.

It gives me a great pleasure to present this research study on the impact of working capital management on manufacturing firms' profitability. Regardless of how significant it is such undertaking calls for cooperation and support of many people. This study too is not exceptional and many individuals have been helping me throughout. Though I cannot reward them for what they have done, at least I owe them a word of gratitude and therefore let me take this opportunity to express my acknowledgment.

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My heartfelt thanks go to my father Nigus Adhana, my mother Maeregu Hayelom, my uncle Kindhaw Hayelom and my sisters (Hana, Brhan, Atsedu, Meselu and Kiros), without whom I would not be the person I am today. I love you all!

Saint Mary, mother of God, pray for us sinners now and at the hour of our death. Bless, protect and intercede for us. AMEN!

Table of Contents

List of tables and figures

List of ACRONYMS/ABBREVIATIONS

AACCSA: Addis Ababa Chamber of Commerce and Sectoral Association

APP: Accounts Payable Period

ARP: Accounts Receivable Period

ASE: Athens Stock Exchange

CATOTA: current assets to total assets ratio

CCC: Cash Conversion Cycle

CLTOTA: current liabilities to total assets ratio

CR: Current Ratio

E.C: Ethiopian Calendar

EBIT: Operating Profit

ERCA: Ethiopian Customs and Revenue Authority

FGR: Firm Growth Rate

FS: Firm size

GWC: Gross Working Capital

IHP: Inventory Holding Period

LEV: Leverage

MOT: Ministry of Trade

NTC: Net Trade Cycle

NWC: Net Working Capital

NYSE: New York Stock Exchange

OLS: Ordinary Least Square

OPM: Operating Profit Margin

QR: Quick Ratio

ROA: Return on Assets

ROE: Return on Equity

WC: Working Capital

WCM: Working Capital Management

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Any business entity is a composition of various important elements including fixed assets, current assets, current liabilities, long term debt, equity and many more resource (Ali & Ali, 2014). To maximize their shareholders wealth firms conduct decisions concerned with acquiring, financing, and managing of those financial resources. Those financial decisions jointly are what the so called corporate finance which, as Samuel (2009) described, can be suitably categorized in to short term (working capital) and long term decision areas. Capital budgeting, dividend policy, and capital structure are grouped under long-term financial decisions, whereas working capital management is concerned with acquisition and allocation of current assets and the related current liabilities. Those current assets and liabilities are known as working capital, a term used to refer the capital invested to meet day to day resource requirements of a firm.

Though the degree of working capital requirement varies across firms because of several factors such as nature of business, scale of operation, production cycle, business cycle, seasonality and production policy, credit policy, growth and expansion opportunities, operating efficiency and availability of raw materials, it is hardly found that a company survives without working capital. Just as human body cannot function without blood, business too will not function as a business unless some resources are reserved as working capital in order to meet requirements of daily business operations. But from economics point of view those resources are scarce, nothing is freely available. Thus management of those resources is of high value for any business striving to generate more from this world of scarcity.

Working capital management is a managerial accounting strategy which targets in maintaining efficient levels of both components of working capital, current assets and current liabilities, in respect to each other (Samson et al., 2012) and it ensures whether a company has enough cash flow in order to meet its maturing obligations and operating expenses. Similarly Charitou et al. (2010) stated that wise utilization of the firm's resources, as it relates to working capital management involves managerial ways to find effective and efficient uses of resources available for day-to-day business operations in order to get optimum benefits.

When a firm invests in a large amount of working capital, funds are tied up in less profitable assets and it reveals the firm's operational problems (Marttonen et al., 2013). The funds tied up in such unprofitable assets have to be freed and diverted in to more profitable investments. But as Rehn (2012) stated it cannot be lowered to a minimum amount unless other operational benefits, liquidity and solvency are compromised. Indeed as Raheman & Nasr (2007) explained that, though the ultimate objective of any business organization is maximizing the profit, maintaining liquidity is important objective as well. Whereas increasing profitability at the expense of liquidity causes serious operational difficulties because both of those objectives have their respective importance that; if the business is not profitable it cannot survive, on the other hand if it is not liquid it will face insolvency or bankruptcy problems, there must involve a trade-off between those two objectives. Hence, effective working capital management attempts to balance the tradeoff between profitability and liquidity.

Imperative advancements of theoretical concept and related techniques in finance during the past four decades have provided the potential for improved practical decisions in business organizations (Rezene, 2004; Singh & Kumar, 2013). But the advancements have not been uniform across all dimensions of corporate decision makings and past literatures on corporate finance has most dominantly focused on long term financial decision; paying less attention to short-term financial decisions. In which working capital management, more specifically, remained an ignored segment of financial management in the research arena, in spite of the widely recognized fact that most of the business failures are results of poor decisions on working capital.

Following the late global financial crisis and the collapse of numerous large companies, however, the topic working capital management has gained a significant attention from researchers (Charitou et al., 2010; Singh & Kumar, 2013; Marttonen et al., 2013) and it is brought to forefront of the research arena. In this regard, working capital management research on the corporate finance literature has mostly targeted three major topics (Monto, 2013); expressly on, typical practices firms use to manage their working capital, factors affecting working capital management of companies, and the impact of working capital management on profitability of firms. Of interest in this study is, therefore, the impact of working capital management on profitability.

Since recent years, as Afrifa (2013) asserted that, there is an increasingly growing research attention in the impact of working capital management on profitability. This is a reflection of the importance of working capital management to every businesses organization. Many prominent research studies such as (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Padach, 2006; Ganesan, 2007; Rahman & Nasr, 2007; Gill et al., 2010; Mbawuni et al., 2016) and many more research articles, suggesting significant relationships between working capital management and profitability of businesses have been conducted.

However, most of the studies are from developed economies (e.g. Deloof, 2003; Lazaridis & Tryfonidis, 2006; Gill et al., 2010), and only few studies are available in the developing nations context. Besides, as can be evidenced from preliminary research studies, findings in the impact of working capital management on firms' profitability lack consistency. As Afrifa (2013) pointed out that, some researchers advocate negative relationship between profitability and working capital management components while others also suggest positive relationships. Likewise the extent to which working capital management components impact profitability considerably differs across research findings. Therefore, the topic "***what is the impact of working capital management on profitability?***" Is an important concern for businesses and remain an open research ground in the corporate finance literature.

1.2. Statement of the problem

Working capital management is an important component of corporate finance because of its direct impact on profitability and liquidity of a business entity (Raheman & Nasr, 2007). Owing to this strategic role in value creation, and following the recent global financial crisis (Charitou et al., 2010; Marttonen et al., 2013), numerous research studies addressing the impact of working capital management on firms profitability have begin to appear in the corporate finance literature. However, as Enow & Brijlal (2014) contended that the findings are quite mixed. They lack cohesiveness which is attributable to variations in factors such as culture, perceptions, market size, industry variations, market depth, efficiency, and regulations.

Working capital management is of magnificent importance, especially, in developing countries (Sebhatleab, 2002; Akbar, 2014), where firms have no access of external finance due to the absence of capital markets and even if the capital markets exist the firms would not be public due

to their small size. Furthermore, as Chan (2010) stated that the need for working capital is relevant in developing countries because of the nonexistence of external credits, thus businesses in such economies have to resolve the time delay involved in operating cycle to freed the cash tied up in working capital. In addition, as pointed out by Panigrahi (2014), developing economies are weak in efficiently utilizing the resources available to them. For those reasons, therefore, working capital management is particularly more important to firms in developing nations. In spite of those justifications, however, research explanations on the impact of working capital management on profitability are dominantly from the developed economies (Bellouma, 2016). Thus, it reveals a need to conduct more researches on developing nation's settings to fill the existing research gap.

As it stands to most of developing nations, researches on the impact of working capital management on profitability in Ethiopian context are scanty. As per the researcher's access and knowledge only a handful of recent studies such as (Tewodros, 2010; Ephrem, 2011; Tirngo, 2013; Wobshet, 2014; Mifta, 2016; Abenet & Venkateswarlu, 2016; Arega et al., 2016) have tried to determine the impact of working capital management on profitability of Ethiopian business organizations. With the exception of Tirngo (2013) and Ephrem (2011) who approached the issue in case of small sized business enterprises of the various sectors, most of the researchers have examined the impact of working capital management on profitability of manufacturing companies. Wobshet (2014) and Arega et al. (2016) also have studied the impact of working capital management on industry specific manufacturing companies' profitability, metal manufacturing companies and food complex manufacturing companies respectively.

While the rest researchers examined the impact of working capital management on similar case studies, various industries of the manufacturing sector. They have selected their samples by stratifying the manufacturing companies in to different stratums of industries and thereby taking proportionate samples, such as (Mulualem, 2011; Mifta, 2016). But in such studies, industry classes with small member companies were given less weight and less coverage because proportionate samples are taken from the various industry stratums. In fact according to CSA (2012) survey report, more than 31 percent of the large and medium manufacturing establishment in Ethiopia is attributable to food and beverage product industries, and are followed by nonmetallic mineral product industries and furniture industries by 18 percent and 13

percent respectively. While chemical, plastic and leather industries each takes below five percent of the establishments.

Due to their relatively small numbers chemical, leather, and plastic manufacturing companies specifically have been given less weight in those studies. The issue in those industries is not examined in detail and only the name "manufacturing companies" is used as pretext for them in the previous Ethiopian studies. Therefore this study tried to investigate the impact of working capital management on profitability by giving due emphasis on those unexplored industries of chemical, leather, nonmetallic mineral, and plastic and rubber manufacturing.

In general, the researcher was inspired to conduct the study entitled as the impact of working capital management on profitability of the selected manufacturing companies, on account of the following motives:

- Working capital management has spectacular importance to firms in developed economies. But, research studies on those economies are scanty and therefore more researches on the impact of working capital management on profitability of firms on developing nations has to be studied.
- Research results, on the impact of working capital management on profitability of businesses lack consistency, as a result research findings reported for one case area may not be relevant for another. In line with this, the impact of working capital management on profitability of unexplored research area, the chemical, leather, nonmetallic mineral and plastic manufacturing industries of Addis Ababa was examined in this study.
- Although few similar research studies have been conducted in the Ethiopian manufacturing sector, the findings of those studies may not be pertinent to the chemical, leather, nonmetallic and plastic manufacturing industries. This is because they have been given less weight due to their small number, in stratified sampling techniques employed by previous researchers. Hence, the impact of working capital management on profitability of the selected manufacturing industries was not explored in detail and it attracted the researcher's attention.

Therefore, this study tried to fill the stated research gaps by determining the impact of working capital management on manufacturing firms' profitability, with special reference to chemical,

leather, nonmetallic mineral, and plastic and rubber industries of Addis Ababa. In view of the stated research problems, the research question of this study was: **what is the impact of working capital management on profitability of the selected manufacturing firms?**

1.3. Objectives of the study

1.3.1. General objective of the study

The general objective of this study was aimed at examining the impact of working capital management on manufacturing firms' profitability, with a special reference to chemical, plastic, leather and non metallic product manufacturing industries of Addis Ababa.

1.3.2. Specific objectives of the study

While it was sought to determine the impact of working capital management on profitability, this study had the following specific objectives to pursue:

- To determine the effect of accounts receivable period on profitability of the manufacturing companies.
- To study the effect of inventory holding period on profitability of the manufacturing companies.
- To find out the impact of accounts payable period on profitability of the manufacturing companies.
- To analyze the impact of cash conversion cycle on profitability of the manufacturing companies.

1.4. Research hypotheses

The objective of this study was to examine the impact of working capital management on profitability of selected manufacturing industries. Previous researches conducted on the impact of working capital management on profitability such as (Deloof, 2003; Padachi, 2006; Rahman and Nasr, 2007; Abenet & Venkateswarlu, 2016; Arega et al., 2016; Mbawuni et al., 2016, and etc.) have asserted the existence of significant relationship between the components of working capital management and profitability. Thus, to achieve the stated research objectives the

following testable hypotheses were developed for this study, on the view of those preliminary studies.

Hypothesis one

The higher ARP the more working capital investment required and consequently the less firm's profitability will be. On the basis of this theoretical relationship and empirical results of (Deloof, 2003; Lazaridis and Tryfonidis, 2006; Raheman and Nasr, 2007;Gill et al., 2010;Jahfer, 2015; Hoang, 2015), therefore, the first testable hypothesis was developed as follow:

- **H_1:** There is significant negative relationship between Accounts Receivable Period (ARP) and profitability of the selected manufacturing industries.

Hypothesis two

The higher the IHP the more working capital investment is, because cash is tied up in unsold inventories and less profitable the firm is. Thus, based on this theoretical relationship and the empirical results of (Raheman and Nasr, 2007; Falope and Ajilore, 2009;Angahar & Alematu, 2014; Hoang, 2015) the following hypothesis was developed:

- **H_2:** There is significant negative relationship between Inventory Holding Period (IHP) and profitability of the selected manufacturing industries.

Hypothesis three

High number of days in APP implies that a firm is paying late and it is financing its operation from suppliers' cash, thus the less firm's working capital investment and better its profitability is. Thus, based on this theoretical relationship and the empirical result found by Falope & Ajilore (2009) the third hypothesis was developed as:

- **H_3:** There is significant positive relationship between Accounts Payable Period (APP) and profitability of the selected manufacturing industries.

Hypothesis four

High number of days in cash conversion cycle represents slow inventory turnover, lenient collection policy and early payment policy for which high working capital investment is required, hence lower the firm's profitability would be. Thus, based on this theoretical

relationship and results of prior studies (Lazaridis and Tryfonidis, 2006; Raheman & Nasr, 2007; Falope & Ajilore, 2009; Yasir et al., 2014; Hoang, 2015; Abenet & Venkateswarlu, 2016; Arega et al., 2016) the following hypothesis was developed for this proxy variable:

- **H_4:** There is significant negative relationship between Cash Conversion Cycle (CCC) and profitability of the selected manufacturing industries.

1.5. Significance of the study

As this study was intended to determine the impact of working capital management on manufacturing firms' profitability, with special reference to chemical, plastic, leather and non metallic mineral manufacturing companies of Addis Ababa, it is expected that it will contribute to the corporate finance literature and practical business endeavors of those manufacturing firms.

The theoretical contribution of this study is that it will provide additional insights to the existing body of knowledge in the impact of working capital management on profitability by providing empirical evidence from underexplored business environment, the Ethiopian manufacturing industries.

To the practical business undertakings, the findings of this study will provide an understanding on the relationship between working capital management and profitability. As a result it will assist managers of the manufacturing companies to improve profitability of their businesses by managing their working capital efficiently and effectively. Additionally, this research may have implications to policy makers by studying financial matters affecting profitability of the manufacturing industries that can be used as additional information to design policies and regulations to the sector. Moreover, this study may be used as reference material for future researchers and other students taking related project works, besides the requirement for the academic qualification of the researcher.

1.6. Scope and limitations of the study

The scope of this study was delimited to the impact of working capital management on profitability of chemical, plastic, leather and non metallic industries of Addis Ababa. A total of 39 manufacturing companies that belongs to the four industry classes of chemical, plastic, leather and nonmetallic were considered with a motive to better explain the relationship between

working capital management and profitability of those manufacturing industries, because they have not been explored sofar. The study period was also limited to only five years covering from 2011 to 2015, due to data unavailability for years prior to 2011 and subsequent to 2015.

This study had also several limitations. One limitation on this regard was that, there were a total of 90 manufacturing companies which belongs to the four industry classes. Due to the criteria employed to generate the final sample unites, some companies with missing values and distinct figures were excluded from the considerations. Hence, they might have been with some meanings, though omitted due to the balanced panel data observation strategy. However, the study used 39 sample firms and they would be highly representative of the population because they are large in number.

Another limitation of this study would be due to the nature of this research the data used was of exhaustively secondary and the figures in the data sources may not be fully reliable, hence, results of this study could be deterred in somehow. Offcourse, the data was collected from authoritative governmental agency ERCA and the data were regarded as highly reliable. In additions, many limitations associated with methodology, example in variable selections and quantitative analysis procedures employed might have limitations.

1.7. Organization of the study

This study has five coherent chapters organized in logical order as follow:

Chapter One: Introduction

This introductory section lays a foundation for the succeeding chapters of the study. It provided a clear picture for the whole paper and briefly outlined the research background, problem statement and research question or hypothesis, the objectives to be achieved, significance of the study, and scope and limitations of the research study.

Chapter Two: Review of Related Literatures

This chapter will provide a review of related theoretical and empirical works by previous researchers on the impact of working capital management on profitability and will identify existing research gaps on the literature.

Chapter Three: Research Methodology

This section will contain the conceptual blueprint within which the research will be conducted and the justifications behind, the population framework and sample sizes, sources and types of data, data collection instruments, measurement of variables and model specification, and the methods to be used in data analysis.

Chapter Four: Results and Discussions

This section will analyze the data collected and will display the results generated through the data analysis methods. In this chapter, interpretations and explanations will be given to the dependent and independent variables of study on the nature and extent of their relationship.

Chapter Five: Conclusions and Recommendations

This chapter will provide a summary of the findings and will forward recommendations to the managers of the companies based on the findings. It will also suggest possible future research directions by recognizing its scope delimitation and research limitations.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

Introduction

This chapter provides a review of related theoretical and empirical works by previous researchers on the impact of working capital management on profitability and identifies existing research gaps on the literature. Moreover, this chapter helps in gaining further insights about the research problem and methodologies to be employed.

2.1. Review of theoretical literatures

Every single decision made in any business entity has financial implication, and any decision that involves the use of money is a corporate financial decision (Damodaran, 2004). Corporate finance, a discipline concerned with acquisition and allocation of firm's economic resources basically involves three decisions, which are:

1) **Long-term investment decisions:** also called capital budgeting are decisions which deals with determination of the type and composition of firms productive assets.
2) **Long-term financing decisions:** are decisions which deals with the sources, costs, and timings of the funds required for the long term investment decisions.
3) **Working capital management or short term financing decisions:** refers to financial decisions which are concerned with efficient and effective utilization of firm's short term assets and liabilities.

As Damodaran (2004) argued that while making those financial decisions, corporate finance is single minded about the ultimate objective of value maximization, which is the long term objective of any firm. However as Sebhatleab (2002) pointed out that the long term value of a firm is a sum of the short term values (such as profit maximization and risk minimization), and working capital management is the one that takes care of the short term values. Thus, the concern of this study is the impact of working capital management on profitability.

2.1.1. The meaning and concepts of working capital

The term working capital originated with the old Yankee peddler who would load up his wagon and go off to peddle his wares. The merchandise was called "working capital" because it was

what he actually sold, or "turned over," to produce his profits. The wagon and horse were his fixed assets. He generally owned the horse and wagon (so they were financed with "equity" capital), but he bought his merchandise on credit by loans obtained from bank. Those loans were called working capital loans, and they had to be repaid after each trip to demonstrate that the peddler was solvent and worthy of a new loan. Banks that followed this procedure were said to be employing "sound banking practices." The more trips the peddler took per year, the faster his working capital turned over and the greater his profits (Brigham & Houston, 2009).

In today's business venture several authors define working capital in various terms. Fabozzi & Peterson (2003) defines working capital as a capital that managers can immediately put in to work to generate benefits of the capital investments made. Working capital represents a net investment in short-term assets which continually flow to and from the business (Atrill, 2009). According to Baker & Powell (2005) working capital refers to current assets of a business used in operations, including cash and marketable securities, accounts receivable, and inventory. The term working capital is also known as circulating capital, a term which signifies for assets that are convertible with relative speed from one form to another *i.e*., starting from cash, changing to raw materials, converting into work-in-progress and finished products, sale of finished products and ending with realization of cash from debtors (Nair, 2011).

The term working capital, all in all, is used to denote the capital required for day-to-day operations of a business concern, such as for purchasing raw materials and for paying operational expenditure on salaries, wages, rents, advertising and etc (Nair, 2011). Nonetheless, the literature reveals some disagreements among various authors and financial experts as to the exact meaning of the term working capital.

The disagreement on the term working capital has based its foundation on the working capital concept, which has passed through considerable changes over the past years. A few decades ago the concept was considered as a measure of debtor's ability to cover the creditors claim in case of liquidation. By that time the main emphasis was on examining whether or not the current assets are immediately realizable and available to pay debts in case of liquidation (Donkor, 2014). However, since recent years the focus has changed from liquidation point of view to the firm's ability in paying the maturing obligations from the funds generated by its operation (going on concern). In view of this, working capital is used to examine the firm's level of margin or buffer

to meet the current obligations. In support of this, Bragg (2011) stated that if an entity is to liquidate in near future the current asset and current liability classifications are in appropriate. Thus, the concept working capital should assume the going on concern.

According to Horne & Wachowicz (2008) there are two concepts related with the term working capital, gross working capital concept and net working capital concept. The gross working capital concept refers to the firm's total investment in current assets such as cash and near cash securities, receivables and inventory. The net working capital concept, on the other hand, refers to the difference between the current assets and current liabilities. The meaning for working capital, however, rests on the net working capital concept (Horne & Wachowicz, 2008). It is because the net concept comprises both current assets and current liabilities which are the focus of working capital management.

The accounting definition for current assets and liabilities are given by Bragg (2011) as, current assets consist of cash and other assets that are reasonably expected to be converted in to cash or sold or consumed during firm's normal operating cycle. When the normal operating cycle is less than one year, a one-year period is used to distinguish current assets from noncurrent assets. But, when firm's operating cycle exceeds one year, the operating cycle is the proper period to use for current asset identification. Current assets include cash and short term securities, receivables, supplies and inventories. Current liabilities on the other hand are obligations classified on the balance sheet statement as current liabilities are to include debts that management of the reporting entity expects to settle in cash within one year of the statement of financial position date, or within one operating cycle, if that period is longer than one year (Bragg, 2011). Current liabilities include accounts and notes payables, and accrued salaries and other outstanding expenses.

2.1.2. Classifications of working capital

Classifications on working capital can be made based on two perspectives (Donkor, 2014); *i.e.* value perspective and time perspective.

1. **From the value perspective:** working capital can be classified as gross working capital (GWC) and net working capital (NWC). The gross working capital refers to the firm's total investment in current assets such as cash and near cash securities, receivables and

inventories, whereas, the net working capital refers to the dollar difference between firm's current assets and the current liabilities required to finance those assets (Horne & Wachowicz, 2008). Mathematically net working capital can be expressed as:

$$\text{NWC} = \text{Total current assets} - \text{Total current liabilities}$$

2. **From the time perspective:** because firms face seasonal fluctuations in their operation they would not keep the same level of working capital and based on this timing variability working capital can be classified as permanent and temporary (Donkor, 2014). Permanent working capital refers to portion of the investment in total current assets which remains fixed regardless of the variations in sales; there is always a fixed minimum level of cash, inventories, and accounts receivables maintained in the business even if sales are reduced to a minimum. Whereas temporary working capital represents the additional investment in current assets needed during prosperity and favorable seasons (Mathur, 2010). It increases with seasonal demand and some other special requirements.

2.1.3. The need for working capital

In a perfect world, where there is no uncertainty, no transaction costs, no scheduling costs of production and technology constraints, working capital would not be required (Sebhatleab, 2002; Berk & Demarzo, 2014). The unit cost of production will not be changed with the level of output. Firms lending and borrowing rates will be similar. The market will be highly competitive since there will not be information asymmetry in the capital, labor and product markets.

In such an ideal markets there would be a little need to hold any inventory other than work in process inventories because the demand is exactly known in advance and suppliers will keep to their due dates, production can be smoothed, and orders will be executed directly without costs and delays. There would be no need of holding extra cash as a reserve other than for the initial costs, as it is possible to make the payment from every receipt of sales. There would also be no need for granting receivables and taking payables if customers pay cash immediately and the firm would also make its purchase on cash (Sebhatleab, 2002).

But, as Sebhatleab (2002) further maintained that, the problem of working capital exists because these ideal assumptions are never realistic and, accordingly Berk & Demarzo (2014) regarded working capital accounts as results of market imperfections. In general, as Gupta (2012) stated

that, non-ideal production technology and imperfect market and distribution systems of firms are the reasons for existence of current assets that, results in blocked funds of a firm. Hence, every business, regardless of its size and nature, requires a minimum amount of working capital (Awan et al., 2014), though, as Deeposhree (2013) affirmed that the level of working capital requirements differs across firms given the various determinant factors.

Working capital investment and financing needs, in general, are resulted from firm's operating cycle. Operating cycle is the period of time that is extended from the cash investment in goods and services to the time that investment produces cash (Fabozzi & Peterson, 2003). Operating cycle is a product of three main business activities which create unsynchronized and uncertain cash flows (Moyer et al., 2006), namely: purchasing resources, producing the product, and distributing the product. They are unsynchronized because the cash disbursements are usually taken place before the cash collections, and they are uncertain that the sales and costs cannot be forecasted a head with accuracy. Operating cycle comprises four basic phases for a typical manufacturing company:

i. Purchase raw material, process the raw materials to produce the finished goods.
ii. Sell the finished goods to generate revenue, which may/mayn't be for cash.
iii. Extend credit for customers, creating accounts receivable.
iv. Collect the credits from customer, then generating cash.

Mathematically operating cycle can be calculated as:

$$\text{Operating Cycle} = \text{inventory conversion period} + \text{receivables conversion period}$$

2.1.4. Determinants of working capital requirements

The corporate finance literature has no conventional rules or formulas used to determine the working capital requirement of a company. Several factors significantly affect the working capital requirement of an entity (Paramasivan & Subramanian, 2009; Mathur, 2010). Some of the important factors that significantly affect the working capital requirements are listed below:

- ✓ **General nature of the business**: The general nature of a business is an important determinant of the required working capital level. Working capital requirements depends upon the general nature and operational activities of the organization. Required working capital levels are relatively low in public utility concerns because inventories and

receivables are rapidly converted into cash. Manufacturing organizations, however, face problems of slow turn-over of inventories and receivables, and invest large amount in working capital.

- ✓ **Volume of sales:** this is another most important factor affecting the size and component of required working capital. Any entity maintains current assets because they support the operational activities which results in sales. The volume of sales and the size of the working capital are directly related to each other. Because *a*s the volume of sales increases, there is an increase in the investment of working capital in the cost of operations, in inventories and in receivables.
- ✓ **Production cycle:** production cycle or operating cycle is time taken by a firm to convert raw materials into finished goods. The longer the duration of the production cycle or operating cycle, the greater is the requirement of working capital. Therefore, the duration of this production cycle should be reduced as much as possible in order to minimize working capital requirements.
- ✓ **Business cycle:** when there are good economic conditions companys' will expand their business operation but will decline an economy is at depression. Consequently, more working capital is required during periods of prosperity and less during periods of economic depression.
- ✓ **Nature of the industry:** asset compositions of a business is related to its size and the industry to which it belongs. Small companies have smaller requirements of working capital than large companies, because their scales of operation are limited.
- ✓ **Liquidity and profitability:** if a firm is to take greater risks for greater gains or losses, it reduces the size of its working capital in relation to its sales. If it is interested in improving its liquidity, it increases the level of its working capital. However, this policy is likely to result in a reduction of sales volume and, therefore, of profitability. A firm, therefore, should choose between liquidity and profitability and decide about its working capital requirements accordingly.

2.1.5. Working capital management

As stated by Donkor (2014) working capital management is a functional area of finance that is concerned with all current accounts of a business entity. Working capital management involves in the administration of current assets namely, cash and marketable securities, receivables,

and inventories and the administration of the related current liabilities (Vanhorne, 1971). According to Mathur (2010) working capital management refers to the management of current assets, current liabilities and the interrelationship between them in such a way that, optimum amount of both is maintained.

Working capital management is a managerial accounting strategy which targets in maintaining efficient levels of both components of working capital, current assets and current liabilities, in respect to each other (Samson et al., 2012) and it ensures whether a company has enough cash flow in order to meet its maturing obligations and operating expenses. Similarly Charitou et al. (2010) stated that wise utilization of the firm's resources, as it relates to working capital management involves managerial ways to find effective and efficient uses of resources available for day-to-day business operations in order to get optimum benefits.

Historically, working capital management has evolved through three principal management stages namely: the control, optimization and value measurement stages (Sebhaltleab, 2002). Initially working capital management started as a systematic mechanism of controlling the incoming, outgoing and remaining balances of cash, receivables and inventories. At this stage the main objective was demonstrating that operating resources are not misappropriated for personal benefits of those who are entrusted with company's management. Under the optimality management stage, the emphasis was not merely on safeguarding the physical safety of working capital items but also on the optimal use of those resources, i.e., minimization of related costs and maximization of related income. This stage has lead for the development of several models of optimal working capital uses. Under the value measurement stage working capital management's main emphasis is on how to help managers in the creation and measurement of value, while simultaneously involving in the controlling and optimization of working capitals. In this stage cash flow approach is used as a means of measuring the value created by a firm.

Effective working capital management is important for several reasons (Baker & powell, 2005). First, a great deal of time is spent by managers of a firm in managing current assets and current liabilities in which, as Brigham & Houston (2007) stated that "About 60 percent of a typical financial manager's time is devoted to working capital." Second, the level in current assets and current liabilities will change quickly in response to sales variation (Mathur, 2010). Hence, they deserve frequent attention and supervision. Third, most firms have sizeable amount of

investments in current assets (Deloof, 2003; Brealy et al., 2011) and short term payable are the substantial sources of their financing. Fourth, working capital management has direct impact on firm's profitability and liquidity (Raheman & Nasr, 2007). Thus, for those reasons working capital management is an important component of financial management and the way each single component is managed affects corporate profitability.

The objective of working capital management is shareholders wealth maximization guided by cash flow decision principles of the corporate finance. Proper management of WCM components has a potential to reduce firm's production costs, in case of manufacturing firms, which in turn would enhances the profit and thereby increases the firm value (Madhou, 2011).

When a firm invests in a large amount of working capital, funds are tied up in less profitable assets and it reveals the firm's operational problems (Marttonen et al., 2013). The funds tied up in such unprofitable assets have to be freed and diverted in to more profitable investments. But as Rehn (2012) stated it cannot be lowered to a minimum amount unless other operational benefits, liquidity and solvency are compromised. Hence, effective working capital management attempts to balance the tradeoff between profitability and liquidity.

2.1.6. Components of working capital management

The term working capital, in its literary definition, constitutes two sub-components of typical firm's balance sheet statement, current assets and liabilities (Kadira, 2010; Baveld, 2012). Based on this, many corporate finance text books segregate working capital management or short term financing decisions in to four principal components namely: cash and marketable securities management, receivables management, inventory management and management of the short term sources of finance in which accounts payable is the principal component, hence accounts payable management. Though, variety of theoretical explanations and important managerial decision issues concerning those components of working capital management exists in the financial literature, comprehensive coverage on those components is beyond the fold of this paper and only general overviews are provided in the subsequent sub-sections.

2.1.6.1. Cash management

In a perfect capital markets cash management is irrelevant. In such settings firms can raise new money when needed at a fair rate, hence, would never be short of cash. Likewise they can invest

idle cash at fair rates and would earn investment returns of greater than zero net present value (Berk & Demarzo, 2014). In the real world, however, markets are imperfect and firms have a cash, the most liquid asset of a business, used to meet day to day expenses like raw materials, supplies, wages, salaries and etc,. But those benefits of cash holdings would not come without costs. Holding cash enhances liquidity but this is not cost free (Vishwanath, 2007), because there is an opportunity cost which is the return that could have been generated from other available investments.

There are three primary motives for firms to hold cash (Vishwanath, 2007; Ross et al., 2008; Horne & Wachowicz, 2008) namely: transaction motive, precautionary motive, and speculative motive. The speculative motive refers to the need to hold cash in order to take advantages of favorable conditions such as reduction in input price, attractive interest rate and etc. Transaction motive refers to the need to have cash on hand to meet payments, such as purchases, wages, taxes, and dividends, arising from ordinary business operations. Also the precautionary motive refers to maintaining a safety cushion or buffer to meet future unexpected cash needs. In this regard, the more predictable the cash inflows and outflows of a firm are, the less cash required for precaution.

To satisfy those motives firms hold cash and marketable securities which are the least profitable assts of all. Thus, firm can increase its returns by minimizing the investment in those cash and marketable securities, but carrying too minimum investment on those assets will make the firm prone to liquidity risk and may not continue its operation (Moyer et al., 2006). Thus firms need to have effective cash management strategy.

Cash management involves managerial decisions to have the optimum, neither excessive nor deficient, amount of cash on hand at the right time (Shim & Siegel, 1998). Proper cash management strategy requires that the company know how much cash it needs, as well as how much it has and where that cash is at all times. And as usual managers should consider the risk-return trade off while deciding on those concerns. According to Moyer et al. (2006) cash management is concerned with the following tasks in general:

- ✓ Determining the optimal amount of firms cash holdings

- ✓ Determining the most efficient methods of controlling the collection and disbursements of cash
- ✓ Determining the appropriate types and amounts of short term investments that a firm should make.

2.1.6.2. Accounts receivable management

Accounts receivable are trade credits that a business grants to its customers while selling goods or services (Moyer et al., 2006). A firm may prefer to be paid in cash at the time of purchase, but such cash-only policy leads to customer lose in a competitive market (Berk & Demarzo, 2014). Thus a firm is enforced to grant credit for its customers in its ordinary sales operation. The worry with credit sale is that, as Ross et al. (2008) described, there are costs associated with granting credit for customers such as the probability of customers failure to pay and carrying costs of those trade credits and therefore, receivables management decisions should involve a trade-off between the benefits of increased sales with those costs of credit granting.

Having determined the net benefits of extending the credit to its customers a firm may decide to grant a credit. Then has to establish credit policy, procedures for granting and collecting those credits (Moyer et al., 2006; Ross et al., 2008), particularly the following issues:

- ✓ **Credit standards**: refers to the criteria a company uses to determine which customers should/shouldn't be offered credit and how much it should be. This will critically evaluate the customer's ability and willingness to pay the amounts granted to him.
- ✓ **Credit terms:** refers to the specific conditions under which a customer is required to pay the credit extended to him/her. Those conditions include credit period or the length of time that the customer has to pay its entire amount, cash discount is the discount offered for a specified period of time to a customer in order to prompt early payment and other terms such as terms of shipment and etc,.
- ✓ **Collection policies:** these are methods a company uses in an attempt to collect amounts which are overdue.

After establishing a credit policy a firm must monitor its accounts receivables in order to evaluate whether the credit policy is functioning effectively (Berk & Demarzo, 2014). There are two tools used to evaluate the credit policy; namely account receivable days and aging schedule:

- ✓ **Account receivable days:** refers to the average number of days receivables are outstanding. Then while judging the effectiveness of the credit policy the firm will compare those days with the payment policy specified in the credit terms.
- ✓ **Aging schedule:** this method classifies customers account by the number of days they are recorded in the firm's book.

2.1.6.3. Inventory management

Inventory includes supplies, raw materials, work-in-process and finished goods (Brigham & Houston, 2007). A firm needs those inventories because holding inventory will minimize the risk of stock outs which in turn could have result in lost sales and then unsatisfied customers. The other reason is that customer demand for products varies and may not match with the production schedule, therefore holding inventory will fill this mismatch between demand and production schedule. Therefore, to meet those needs a firm should hold inventories of various forms.

Furthermore there are two costs involved with inventory holding (Ross et al., 2008); carrying costs and shortage costs. Carrying cost include all direct costs and opportunity costs such as storage and tracking costs, insurances and taxes, losses due to obsolescence, deterioration and theft, and the opportunity cost of the capital tied up in inventory. Shortage costs on the other hand refers to costs arising from keeping inadequate inventory levels and, includes restocking or ordering costs and safety reserve costs which are opportunity costs of lost sales and customer good wills. With this regard, carrying costs increase with the increase in level of inventories whereas shortage costs decrease with the inventory levels. The basic objective in inventory management is to trade off with the two types of costs and the optimal level is the minimum sum of those two costs.

Recently a new inventory management technique called Just-In-Time was developed by Toyota for firms to reduce their carrying costs as much as they could. In which firms place an order when a need arises and the minimum inventory level is reduced to zero. A firm could achieve this inventory level by maintaining an exceptional coordination with its suppliers and improved forecasting of customers demand (Berk & Demarzo, 2014). Inventory management, thus, encompasses different principles and techniques for deciding what, when and how much a firm should purchase and sell as well as how and where should store the various forms of stocks (Sebhatleab, 2002).

2.1.6.4. Accounts payable management

When a firm makes purchases from other firms on credit it records the debt as account payable and it takes the largest share of operating current liabilities, representing more than 40% of typical non- financial firm's current liability (Brigham & Houston, 2007). Accounts payable, *i.e.* outstanding payments to other companies is the principal component of firm's current liability (Brealy et al., 2001). Accounts payable balance represents the amount that a company owed to its suppliers for goods that it has received but for which it has not yet paid (Berk & Demarzo, 2014).

Accounts payable differs from the other component of working capital in the sense that it does not consume resources; instead it is often used as a short term source of finance. Thus it helps a firm to reduce its cash operating cycle, but it has an implicit cost when discounts are offered for early settlement of invoices (Padachi, 2006). Hence, a firm should choose to borrow using accounts payable only if trade credit is the cheapest source of funding. The cost of trade credit depends on the credit terms of the suppliers. The higher the discount percentage offered, the greater the cost of forgoing the discount. The cost of forgoing the discount is also higher with a shorter loan period. When a firm has a choice between trade credit from two different suppliers, it should take the less expensive alternative (Berk & Demarzo, 2014).

2.1.7. Profitability versus liquidity trade-off

Profitability and liquidity are the most crucial concerns that managers of any firm should examine and consider as their most demanding managerial duties (Niresh, 2012). Profitability refers to a firm's or an industry's ability to generate sufficient amount of return after satisfying all other costs (Hoque et al., 2015), whereas liquidity refers to a firm's or an industry's ability to meet its short term obligations. While the immediate survival of a firm depends on its liquidity, its long term survival and growth depends on profitability. In other words, liquidity ensures short term survival and profitability ensures long term survival (Niresh, 2012). Both profitability and liquidity are, therefore, important for any firm to continue its normal operation.

Liquidity and profitability goals are two contradictory issues in most financial manager's decision. A firm with high liquidity may have low risk and low profitability. Conversely, a firm with low liquidity may face high risk and higher return, because return increases with high risk

undertakings. Consequently, a firm has to maintain a balance between liquidity and profitability in its day-to-day operations (Niresh, 2012).

Working capital management simultaneously affects both liquidity and profitability of a firm (Panigrahi, 2014). Since working capital is life blood of any business it is hardly found that a business continues its normal operation without working capital, though the degree of requirement differs across firms, given the effect of various determinant factors. Unlike long term investments, however, investments in current assets are not profitable, hence investment in working capital yields low profit.

As Raheman & Nasr (2007) explained the ultimate objective of any business entity is to generate profit. Firms, therefore, have to reduce the investment in the less profitable undertakings, working capital investment. But as Rehn (2012) stated it cannot be reduced to a minimum amount unless other operational benefits are compromised, i.e. liquidity and solvency, because lower working capital investment ultimately provokes liquidity risk. Therefore, managers should thoroughly contemplate the trade-off between liquidity and profitability to maximize shareholders wealth.

Moreover as Raheman & Nasr (2007) explained that, though the ultimate objective of any business organization is maximizing the profit, maintaining liquidity is important objective as well. Whereas increasing profitability at the expense of liquidity causes serious operational difficulties, there must involve a trade-off between those two objectives. Profitability and liquidity have their respective importance that; if the business is not profitable it cannot survive, on the other hand if it is not liquid it will face insolvency or bankruptcy problems. Thus there is always a tradeoff between profitability and liquidity in working capital decision, and they are the dual objectives of working capital management (Sebhatleab, 2002).

2.1.8. Working capital management strategies

As Robles (2016) explained that, working capital decisions that increase profitability normally mean low levels of liquidity, and working capital decisions that maximize liquidity levels would tend to lower firm's profitability. Thus, to keep the balance between those two contradicting goals a firm must design an optimal policies or strategies concerning the levels of each working

capital components. According to Moyer et al. (2006) optimal working capital policy is the one that is expected to maximize the shareholders wealth. With reference to this Horne & Wachowicz (2008) maintained that a sound working capital management of a firm underlies two fundamental decision issues or strategies, which are influenced by the trade-off between profitability and risk. Those decision issues are:

i. The determination of the optimal level of investment in current assets (working capital investment policies).
ii. The determination of the appropriate mix of short-term and long-term financing used to support this investment in current assets (working capital financing policies).

2.1.8.1. Policies on levels of working capital investments

Working capital investment policy deals with issue on how much of firm's resources should be invested in working capital and it is measured by the proportion of current assets to the total assets. Both excessive and inadequate levels of working capital investment are dangerous for a firm. Excessive level of working capital bears high carrying costs and an opportunity cost, a lost profit which could have been generated from other profitable projects, because current assets are the least profitable assets of the firm. Inadequate level of working capital on the other hand represents poor liquidity position of the firm which would cause serious operational problems. Therefore, a firm should adopt an effective working capital investment policy that balances the strike between those costs and benefits (trade-off between liquidity and profitability).

In connection with this, a firm may have an optimal level of working capital that maximizes its value (Deloof, 2003; Rahman & Nasr, 2007). But, as Moyer et al. (2006) maintained that there is no unique optimal working capital investment policy equally applicable for all firms, because the various determinants of working capital does not equally influence firms working capital needs. Given those variations, in general, there are three alternative policies with regard to the level of current asset holdings (Brigham & Houston, 2009); namely relaxed or aggressive investment policy, restricted or conservative investment policy and moderate investment policy, which Watson & Head (2007) defined them as follow:

1) **An aggressive policy** with regard to the level of investment in working capital means that a company chooses to operate with lower levels of stock, debtors and cash for a given level of activity or sales. An aggressive policy will increase profitability since less

cash will be tied up in current assets, but it will also increase risk since the possibility of cash shortages or running out of stock (stock outs) is increased.

2) **A conservative policy** is associated with maintaining a larger cash balance, perhaps even investing in short-term securities, offering more generous credit terms to customers and holding higher levels of stock. Such a policy will give rise to a lower risk of financial problems or stock problems, but this is at the expense of profitability.
3) **The moderate policy** falls in a middle path between the aggressive and conservative approaches, the two extreme limits of working capital investment policies.

2.1.8.2. Working capital financing policies

Investments in working capital must be financed; and the primary sources of funds include both current liabilities such as bank loans, credit from suppliers (accounts payable) and accrued liabilities, and long-term finances such as bonds and equities. Each of which have advantages and disadvantages (Brigham & Houston, 2009). Watson & Head (2007) pointed out that short-term sources of finance are cheaper and more flexible than the long-term sources of finance. But, on the other hand short-term sources of finance are riskier than long-term sources from the borrower's point of view that they may not be renewable or even when they are, the terms are not favorable. In addition to that, short term interest rates are more volatile than the long term interest. Thus a company must carefully determine a level and mix of those sources of finance which is optimal for it. Then this is about what the working capital financing policy is concerned with.

In general there are three alternative policies with regard to the levels and mixes of those short term and long term funds to finance working capital, namely matching working capital funding policy, conservative working capital funding policy and aggressive working capital funding policy (Watson & Head, 2007); which are defined as below:

1) **Matching funding policy:** also known as moderate financing policy is a WC financing strategy which uses short-term funds to finances the temporary working capital and long-term funds to finance the permanent working capital along with fixed assets. This financing policy tries to match the life of the assets with maturities of the liabilities, though; in reality exact matching is difficult.

2) **Conservative funding policy:** is the WC financing strategy which uses long-term funds to finance not only fixed assets and permanent current assets, but parts of the temporary working capital as well. The risk of such financing policy is lower as there is less reliance on short-term finance, but long term finances have high cost than the short term finance, hence the profitability will be reduced.
3) **Aggressive funding policy:** this is a reverse of the conservative WC financing strategy which uses short term funds to finance not only the temporary working capital, but parts of the permanent working capital as well. This policy bears high risk of solvency as payment for short term finance are recurrent, but also results in higher profits and increased shareholders value because the costs of short term finance are lower.

2.1.9. Measures of working capital management

Cash conversion cycle and liquidity ratios are used in the finance literature to measure working capital management. Often the term working capital is used as a metric to assess the liquidity position of a firm. In line with this, analysts compare the levels of current assets with current liabilities to determine firm's ability to meet its short term obligations. Those measures that compare the level of current assets with current liabilities are the liquidity ratios. Preliminary studies have used them as metrics of working capital management, because determination of optimum levels of current assets and current liability rests on the working capital management concern.

Cash conversion cycle is used as a comprehensive measure of working capital management in view of the fact that it shows the time lag between the cash outlay for purchase of raw materials and the cash collection from customers (Padachi, 2006). Furthermore, the cash conversion cycle is disaggregated in to three segments (Serrasqueiro, 2014); namely the accounts receivable period (ARP), inventory holding period (IHP) and accounts payable period (APP). Following is the detail of those measures:

1. **Accounts Receivable Period (ARP):** Signifies for the average time lag the firm allows its customers to pay after the sale of the product takes place. This variable represents the number of days the firm takes to collect the payments from the customer. The

higher the number of days the more working capital investment is because the firm's cash is used by customers to finance their own operation. Mathematically it is expressed as:

$$\text{Accounts Receivable Period (ARP)} = \frac{\text{Average accounts receivable}}{\text{Sales}} \times 365$$

2. **Inventory Holding Period (IHP):** refers to the average number of days a firm holds its inventory in store. The higher the number of days the more working capital investment is, because cash is tied up in unsold inventories. Mathematically it is expressed as:

$$\text{Inventory Holding Period (IHP)} = \frac{\text{Average inventories}}{\text{cost of goods sold}} \times 365$$

3. **Accounts Payable Period (APP):** signifies to the average number of days a firm takes to pay for its suppliers. High number of days in this measure implies that a firm is paying late and it is financing its operation from suppliers' cash, thus the less firm's working capital investment is. Mathematically it is expressed as follow:

$$\text{Accounts payable period (APP)} = \frac{\text{Average accounts payable}}{\text{Cost of goods sold}} \times 365$$

4. **Cash Conversion Cycle (CCC):** it represents the length of time between the firm's payment for raw materials and the collection of payment from the customer (Brealey et al, 2001). It is an additive measure derived from the above metrics and mathematically expressed as:

$$\text{Cash conversion cycle (CCC)} = \text{ARP} + \text{IHP} - \text{APP}$$

The longer the cash conversion cycle, the more cash a firm has tied up in inventories and a longer it takes customers to pay their bills, the higher the value of accounts receivable. On the other hand, if a firm can delay paying for its own materials, it may reduce the amount of cash it needs, *i.e.,* accounts payable reduces net working capital (Brealey et al, 2001).

2.1.10. Profitability measures

Whether a business has succeeded or not is examined by measuring its profitability Deeposhree (2013). Profitability refers to firm's or an industry's ability to generate sufficient amount of return after satisfying all other costs. When revenue of an organization is greater than its cost

then profit is generated. Profit is an absolute measure of firm's performance whereas profitability is a relative measure of firm's performance (Hoque et al., 2015).

Profitability is measured by profitability ratios which are financial figures used to evaluate how well a firm is operating and utilizing its assets (Brigham and Houston, 2009). Those profitability ratios examine how profit was earned in relation to total sales, total assets and net worth (Deeposhree, 2013). The following ratios are used to determine firm's profitability:

1. **Gross Profit Margin:** is a profitability measure that relates the gross profit with the sales of a company. This shows the percentage of sales revenue that remained after the expenses of making the inventories available for sale (or direct costs of providing the service) are taken into account (McLaney, 2009). Mathematically it is expressed as follow:

$$\text{Gross Profit Margin (GPM)} = \frac{\text{Gross Profit}}{\text{Sales Revenue}} \times 100\%$$

2. **Operating profit Margin:** This measure shows the percentage of sales revenue that remained after all the operating expenses of running a business for entire period have been met. It is a profitability measure that relates the operating profit with the sales of a company (McLaney, 2009) . Mathematically it is expressed as follow:

$$\text{Operating Profit Margin (OPM)} = \frac{\text{Operating Profit (EBIT)}}{\text{Sales Revenue}} \times 100\%$$

3. **Net Profit Margin:** this measure shows the net income generated from each dollar of sales and it considers financing costs that the operating profit margin and gross profit margin doesn't consider (Fabozzi & Peterson, 2003). It relates the net income with the sales revenue. Mathematically it is expressed as follow:

$$\text{Net Profit Margin (NPM)} = \frac{\text{Net Income}}{\text{Sales Revenue}} \times 100\%$$

4. **Return on Assets (ROA):** shows management's efficiency in using the assets to generate earnings (Rimo & Panbunyuen, 2010). It relates operating income with the total assets invested. Mathematically it is determined as follow:

$$\text{Return on Assets (ROA)} = \frac{\text{Earnings Before Interest and Taxe (EBIT)}}{\text{Total Assets}}$$

5. ***Return on Equity:*** shows the ratio of net income that shareholders receive to their equity in the stock (Fabozzi & Peterson, 2003). Mathematically it is expressed as follow:

$$\text{Return on Equity (ROE)} = \frac{\text{Net Income}}{\text{Book Value of shareholders equity}}$$

2.2. Empirical literature

Because of the ever increasing market competitions and following the recent global financial crisis, businesses have recognized the importance of working capital management decisions since recent years. Likewise researchers are unreservedly and thoroughly examining the impact of working capital management on corporate profitability. Though the extent of coverage widely varies between the developed and developing economies, researches on the impact of working capital management on profitability have been conducted across the globe. This paper has reviewed relevant literatures from overseas and Ethiopian cases, and presented them in two sections as follow:

2.2.1. Overseas studies

Deloof (2003) conducted a study to assert the effect of working capital management on profitability of Belgian firms by taking sample of 1009 large non-financial firms for five year time period covering from 1992 upto1996. In this study fixed effect and ordinary least square regression models were employed to determine the impact of working capital management on profitability. Days in inventory as measure of inventory policies, days in receivables and days in payable as a measure of trade credits, cash conversion cycle as comprehensive measure of working capital management and gross operating income as measure of profitability were the variables used. Significant negative relationship between gross operating income and the WCM measures of days in inventory, days in receivables and days in payables were observed implying that shortening the time lag in the operating cycle increases profitability. But the negative relationship between cash conversion cycle and gross operating income was insignificant. In this study Size, sales growth, financial debt ratio, fixed financial ratio and net operating income variability have also been used as control variables.

Lazaridis and Tryfonidis (2006) the relationship between working capital management and profitability by taking a sample of 131 firms listed on the Athens Stock Exchange for Four years

period covering from 2001 to 2004. The independent variable WCM, measured by CCC, and the dependent variable profitability measured by gross operating profit were the variables used in this study. Results from regression analysis revealed that there was statistically significant negative relationship between profitability and WCM measures, i.e., days accounts receivable, days accounts payable, and cash conversion cycle. The relationship between profitability and days in inventory was found to be negative but insignificant.

Padachi (2006) studied trends in working capital management and its impact on firms' performance for a sample of 58 Mauritian small manufacturing firms, by taking panel data for the period 1998-2003. Using return on total assets as a measure of profitability and days in inventory, accounts receivables days, accounts payable days and cash conversion cycle as variables of working capital management he come up with significant negative relationships between profitability and measures of working capital management except cash conversion cycle, for which the relationship was found to be significantly positive. Current assets to total assets ratio and current liabilities to current assets ratio were also used as control variables in this study. Results revealed that there was significant positive relationship between current assets to total assets ratio and profitability while there was insignificant negative relationship between profitability and current liabilities to total assets ratio.

Ganesan (2007) investigated the working capital management efficiency of firms from telecommunication equipment industry in India. Correlation and regression analyses were used to examine the relationship between working capital management efficiency and profitability. Days sales outstanding, days inventory outstanding, days payable outstanding and days of working capital were used as proxy variables of working capital management efficiency. The firm's profitability was also measured using the operating income plus depreciation related to total assets and the operating income plus depreciation related to sales. In addition the study employed analysis of variance to investigate whether the means of the working capital management components are significantly different and it was found that the means are varied. By taking a sample of 349 telecommunication equipment companies covering from the period 2001 to 2007, he contended that although "days of working capital" was negatively related to the profitability, it was not significantly impacting the profitability of firms in the telecommunication equipment industry.

Raheman and Nasr (2007) conducted a study to investigate the relationship between the working capital management components and profitability of sampled 94 Pakistani companies listed on Karachi Stock Exchange for a period of 6 years from 1999 to 2004. Using pooled least square and general least square techniques of regression analysis they found a strong negative relationship between profitability measured by net operating profit and all the working capital management components. Net operating profit had a significant negative relationship with the average collection period, inventory turnover in days, average payment period and cash conversion cycle. They interpreted the results to mean that if the inventory takes long time to sell, it will adversely affect profitability. With regard to the relationship between profitability and accounts receivable period they concluded that firm's collection policy has a significant effect on profitability. The relationship between accounts payable period and profitability was also interpreted to mean that less profitable companies wait longer to pay their bills.

Samiloglu and Demirgunes (2008) examined the effect of WCM on profitability of sampled manufacturing companies listed on the Istanbul Stock Exchange for a period of 10 years, from 1998 to 2007. By employing multiple regression analysis they found a significant negative relationship between firm profitability as a measured by return on asset (ROA) and inventory holding period, and accounts receivable period. They argued that the negative relationship between accounts receivable period and profitability may be due to the fact that customers want more time to assess the quality of products they buy from firms with declining profitability. Similarly for the negative relationship between inventory period and profitability they maintained that, it may be a result of declining sales which leads to lower profit and higher inventory. Conversely, they did not found statistically significant relationship between ROA and cash conversion cycle.

A study by Falope and Ajilore (2009) investigated the relationship between WCM components and profitability of quoted non-financial companies in Nigeria by employing a fixed effect model of panel data regression analysis on a sample of 50 companies from 1996 to 2005. The study found a significant negative relationship between return on assets (ROA) and accounts receivable period, inventory holding period, and cash conversion cycle. The negative relationship between profitability and accounts receivable period was interpreted as more restrictive credit policy potentially improves firm's profitability. Likewise the negative relationship between inventory

holding period and profitability was interpreted as firm's profitability decreases with the length of time the firm takes to sale its inventory. The study also translated the negative relationship between profitability and cash conversion cycle as more profitable companies tend to minimize their cash conversion cycle to reduce the working capital. Then again the study found a positive relationship between accounts payable period and profitability. It was maintained that the positive relationship does make economic sense that the longer a company delays its payments, the higher the level of WC levels it reserves and uses in order to increase profitability.

Gill et al. (2010) studied the relationship between WCM components and profitability by using a sample of 88 American manufacturing companies listed on New York Stock Exchange for a period of 3 years from 2005 to 2007. Pearson bivariate correlation analysis and weighted least squares regression techniques were employed to analyze the data. In this study cash conversion cycle was found to have a significant positive relationship with profitability, measured by gross operating profit. Accounts receivable period was also found to have significant negative relationship with profitability. With this regard they have concluded that managers can create value for their shareholders by reducing the number of accounts receivable period and the longer the cash conversion cycle, the higher the profitability of the company. But inventory holding period and accounts payable period were found to have an insignificant relationship with profitability.

Akbar (2014) conducted a study to examine the relationship between working capital management efficiency and firm's performance in china's textile companies. Panel data of 77 listed Textile companies have been taken for seven year time period from 2007 to 2013. Ordinary linear regression, fixed and random effect models of regression analysis have been employed to analyze the panel data. In this study net trade cycle (NTC) and return on assets (ROA) were used as measures of working capital management efficiency and firm performance respectively. Net trade cycle (NTC) was found to have a significant negative relationship with firm performance. And this was interpreted as, the larger the number of days firms take to liquidate their short term investments in account receivables and inventories the lower the firm's performance. Finally it was argued that the negative relationship is in strong position to support the fact inefficient working capital management has a negatively effect on firm performance.

A study have been conducted by Angahar & Alematu (2014) to examine the impact of working capital management on profitability of Nigerian cement firms by taking a sample of four cement firms for the period 2002- 2009. Using number of days in receivables, number of days in inventory and cash conversion cycle as measures of working capital, and return on asset as measure of profitability they found negative relationship between profitability and days in inventories of the cement firms, and negative but insignificant relationship between days in receivables and profitability. They also found a strong positive relationship between profitability and cash conversion cycle of the cement firms.

Yasir et al. (2014) examined the relationship between cash conversion cycle (CCC) and firm's performance in the cement industry of Pakistan by taking a sample of 16 companies for 6 years period covering from 2007 to 2012. Employing a regression analysis they regressed the cash conversion cycle and its components (receivable collection period, inventory conversion period, and payable deferral period) against profitability, measured by return on assets (ROA). The study found a significant negative relationship between return on assets and receivable collection period, inventory conversion period, payable deferral period and cash conversion cycle, showing that negative change in receivable collection period, inventory conversion period, payable deferral period, cash conversion cycle causes a negative change in return on assets. Generally it was concluded that higher length of cash conversion cycle reduces firms' profitability and smaller length of cash conversion cycle enhance firm's profitability.

Jahfer (2015) conducted a study to investigate the effect of working capital management on profitability in manufacturing companies listed on the Colombo Stock Market of Sri Lanka for the period 2008 to 2013. Pooled ordinary least square and fixed effect models of panel regression techniques have been used to analyze the data. Working capital management as measured by days accounts receivable, days accounts payable, inventory holding period, cash conversion cycle and net trading cycle was regressed against the profitability measure gross operating profit. This study observed that accounts receivable, accounts payable and the net trade cycle had significant negative relationship with profitability, and days in inventory had a significant and positive relationship with profitability. The negative relation between accounts payable and profitability was consistent with the view that less profitable firms wait longer to

pay their bills. Insignificant and negative relationship between the cash conversion cycle and profitability was also observed in this study.

Hoang (2015) investigated the relationship between working capital management and profitability by taking a panel data of 98 manufacturing firms listed on Ho Chi Minh City Stock Exchange of Vietnam for 6 years period covering from 2009 to 2014. The cash conversion cycle, net trade cycle, average collection period, average inventory period, average payment period as measures of working capital management and return on asset as measure of profitability were the variables used in this study. Using the fixed effect multiple regression analysis the study found significant negative relationships between return on assets and cash conversion cycle, net trade cycle, average collection period, average inventory period, and average payment period. As a concluding remark he postulated that managers could improve the firm's profitability by reducing the net trade cycle, the cash conversion cycle, and it's components to an optimal level.

A recent study by Mbawuni et al. (2016) examined the impact of working capital management on profitability of petroleum retail companies of Ghana by taking sample data of 5 petroleum firms for Six years time period, from 2008 to 2013. Return on assets as measure of profitability and average days in inventory, average day's receivable, average days in payable and cash conversion cycle as measures of working capital management, were the variables used. By employing regression analysis this study found that only the measure average days in payable had significant negative impact on profitability of the petroleum retail firms. But with respect to the other measures of working capital management the return on assets had an insignificant relationship. There was an insignificant negative relationship between average days in inventory and profitability. In addition insignificant positive relationship between profitability and average days receivable and the cash conversion was observed.

2.2.2. Studies in Ethiopian context

While searching on the web for related researches in Ethiopian cases, the researcher did not found any research conducted prior to the year 2010. The topic what is the impact of working capital management on profitability is, therefore, an infant issue in Ethiopia and demanding more investigation. Only a few researches have been found and the following of them were reviewed for this study in Ethiopian context:

A study has been conducted by Tewodros (2010) to examine the impact of working capital investment and financing policies on firms' profitability by taking a sample data of 11 manufacturing private limited companies in Tigray region, Ethiopia, for a period of five years covering from 2005 to 2009. In this study return on assets, return on equity and operating profit margin as profitability variables, and accounts receivable period, inventory holding period and accounts payable period as measures of working capital investment, were used proxies. Cash conversion cycle and the current assets to total assets ratio were used as comprehensive measures of working capital investment policy. Also the current liabilities to total assets ratio as measure of working capital financing policy, and current ratio and quick ratio as measures of liquidity have been used as independent variables.

Employing pooled panel data regression analysis Tewodros (2010) found a strong negative relationship between all the profitability measures and account receivable period, inventory holding period and cash conversion cycle. The relationship between accounts payable period and all the profitability measures was negative but insignificant except for the operating profit margin measure, which was significantly related. The study also showed that all the profitability measures had significant negative relationship with the cash conversion cycle. The relationship between profitability and the WC investment policy (current assets to total assets ratio), and WC financing policy (current liabilities to total assets ratio) was statistically significant positive. Based on these positive relationships it was interpreted that profitability decreases with the aggressive working capital investment policy but increases with respect to aggressive financing policy of working capital. Furthermore the study validated the theoretical negative relationship between profitability measures and liquidity as measured by the current ratio and quick ratio.

Mulualem (2011) examined the impact of working capital management on profitability of 13 sampled manufacturing share companies registered in Addis Ababa city administration trade and industry bureau, for a period of five years covering from 2005 to 2009. By employing ordinary least square regression analysis the study found a statistically significant negative relationship between firms profitability measured by gross operating profitability and all the working capital measures (average collection period, inventory turnover in days, average payment period and the cash conversion cycle). He interpreted the negative relationship between profitability and average collection period as less profitable firms tend to decrease their accounts receivable in

order to reduce their cash gap in the cash conversion cycle. The negative relationship between number of days in inventory and gross operating profitability was also interpreted as sudden drop in sales associated with inefficient inventory management results in excess capital tied up at the expense of profitable operations. The negative relationship between average payment period and profitability was also maintained to be consistent with the view that less profitable firms wait longer to pay their bills. Finally he concluded that the manufacturing companies could enhance their profitability by reducing their cash conversion cycle and keeping each component to optimum.

Ephrem (2011) investigated the impact of working capital management on profitability of 30 selected small and medium sized cooperatives in Nifas-silk-Lafto and Kirkos sub cities of Addis Ababa for 5 years time period from 1998-2002. Net operating profitability as measure of profitability and average collection period, average payment period and cash conversion cycle as measures of working capital management were the variables used in this study. Current ratio was also used as measure of liquidity. By employing pooled least squares regression analysis the study found a significant negative relationship between profitability and average collection period, average payment period and cash conversion cycle. Based on the findings he concluded that the cooperatives profitability was negatively affected by the time period required by the enterprises to receive their debts, pay their bills and collect cash. On contrary to the theoretically negative relationship between liquidity and profitability, this study contended the existence of positive relationship between liquidity measured by the current ratio and profitability as measured by net operating profitability. He interpreted this positive relationship between profitability and liquidity as firms with high liquidity ratio are better-off than those with lower liquidity in small firm's context.

Tirngo (2013) examined the impact of working capital management on profitability of 67 selected small and micro enterprises of Bahirdar city administration, by taking a cross sectional data for the year 2003 E.C. Return on assets as measure of profitability and number of days account receivable, number of days account payable, number of days inventory and cash conversion cycle, as measures of working capital management were the variables used in this study. Employing ordinary least squares cross sectional regression analysis the study found a significant positive relationship between the profitability of the enterprises and the number of

days accounts payable. On the other hand the study found a significant negative relationship between profitability and the number of days accounts receivable, number of days in inventory and cash conversion cycle. She, therefore, concluded that firm's profitability can be increased by shortening the cash conversion cycle.

Wubshet (2014) examined the impact of working capital management on profitability of 11 sampled metal manufacturing private limited companies in Addis Ababa for 5 years time period covering from 2008 up to 2012. Return on total assets and return on investment capital as measures of profitability, and accounts receivable period, inventory holding period, accounts payable period and cash conversion cycle, were the proxy variables used in this study. In addition current ratio was used as measure of liquidity. By employing correlation and pooled panel data regression analysis the study found a significant negative relation between inventory conversion period, account receivable period, account payable period and cash conversion cycle with the ROA measure profitability. There was not found significant relationship between the return on investment capital measure of profitability and inventory conversion period, account receivable period, account payable period and cash conversion cycle measures of working capital management. The results indicates that longer accounts receivable and inventory holding periods are associated with lower profitability and concluded that cash conversion cycle in general had a significant negative impact on profitability of the manufacturing firms.

Endale (2015) examined the impact of working capital management on profitability Ethiopian brewery factories. This study used a ten year financial statements of two brewery factories, from the period 2005 to 2014. Having employed correlation analysis and pooled panel data regression models, this study has established an insignificant negative relationship between profitability and inventory conversion period, days sales outstanding and days payables outstanding. In addition, this study found a statistically insignificant positive relationship between cash conversion cycle and profitability of the brewery manufacturing companies.

Henok (2015) studied the relationship between working capital management and profitability of sampled 19 manufacturing share companies in Addis Ababa, for 5 years period covering from 2010 to 2014. The measures accounts receivable period, inventory holding period and accounts payable period as independent working capital investment policy variables, cash conversion

cycle and current assets to total assets ratio as comprehensive measures of working capital investment policy were used. In addition, current liabilities to total assets ratio was used as measure of working capital financing policy. The regression results revealed significant negative relationship between profitability measured by ROA and accounts receivable period, inventory holding period and cash conversion cycle. But the relationship between profitability and Accounts Payable Period was insignificant. Moreover significant positive relationships between profitability and current assets to total assets ratio, and current liabilities to total assets ratio have been observed. Based on the relationship between the working capital policies and profitability, he concluded that managers should follow conservative investment policy and aggressive financing policy in their working capital management to maximize their profitability.

Mifta (2016) studied the impact of working capital management on profitability of manufacturing companies by collecting sixteen large taxpayer share companies' financial statements for seven years study period covering from 2008 to 2014. Samples for this study have been selected through stratified random sampling technique and data of those firms' financial statements were analyzed through ordinary least squares. Having used ROA as measure of profitability and average collection period, inventory holding period, payables period and cash conversion cycle as measures of working capital management, the study found significant negative relationship of ROA with average collection period and cash conversion cycle. ROA was found to have negative relationship with inventory holding period while it was also positively related with payables period. However the relationships between ROA and inventory holding period, and payables period were insignificant.

A recent study by Abenet & Venkateswarlu (2016) analyzed the impact of working capital management on profitability of 30 manufacturing companies from eastern Ethiopia, for a period of 5 years covering from 2010 to 2014. Return on assets as measure of profitability and number of days accounts receivable (ARD), number of days inventories (INV), number of days accounts payable (AP) and cash conversion cycle (CCC) as measures of working capital management, were the proxies used in this study . In addition current ratio, firm size, sales growth and debt ratio were used as control variables. By employing pooled panel data regression analysis technique this study found a significant negative relationship between profitability and the working capital measures of days accounts receivable, days accounts payable and cash

conversion cycle. On the other hand a statistically significant positive relationship between number of days in inventory and return on assets was observed. This study finally concluded that managers could create value by reducing the cash conversion cycle and keeping its components to a reasonable optimum.

Another most recent study by Arega et al. (2016) investigated the impact of working capital management efficiency on profitability of food complex manufacturing companies operating in Addis Ababa and its surrounding, for five years time period covering from 2009 to 2013. For the purpose of this study financial statements of 10 selected food complex manufacturing companies were considered and analyzed using correlation and multiple regression analysis techniques. Return on assets as measure of profitability and days sales outstanding, days inventory outstanding, days payable outstanding, cash conversion cycle, current ratio and quick assets ratio as measures of working capital management efficiency, were the proxy variables used in this study. Results from this study shows that, there was statistically significant and negative relationship between profitability as measured by return on assets and the working capital management measures of days sales outstanding, days inventory outstanding, days payable outstanding and cash conversion cycle. But no statistical significance was observed with regard to relationship between profitability and current ratio and quick assets ratio. Finally this study concluded that by optimizing their working capital cycle those firms could increase their profitability and mitigate their financing problems.

2.3. Literature Conclusion and Knowledge Gap

Finance scholars have provided many theoretical explanations and dozens of empirical studies associated with firms financial decision makings. Even so, still there are an addressed knowledge aspects with regard to the financial decision makings, specifically on the impact of working capital management on profitability. This study has identified the following knowledge gaps:

- Though, since recent years the topic how working capital management affects corporate profitability has gained considerable researchers attention, still there is no clear cut explanation whether it is positively or negatively affecting the profitability. The literature remained full of controversies and confusions regarding the direction of the relationship between working capital management and profitability.

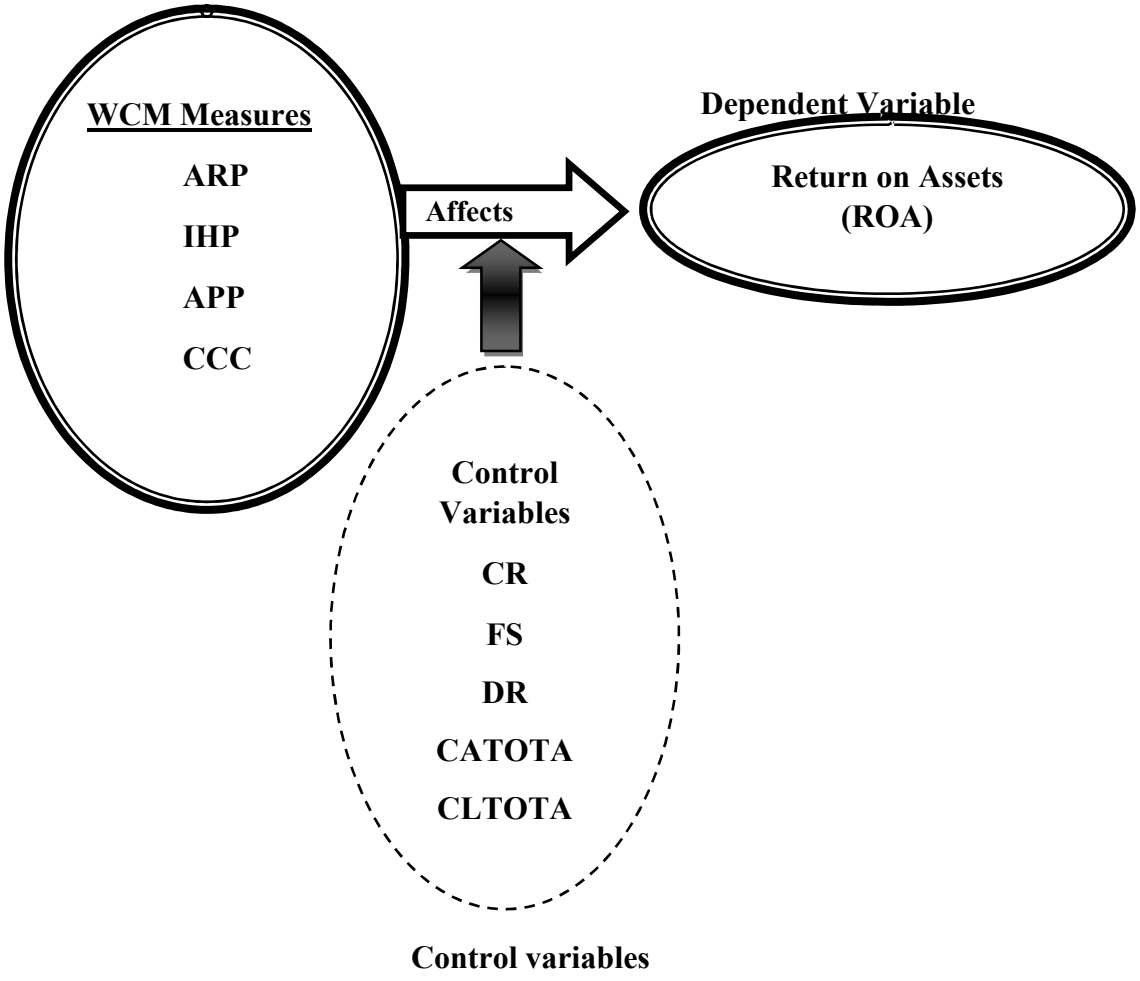
- Most of the extant theoretical explanations and empirical evidences on the literature had based their argument in the context of developed economies. Little attention has been paid to developing economies, where firms of small size operate in undeveloped or nonexistent capital markets. Besides, the inadequate evidence that is available on the literature from developing nations' context is delimited to the Asian and western African countries. Hence, it would be difficult to generalize the findings of those scanty researches to other developing nations, countries with different cultural endowments, economic developments and regulatory frameworks.
- As it is the case for all developing nations, research on the impact of working capital management on profitability in Ethiopia, is a recent phenomenon and only scanty of recent studies are available on the database evidencing from Ethiopian business organizations.
- Moreover, the impact of working capital management on profitability of the chemical, plastic, leather and nonmetallic manufacturing industries, specifically, was not examined so far. Only the name "manufacturing companies" have been used as cover for those companies, along with others. Few Ethiopian researches have studied on sector wise impact of working capital management on profitability, mainly the manufacturing sector as a whole. But those studies have been involved in stratified sampling techniques where they select proportionate sample sizes from various industries. In case of such studies, industry classes with small numbers of member companies have been given less weight and less coverage. Thus, this study examined the impact of working capital management on profitability of chemical, plastic, leather and nonmetallic industries.

2.4. Conceptual Framework of this Study

A conceptual framework shows the existing relationship between independent and dependent variables. It is developed from the theoretical explanations and prior empirical findings, reviewed so far in this study. The dependent variable in this study is profitability, which is measured by return on assets (ROA). While the independent variables in this study are working capital management proxies developed by finance scholars including Accounts receivable Period (ARP), inventory holding period (IHP), accounts payable period (APP) and cash conversion cycle (CCC). There are also firm specific control variables which are identified by prior studies,

as having a significant effect on profitability. Thus, this study has make inclusions of these variables. Specifically current ratio (CR), firm size (FS), debt ratio (DR), current assets to total assets ratio (CATOTA) and current liabilities to total assets ratio (CLTOTA) were used as control variables in this study. The conceptual framework for this study seems as follow:

Figure 2.1: *conceptual framework of the study*



Source: researchers own design

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

The purpose of this chapter is to explain how the research was undertaken to achieve the stated research objectives. This includes the research design, sampling design, data sources and collection methods, variable descriptions and measurements, data and statistical models which are used to examine the relationship between profitability and the working capital management measures.

3.1. Research Design

Research design is the conceptual structure within which a research is to be conducted and it involves decisions regarding what, where, when, how much and by what means the research study will be conducted (Kothari, 2004). It is the blueprint or structural plan for data collection, measurement and data analysis activities of a particular study.

The objective of this study is to examine the impact of working capital management on manufacturing firms' profitability with reference to selected industries in Addis Ababa, Ethiopia. It was designed to assess the impact of individual working capital management components (ARP, IHP, APP and CCC) on profitability (ROA). Researches of such types that involve in examining cause and effect relationships of two or more variables are explanatory in nature and, therefore, the type of design used in this study is explanatory research design. To eamine this, the study used a five years financial statements of selected firms, thus the research approach employed was quantitative.

3.2. Sampling Design

Sampling design signifies for the definite plan designed to obtain a sample unites from a given population; it includes the technique or the procedure the researcher has adopted while selecting items for inclusion in the sample, and the total number of the items included in the sample (Kothari, 2004).

The target population of the study was defined to the chemical, plastics and rubber, leather and nonmetallic mineral product manufacturing firms of Addis Ababa city administration that are

registered in ERCA large taxpayers' branch office. In view of the International Standard Industrial Classification (ISIC), manufacturing business enterprises in Ethiopian context are classified as follow (MOT, 2013):

- ✓ Manufacture of food products, beverages and tobacco products
- ✓ Manufacture of textiles, clothing and leather goods
- ✓ manufacture of wood & of products of wood & cork, except furniture; manufacture of articles of straw & plaiting materials; manufacture of paper and paper products; publishing, printing and reproduction of recorded media
- ✓ Manufacture of other non-metallic mineral products
- ✓ Manufacture of basic metals, fabricated metal products, machinery and equipment
- ✓ Manufacture of electrical machinery and apparatus
- ✓ Manufacture of radio, television and communication equipment and apparatus and of medical, precision and optical instruments, watches and clocks.
- ✓ Manufacture of furniture; Manufacturing of office and household furniture, manufacturing of recreational equipments, recycling of metals and non metal wastes and scraps etc.

In addition to this industrial classification, lists of manufacturing industries with similar characteristics are amalgamated, for brevity purpose, into eight broad categories in Ethiopian revenue and customs authority (ERCA) database. Those categories include food and beverage products industries, textiles and apparel products industries, leather and leather products industries, wood, paper and paper products industries, chemical and chemical products industries, rubber and plastic products industries, other non-metallic mineral products industries, and metal and engineering products industries.

On this regard, the manufacturing sector has been exclusively considered while specifying the study area. This is due to the fact that manufacturing companies have all components of working capital (cash and marketable securities, inventories, receivables and payables), therefore, they are the most appealing sector of an economy for working capital management purpose. In addition,

preliminary works on the topic are most dominantly in this sector and therefore, for the sake of comparison this study sought to be consistent with those studies.

Then after, when coming to define the population framework, the researcher deliberately delimited his considerations only to large taxpayer industries of chemical manufacturing, plastic and rubber manufacturing, leather manufacturing and nonmetallic mineral product manufacturing. The logic behind this delimitation emanated from review of related researches in Ethiopian context and also it was for the reason that, data for most of the manufacturing firms is available in ERCA large taxpayers' branch. With reference to the tax payment category, Ethiopian revenues and customs authority (ERCA) has increased the entry point of large taxpayer category to Birr 27 million in annual sales turnover, which previously has been Birr 15 million. This change has been in effect since August 7, 2013 and it was made to revise the decree passed on July 2010, for the 15 million entry point.

Since the year 2010 there have been few similar empirical studies in Ethiopia and with few exceptions, most of them have examined the case in manufacturing firms, specifically in Addis Ababa. Earlier studies including Mulualem (2011) and Mifta (2016) have defined their population frameworks to include all manufacturing companies and have been involved in stratified sampling based on which they stratify the samples in to industry classes. Thus, they have taken proportionate samples from each of those industry classes, proportionate to their total number. While doing this, however, industry classes with relatively lower number of companies were given less weight and less coverage on the topic. The impact of working capital management on profitability of the selected industries is not yet examined in detail, and in the pretext of the name manufacturing companies, its reality remained hidden. In addition data availability to undertake the study induced the researcher to do so. Thus, this study paid its due attention to the hidden realities of those industry classes and the impact of working capital management on profitability was examined with data from member companies of those industries that met further selection criteria imposed by the researcher.

Having delimited the study population framework, a total of 90 large taxpayer manufacturing companies that belong to the industry classes of chemical, plastic, leather and nonmetallic minerals were taken for further considerations. The population framework contained 22 chemical manufacturers, 18 leather manufacturers, 17 non metallic mineral product manufacturers, and 33

plastic and rubber manufacturers. The results of any study may seem as of high accuracy if it covers the entire population, but some technical and statistical constraints are inevitable in any research undertaking and taking selected sample units supposed to be representative of the population is the only way to deal with such constraints. This research too was not an exception and it only have taken into account selected manufacturing companies of those industries, which have fulfill the sets of prescribed criteria purposively developed by the researcher. Thus, the sampling method employed in this study was purposive sampling.

Then, certain sampling yardsticks have been employed to arrive at the final sample unites. First to be included in the sample a company should have its financial statement, specifically balance sheet and income statement for the entire period under consideration, covering from 2011 up to 2015. Second, companies with special figures and unusable values in some items of balance sheet and income statements were deliberately excluded. Third, balanced panel data was chosen over the unbalanced one, with an intention to give equal chances of observations, therefore companies with missing yearly figures in one or more variables of the study were removed from the sample. Due to the application of those criteria, only 39 manufacturing companies that belong to the four industry classes were included in the final sample, representing 43.33 percent of the population. The proportionate size of each industry class in the sample is presented as follow:

Table 3.1: proportion of the industry classes in the sample

Industry classes	**№ of companies included**	**Proportion** (%)
Chemical industry	12	30.77
Leather industry	5	12.82
Nonmetallic mineral industry	7	17.95
Plastic and rubber industry	15	38.46
Total	**39**	**100**

Source: researcher's design

Further sample size increment was impossible because most companies failed to fulfill the selection criteria. However, the samples are large enough to represent the population because the

number of samples in this study is 39 companies, greater than 30 that many statistics text books consider as a boundary.

3.3. Data type and data Sources

The required data to analyze the impact of working capital management on profitability were quantitative of nature, accounting figures extracted from audited annual financial statements (basically the balance sheet statement and income statement) prepared by the sample companies for the past five most recent consecutive years covering from 2011 to 2015. The reason to limit the time period with in those five years was due to data unavailability for years beyond. Data from most of the companies was available only for those years. From the financial statements, values for the study variables have been computed through the help of accounting ratio analysis. Thus, the data required for this study were solely obtained from secondary sources (financial statements) and were collected through document review.

The data for this study (the financial statements) were collected from authoritative governmental agency of Ethiopian Revenue and Customs Authority (ERCA), large taxpayers' branch in Addis Ababa. Due to the confidentiality nature of those financial data and the prevailing inexperience to publicly release information, Ethiopian companies are in general reluctant to provide the required data. For that matter and due to difference in operational locations data was collected exclusively from ERCA. The data is highly reliable because the financial statements are submitted for income tax purpose and ERCA assures their reliability for its own purpose.

Addis Ababa was also selected as study location due to the fact that it is the economic and commercial center of the nation where most manufacturing and other business activities takes place with good business practices. In addition, its relative proximity for data collection makes it convenient for the researcher.

3.4. Data Analysis Techniques

Once the required data was obtained, data computations and entries have been made with the help of Microsoft Excel. Values of measurement variables have been derived from combinations of two or more balance sheet and income statement items in Excel. Then, having entered and computed the values of the variables, data was processed by using STATA version 13 software

program for meaningful analysis. Analysis of data have been undertaken to show important relationships of the selected variables in the study. To this end, mixes of both descriptive statistical and quantitative analysis were employed.

3.4.1. Descriptive analysis

This is the first analysis used in any study and normally helps the researcher to obtain a summary detail of the collected data. In this study descriptive analysis was used to describe patterns of behavior or relevant aspects of the data values and detailed information about the variable selected. This descriptive analysis shows the average and standard deviation of the different variables of interest in the study. It also presents the minimum and maximum values of the variables. Thus, it was helpful in gaining a picture about the maximum and minimum values a variable can achieve.

3.4.2. Quantitative analysis

Quantitative analysis was used to determine the nature and extent of the relationship between profitability and working capital management measures. It helped to test the hypotheses of the research. This study has used two types of quantitative analysis methods namely: correlation and regression analysis.

3.4.2.1. Correlation Analysis

This study was designed to assess the relationship between the manufacturing companies' profitability and working capital management components (ARP, IHP, APP and CCC) and thereby to test certain hypotheses developed for the extant relationship. The correlation coefficient of any two variables lies between -1 to +1. If the coefficient is 0, it is to mean that there is no association between the two variables. A correlation coefficient of +1 it indicates the existence of strong positive correlation between the variables, whereas a correlation coefficient of -1 indicates the existence of strong negative relationship between the variables. The positive sign indicates increase in one variable will increase the other variable. On the other hand a negative sign means increases in one variable will reduce the other variable.

3.4.2.2. Regression Analysis

To examine the impact of working capital management on profitability and to test the research hypotheses this study employed pooled panel data regression analysis, because the data has both time series and cross-sectional dimensions. Panel data is more useful in studying the dynamics of adjustment, and is better able to identify and measure effects that are simply not detectable in pure cross-sections or pure time series data. Moreover, many variables can be more accurately measured at the micro level and biases resulting from aggregation over firms or individuals are eliminated (Rahman & Nasr, 2007). In pooled ordinary least squares time series and cross-sectional observations are combined in determining the causal relationship between profitability variable and the independent variables of working capital management measure (Ncube, 2011).

From the ongoing explanation, it is apparent that ordinary least squares (OLS) regression analysis was used. For this reason, diagnostic tests of classical linear regression model assumptions were run prior to the regression analysis. Classical tests of normality, heteroscedasticity and multicollinearity were specifically made.

3.5. Variable descriptions and Research hypotheses

While reviewing related researches that analyzed the impact of working capital management on firms' profitability this research has identified key proxy variables used to measure profitability, working capital management and other factors that inherently affects profitability. Profitability measure was used as dependent variable, and working capital management measures (ARP, IHP, APP and CCC) were the independent variables employed in this study. In addition proxy variables of other factors that inherently affect company's profitability but not are the prime interest of this study have been included in the analysis in order to generate reliable results. The variable selection is influenced by previous studies such as (Deloof, 2003; Padachi, 2006; Rahman & Nasr, 2007; Falope & Ajilore, 2009; Jahfer, 2015).

3.5.1. Dependent variable

Dependent Variable in this study was the variable used to measure the profitability of firms. Thus, the dependent variable for this study is Return on Assets (ROA) that shows management's efficiency in using the assets to generate earnings (Rimo & Panbunyuen, 2010). It relates operating income with the total assets invested. Mathematically it is determined as follow:

$$\text{Return on Assets (ROA)} = \frac{\text{Earnings before interest and taxe (EBIT)}}{\text{Total assets}}$$

For the purpose of this study the proxy variable Return on assets (ROA) was selected to measure firm's profitability because, as Hoang (2015) explained that, it is a better measure since it relates a firm's profitability to its total asset base and is also used by most of researchers. Thus, it is believed that this measure would be an appropriate measure of firm's profitability in the context of this study.

3.5.2. Independent Variables and respective Hypotheses

A variable that influences the dependent variable in either a positive or negative way is termed as independent variable. For every unit of increases or decreases in the independent variable, there is an increase or decrease in the dependent variable. In this study the explanatory or independent variables of working capital management measures were used to examine the extents that the dependent variable (return on assets of the manufacturing companies) changes every year, depending on the changing values of those independent variables. The following efficiency and performance ratios were used in this study as the independent variables:

1. **Accounts Receivable period (ARP):** Signifies for the average time lag the firm allows its customers to pay after the sale of the product takes place. This variable represents the number of days the firm takes to collect the payments from the customer and it is used as proxy variable to measure firms collection policy efficiency. Mathematically it is expressed as:

$$\text{Accounts receivable period (ARP)} = \frac{\text{Average accounts receivable}}{\text{Sales}} \times 365$$

Higher the ARP the more working capital investment is required and consequently the less firm's profitability will be. On the basis of this theoretical relationship and empirical results of (Deloof, 2003; Lazaridis and Tryfonidis, 2006; Raheman and Nasr, 2007; Gill et al., 2010; Jahfer, 2015; Hoang, 2015), the following testable hypothesis was developed with regard to this variable:

H_1: There is significant negative relationship between Accounts Receivable period (ARP) and Return on Assets (ROA) of the selected manufacturing industries.

2. **Inventory Holding Period (IHP):** refers to the average number of days a firm holds its inventory in store. This measure is used as a proxy variable of firm's inventory policy efficiency. Mathematically it is expressed as:

$$\text{Inventory holding period (IHP)} = \frac{\text{Average inventories}}{\text{Cost of goods sold}} \times 365$$

The higher the IHP the more working capital investment is, because cash is tied up in unsold inventories and less profitable the firm is. Thus, based on this theoretical relationship and the empirical results of (Raheman and Nasr, 2007; Falope and Ajilore, 2009; Angahar & Alematu, 2014; Hoang, 2015) the following hypothesis was developed:

H_2: There is significant negative relationship between Inventory holding Period (IHP) and Return on Assets (ROA) of the selected manufacturing industries.

3. **Accounts Payable Period (APP):** signifies to the average number of days a firm takes to pay for its suppliers. It is used as proxy variable for firm's payment policy efficiency. Mathematically it is expressed as follow:

$$\text{Accounts payable period (APP)} = \frac{\text{Average accounts payable}}{\text{Cost of goods sold}} \times 365$$

High number of days in APP implies that a firm is paying late and it is financing its operation from suppliers' cash, thus the less firm's working capital investment and better its profitability is. Thus, based on this theoretical relationship and the empirical result found by Falope & Ajilore (2009) the following hypothesis was developed:

H_3: There is significant positive relationship between Accounts Payable Period (APP) and Return on Assets (ROA) of the selected manufacturing industries.

4. **Cash conversion cycle (CCC):** it represents the length of time between the firm's payment for raw materials and the collection of payment from the customers (Brealey et al, 2001). It is an additive measure derived from the above metrics and used as a comprehensive measure of firm's working capital management efficiency. Mathematically it is expressed as:

$$\text{Cash conversion cycle (CCC)} = \text{ARP} + \text{IHP} - \text{APP}$$

High number of days in this cycle represents slow inventory turnover, lenient collection policy and early payment policy for which high working capital investment is required , hence lower the

firm's profitability would be. Thus, based on this theoretical relationship and results of prior studies (Lazaridis and Tryfonidis, 2006; Raheman and Nasr, 2007; Falope & Ajilore, 2009; Yasir et al., 2014; Hoang, 2015; Abenet & Venkateswarlu, 2016; Arega et al., 2016) the following hypothesis was developed for this proxy variable:

H_4: There is significant negative relationship between Cash Conversion Cycle (CCC) and Return on Assets (ROA) of the selected manufacturing industries.

3.5.3. Control variables

Variables other than the independent variables that have a strong effect on the dependent variable are controlling variables. The presence of controlling variables disturbs the relationship that exists between the independent and the dependent variables. If controlling variables are not taken into account, the theorized relationship between the dependent and independent variables will not hold (Sekaran, 2003). Thus, to overcome such problems this study has taken into account those control variables, in addition to the independent or explanatory variables. Firm specific variables of current ratio, firm size, leverage, current assets to total assets ratio and current liabilities to total assets ratio were used as control variables in line with the study by Padachi (2006) and Jahfer (2015).

1. **Current ratio:** is defined as current assets divided by current liabilities and it shows the ability of a firm to cover its current liabilities with its current assets (Horne & Wachowicz, 2008). Mathematically it is computed as follow:

$$\text{Current ratio (CR)} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

From corporate finance perspective profitability and liquidity are the two contradicting goals of any financial decision. The higher the liquidity position of a firm the lower its profitability is, because they are the contradicting objectives of working capital management.

2. **Firm size (FS):** was the control variable used and it is determined by natural logarithm of total assets. From economics and strategic management perspectives as firms become large in size they would be more profitable because of the economies of scale scenario. Thus, larger firms are more profitable than the small ones. But, from corporate finance point of view, larger firms could also be problematic than their small counter parties. This problem

could be justified by the existence of agency problem in the larger ones because of the agent principal relationships. While small companies are mostly owner managed and there would not be agency problem.

Therefore, in order to control those effects on profitability, the variable FS is used as control variable in this study.

3. **Debt ratio (DR):** is a proxy variable for capital structure of firms and mathematically it is expressed as:

$$\text{DR} = \frac{\text{Total liabilities}}{\text{Total assets}}$$

In this study the variable DR is added as control variable to handle the effect of capital structure on the firms' profitability.

4. **Current assets to total assets ratio (CATOTA):** this is a proxy variable to measure working capital investment policy's degree of aggressiveness/conservativeness**.** This measure is expressed mathematically as:

$$\text{CATOTA ratio} = \frac{\text{Total current assets}}{\text{Total assets}}$$

This study has included the control variable CATOTA ratio, in line with the studies by Padachi (2006) and Jahfer (2015, to handle the impact of working capital investments on profitability.

5. **Current liabilities to total assets ratio (CLTOTA):** this is a proxy variable to measure the degree of aggressiveness/conservativeness in working capital financing. The higher the value in this ratio the more degree of aggressiveness in working capital financing policy it implies and the higher the reveres is the more degree of conservativeness it shows. This measure is mathematically expressed as:

$$\text{CLTOTA ratio} = \frac{\text{Total current liabilities}}{\text{Total assets}}$$

This variable was used to handle the impact of working capital financing requirements on profitability and this was consistent with the study by Padachi (2006). Summary of the proxy variables used in this study and their measurement are provided below:

Table 3.1: Variables and their measurements

Variable category	Variable name	Abbreviation	Measurement
Dependent	Return on assets	ROA	$\frac{\text{Earnigs before interest and tax}}{\text{Total assets}}$
Independent	Accounts receivable period	ARP	$\frac{\text{Ave. Accounts receivable}}{\text{Sales}} \times 365$
	Inventory holding period	IHP	$\frac{\text{Ave. Inventories}}{\text{Cost of goods sold}} \times 365$
	Accounts payable period	APP	$\frac{\text{Ave. Accounts payable}}{\text{Cost of goods sold}} \times 365$
	Cash conversion cycle	CCC	ARP + IHP - APP
Control	Current ratio	CR	$\frac{\text{Total current assets}}{\text{Total current liabilities}}$
	Firm Size	FS	Ln(Total assets)
	Debt ratio	DR	$\frac{\text{Total liabilities}}{\text{Total assets}}$
	Current assets to total assets ratio	CATOTA	$\frac{\text{Total current assets}}{\text{Total assets}}$
	Current liabilities to total assets ratio	CLTOTA	$\frac{\text{Total current liabilities}}{\text{Total assets}}$

3.6. Analytical model specifications

On this study the impact of working capital management on profitability of selected manufacturing companies was analyzed using panel data regression of cross-sectional and time series data. Pooled Ordinary least square regression, also called the constant coefficients model is a regression model in which both the intercepts and slopes are constant, where the cross-section firm data and time series data are pooled together in a single column assuming that there is no significant cross-section or temporal effects (Rahman & Nasr, 2007).

This study has employed pooled ordinary least squares regression analysis for the same reason which Ncube (2011) has pointed out that, the prime objective of this study was not necessarily to investigate the profitability variations within the manufacturing companies. Rather it was to examine the variation in profitability due to the working capital management efficiency of those manufacturing industries. The objective of this study was to establish statistical significant relationships between profitability and working capital management efficiency of the selected manufacturing industries. Moreover this choice is made with the intent of maintaining consistency with many previous studies such as (Deloof, 2003; Lazaridis & Tryfonidis 2006; Padachi, 2006; Rahman & Nasr, 2007; Mathuva, 2010; Hoang, 2015) from abroad and the studies of Tewodros (2010), Ephrem (2011), Mulualem (2011), Abenet & Venkateswarlu (2016), Arega et al. (2016), and Mifta (2016) in Ethiopian context. As a result, this consistency also helped for easy comparisons and linkages of results with the findings of those similar works. In line with the study by Padachi (2006) the following general form of regression model was employed to study the impact of working capital management on profitability:

$$\mathrm{ROA} = \mathrm{f}(\mathrm{WCM}, \mathrm{CR}, \mathrm{FS}, \mathrm{DR}, \mathrm{CATOTA}, \mathrm{CLTOTA})$$

Where: the symbols stands for:

WCM: working capital management
CR: current ratio
FS: firm size
DR: debt ratio
CATOTA: current assets to total assets ratio
CLTOTA: current liabilities to total assets ratio

The above general model of ordinary least squares regression was further segregated into four specific multiple regression models, in which each independent variable was replaced by another independent variable, while keeping the control variables constant. Further specifications were made with intent to determine the impact of working capital management on profitability by examining the individual impact of WCM component (ARP, IHP and APP) on profitability. And this is in line with most of the studies in the literature such as (Deloof, 2003; Padachi, 2006;

Rahman & Nasr, 2007; Charitou et al., 2010; Mathuva, 2010; Bagchi & Khamrui, 2012; Hoang, 2015).

Another reason for such specific model specifications while studying the impact of working capital management on profitability is to avoid the possible existence of multicollinearity problems in the independent variables (Ncube, 2011; Donkor, 2014). Given that the comprehensive measure of working capital management (CCC) is a combination of the other three measures (ARP, IHP and APP); there would be multicollinearity problem in the model. Multicollinearity is a problem that occurs when explanatory variables in a model are highly correlated with each other (Brooks, 2008). Thus, the specific regression models help to deal with those problems. The four specific regression models in this study were the following:

Model I: regression model for Accounts receivable period and used to test hypothesis One

$$ROAit = \beta_0 + \beta_1(\mathbf{ARP}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

Model II: regression model for Inventory holding period and used to test hypothesis Two

$$ROAit = \beta_0 + \beta_1(\mathbf{IHP}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

Model III: regression model for Accounts Payable Period and used to test hypothesis Three

$$ROAit = \beta_0 + \beta_1(\mathbf{APP}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

Model IV: regression model for Cash Conversion Cycle and used to test hypothesis Four

$$ROAit = \beta_0 + \beta_1(\mathbf{CCC}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

Where the symbols:

ROA_{it}: return on assets of firm *i* at time *t*

ARP: Accounts receivable period

IHP: Inventory holding period

APP: Accounts payable period

CCC: Cash conversion cycle

CR: Current ratio

FS: Firm size

DR: Debt ratio

CATOTA: Current assets to total assets ratio

CLTOTA: Current liabilities to total assets ratio

β_0**:** constant term of the model

β_i**:** coefficients of the respective variables

e_{it}**:** the error term of the model

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter presents the processed output from the raw data collected through the methodology specified in the previous chapter. Values for the dependent, independent and different control variables were extracted from data sources and computed by the help of Microsoft excel. Then raw data is entered in to STATA software to further process it. Finally the data is presented in this chapter with the help of descriptive statistics, correlation and regression analysis. In addition, Diagnostic tests of classical linear regression model assumptions were made in order to verify whether the data used have met the assumptions underlying the ordinary least squares regression and if possible to remove the diagnostic problems.

4.1. Results of descriptive statistics

Descriptive analysis is used to describe patterns of behavior or relevant aspects of the data values and detailed information about the variable selected in this study. This descriptive analysis shows the mean values and standard deviations of the different variables of interest in the study. It also presents the minimum and maximum values of the variables. It is helpful in gaining a picture about the maximum and minimum values a variable can achieve.

This study used a total of 10 continuous variables containing one dependent variable (Return on Asset), Four independent variables (accounts receivable period, inventory holding period, accounts payable period and cash conversion cycle as measures of working capital management efficiency) and five control variables including current ratio, firm size, leverage, current asset to total assets and current liabilities to total assets ratios. This section, the descriptive statistics, presents the mean distribution, standard deviations, minimum and maximum values of the variables during the study period of 2011 to 2015, for the whole sample units.

From **Table 4.1** below, the mean value of return on asset is 14.14 percent with standard deviation of 12.59 percent and the minimum value of return on asset is -13.85 percent while the

maximum is 78.20 percent. Those figures shows that, profitability of the sample firms as measured by return on asset, was about 14.14 percent on average throughout the five years study period covering from 2011 to 2015 and it deviates from the mean value to both sides by 12.59 percent. A minimum of -13.86 percent ROA is observed, indicating that a loss of 13.86 percent have been incurred while a maximum of 78.20 percent ROA have been generated by the manufacturing firm, i.e. there is a wide range of ROA among the sample firms.

Table 4.1: descriptive statistics of all variables of the study

```
. summarize ROA ARP IHP APP CCC CR FS DR CATOTA CLTOTA
```

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	195	.1413835	.1258821	-.1385721	.7820415
ARP	195	41.52608	46.61965	0	260.6383
IHP	195	158.2426	135.5832	0	801.3231
APP	195	91.9654	131.8367	0	713.3657
CCC	195	107.8034	172.4531	-576.3448	794.3246
CR	195	4.078895	3.940249	.2316139	23.76057
FS	195	18.59724	.9242633	16.25963	23.38499
DR	195	.3910897	.1886653	.0612762	1.056745
CATOTA	195	.5913159	.2083245	.0196749	.9722477
CLTOTA	195	.2420638	.1720281	.0145668	.8786913

Source: *financial statements of sample firms (STATA output)*

Regarding the independent variables the table above shows a descriptive summary statistics of working capital management efficiency ratios. Of the working capital management efficiency ratios, one is the accounts receivable period, a proxy variable to measure for collection policy of a firm. On this table, the mean value for accounts receivable period (ARP) is 42 days with standard deviation of 47 days. This shows that firms on the sample wait about 42 days, on average, to collect cash from their customers for the credit sale they made and it deviates by 47 days to both sides of the mean distribution. In addition, the minimum number of days for accounts receivable period was 0 days which is a cash only policy and the maximum was 261 days, showing that firms in the sample waits a maximum of 261 days to collect cash from customers.

The mean value for inventory holding period, a proxy variable to measure inventory policy, is 158 days with a standard deviation of around 136 days. Those number of days shows that firms on the sample take about 158 days long, on average, for selling their inventory to their customers either on credit or for cash and it deviates by 136 days to both sides of the mean distribution. In addition, the number of days inventories are kept in store ranges from a minimum of 0 and a maximum of 801 days implying the samples taken in this study takes a maximum of 801 days to sell their inventories.

Another measure of working capital management efficiency is the accounts payable period, a proxy variable to measure firm's payment policy. On this study, the mean value for this variable was about 92 days with a standard deviation of around 132 days. Those numbers of days shows that firms on the sample wait about 92 days, on average, to pay their suppliers for the credit purchase they made and it deviates by around 132 days to both sides of the mean distribution. The minimum number of days in accounts payable in this study is 0 days which implies that, at least one unit out of the samples has not had credit purchases while firms in the sample have taken maximum of 713 days to pay for their suppliers.

Cash conversion cycle, a proxy variable to measure the overall time lag collapsed in converting all the working capital management components in to cash, is also considered as a comprehensive measure of working capital management efficiency. In this study, as shown in **Table 4.1** above, the mean value for cash conversion cycle was about 107 days with standard deviation of around 172 days. This shows that firms in the sample take around 107 days long, on average, to convert their inventories into sales, collect cash from their credit sales and finally to make cash payment for their credit purchases, and it deviates by around 172 days to both sides of the mean distribution. In addition to, a minimum value of the cash conversion cycle, -576 days, was observed implying that some firms in the sample take longer period of time to pay for their creditors than the days they take to sell their inventory and collect cash from their credit sell. The maximum value is about 794 days and it shows that firms in the sample wait up to 794 days to make cash inflows from sale of inventories even after they made payments for creditors.

An inclusion of other variables, identified by preliminary studies and supposed to have significant impact on firm's profitability, is also made in this study and they are categorized as control variables. One of those variables is the traditional measures of firms' liquidity position,

current ratio. Finance literature has proposed a rule of thumb for current ratio that a ratio of 2 for current assets to current liabilities is reasonably preferable. **Table 4.1** above shows a mean value of 4.08 for the measure current ratio with standard deviation of 3.94 and this figure shows that the liquidity ratio of the sample firms as measured by current assets to current liabilities ratio is around 4.08, on average, with standard deviation of 3.94 and this mean value is apparently larger than the standard liquidity position or the rule of thumb proposed by finance literature. The minimum value of this ratio is 0.23 while the maximum is 23.76 and this shows a wide range of liquidity positions among the sample firms as measured by current ratio.

Firm size, expressed in natural log of total assets, was the other control variable used and the mean value for this variable was around 18.60 (Br. 119, 640, 264.00) with standard deviation of 0.924. This shows that firms in the sample have a size of around Br. 119, 640, 264.00, on average and it deviates by 0.924 (Br. 5, 943, 419.57) to both sides of the mean distribution. The minimum value for firm size was 16.25963 representing Br. 11,520,400.75 while the maximum is 23.38499 or Br. 14,320,959,494 and this shows a wide range of firm size, around Br. 14,309,439,093.25 among the sample firms.

The mean value of leverage or debt ratio for the sample firms is around 39.11 percent with standard deviation of 18.87 percent showing that on average 39.11 percent of the total investment in the sample firms is financed by debt. The minimum and maximum values of this variable are around 0.61 percent and 105.67 percent respectively, the maximum value showing a little troublesome on the going on concern of some sample firms.

Other control variables used in this study were measures of working capital investment and financing policy's degree of aggressiveness and/or conservativeness. Current assets to total assets ratio, a proxy variable to measure working capital investment policy's degree of aggressiveness/conservativeness was used. The higher the value in this ratio the more degree of conservativeness in working capital investment policy it implies and the reverse is the more degree of aggressiveness it shows. In this study it was observed that the mean value for this measure was about 59.13 percent with standard deviation of 20.83 percent. This shows that in the sample firms around 59.13 percent of the total asset investment, on average, is made of current assets and it deviates by 20.83 percent to both sides of the mean distribution. The minimum value for this ratio is around 1.97 percent and this shows the high degree of aggressiveness while

the maximum value observed, 97.22 percent, is representing the high degree of conservativeness in working capital investment policy of the sample firms. Furthermore, the observed 59.13 percent mean value of the current assets to total assets ratio suggests the degree of moderate working capital investment policy in the sample firms and it falls in the middle of the two extremes, *i.e.* aggressive and conservative working capital investment policies.

Current liabilities to total assets ratio is used in this study to measure the degree of aggressiveness/conservativeness in working capital financing policy of the firms. The higher the value in this ratio the more degree of aggressiveness in working capital financing policy it implies and the higher the reveres is the more degree of conservativeness it shows. **Table 4.1** above shows a mean value of 24.21 percent with standard deviation of 17.20 percent. This figure shows that in the sample firms around 24.21 percent of the total asset, on average, is financed from current liabilities and it deviates by 17.20 percent to both sides of the mean distribution. The minimum value for this ratio is around 1.46 percent and this shows almost the extreme degree of conservativeness in working capital financing policy of the sample firms while the maximum value of current liabilities to total assets ratio observed, 87. 87 percent is representing the high degree of aggressiveness in working capital financing. Furthermore, the observed 24.21 percent mean value of the current liabilities to total assets ratio suggests the degree of moderate working capital financing policy in the sample firms and it falls in the middle of the two extremes, *i.e.* aggressive and conservative working capital financing policies.

4.2. Correlation analysis

Prior to regression analysis it is important to check the correlation between the different variables of the study. Correlation analysis is used to explain how two variables react to each other or what change will occur in one variable with a unit change in other variable. Correlation analysis is used to examine the degree of linear association between two variables (Brooks, 2008). Pearson's Correlation analysis was used for this study to examine the relationship between all the variables considered.

Results from **Table 4.2** below shows that the correlation coefficient between profitability as measured by ROA and the working capital management efficiency ratios of ARP, IHP, APP and CCC are -0.1002, -0.1919, -0.1730 and -0.0457 respectively. The negative relationship between profitability and all the working capital management indicates that a reduction in the components

of working capital management tends to increase firms profitability. The results supports the hypotheses in this study that are developed for the respective variables, except the reservation for the observed negative relationship between profitability and APP that it was hypothesized with expectation of positive relationship.

Table 4.2: Pearson correlation matrix for all variables of the study

```
. correlate ROA ARP IHP APP CCC CR FS DR CATOTA CLTOTA
(obs=195)
```

	ROA	ARP	IHP	APP	CCC	CR	FS	DR	CATOTA	CLTOTA
ROA	1.0000									
ARP	-0.1002	1.0000								
IHP	-0.1919	0.0753	1.0000							
APP	-0.1730	0.2025	0.1863	1.0000						
CCC	-0.0457	0.1747	0.6642	-0.5633	1.0000					
CR	-0.0360	-0.2198	0.0589	-0.2390	0.1696	1.0000				
FS	-0.0719	0.2020	0.2316	0.2537	0.0428	-0.1728	1.0000			
DR	-0.1271	0.2275	-0.0158	0.2819	-0.1664	-0.2467	-0.1299	1.0000		
CATOTA	0.4007	0.2107	0.1740	0.0163	0.1813	0.1524	-0.0600	0.2003	1.0000	
CLTOTA	0.0479	0.4543	-0.0842	0.2547	-0.1381	-0.5812	0.0871	0.6149	0.1905	1.0000

Source: *financial statements of sample firms (STATA output)*

The correlation coefficient between ROA and ARP is (-0.1002). This negative relationship between return on assets and accounts receivable period implies that as a firm waits longer to collect cash from customers its profitability will decrease because of the large capital tied up in receivables. That is to say, the little the time taken by customers of the firm to pay, the more firm's profitability will be as free cash is available to restock inventories that would increase sales to meet customers demand and thereby increase profitability. This finding also supports the hypothesis made so far in this study for the existence of negative relationship between inventory holding period and profitability.

The correlation coefficient between ROA and Inventory Holding Period is (-0. 1919). This negative relationship indicates that as firms reduce the period they keep inventories in store, their

profitability will increase in effect. It supports the hypothesis made so far in this study for the existence of negative relationship between inventory holding period and profitability.

The correlation coefficient between ROA and accounts payable period is (-0.1730) and it implies that less profitable firms take longer time period to pay their creditors or as Hoang (2015) justified that, it implies waiting longer to pay creditors may damage the firm's credit reputation and decrease its profitability that would arise from cheep financing, accounts payable in particular. The finding is against the expectation of the research hypothesis developed for this variable (accounts payable period) that has been developed with expectation of a positive relationship with the view that, using suppliers cash to finance daily operation would decrease own cash requirements.

In a similar fashion, the correlation coefficient between ROA and cash conversion cycle is (-0. 0457). This negative relationship implies that as the time period that elapses between cash collections from customers and cash payment to suppliers gets large and large the profitability of the firm will decrease. This finding supports the theoretical relationship between profitability and cash conversion cycle, as comprehensive measure of working capital management and it is in line with its respective hypothesis developed in this study that has expected a significant negative relationship.

Similar preliminary studies have suggested that, in order to have sound analysis in the impact of working capital management on profitability, control variables should be added to the analysis along with the main variables of working capital management. Consistent with those studies correlation analysis of selected control variables with the profitability measure of return on assets was also made in this study.

In financial theory profitability and liquidity are the two competing objectives of working capital management and there involves a trade-off one over the other. Thus current ratio was used in this study as control variable to handle this theoretical negative impact of firms' liquidity positions on their profitability. As can be seen from **Table 4.2**, the correlation coefficient between return on assets and the liquidity measure current ratio is -0.0360. The negative relationship between return on assets and current ratio observed in this study supports the theoretical relationship between profitability and liquidity that as a firm is highly liquid it is less profitable.

Firm size as measured by $\text{Ln}(\text{Total assets})$, was another control variable used and the correlation coefficient between return on assets and firm size is -0.0719. This negative relationship between profitability and firm size suggests that profitability decreases as the firms get large in size. This could imply that there is a diseconomy of scale in the sampled manufacturing firms and expansion would lead to less profit. There would not be a comparative advantage associated with economies of scale that can increase profitability. Instead there is risk of firms being disadvantageous from increased managerial and administrative costs.

Likewise the correlation coefficient of debt ratio, a measure for capital structure, with return on assets is -0.1271 and it shows that, profitability will decrease as firms are more financed by debt than equity. The negative association implies that profitability decrease as debt financing increases because of the fact that, part of the earnings of all business operations are taken away by the debt holders and only small amount of the earnings is left for the business. This finding is in line with the pecking order theory of capital structure, which proposes the advantage of internal financing sources over the external sources.

In line with the study by Padachi (2006), this study has also used the working capital investment and financing policy measures as control variables and as shown in the correlation matrix both current assets to total assets and current liabilities to total assets ratios have positive correlation coefficients. The correlation coefficient of current assets to total assets ratio, a measure for working capital investment policy, with return on assets is 0.4007. This positive relationship between return on assets and current assets to total assets ratio shows that when current asset to total asset ratio increases profitability will increase as well and it implies that as those firms follow more conservative investment policy (high current assets to total assets), their profitability will increase.

The other working capital policy measure employed in this study as control variable is current liabilities to total assets ratio, a proxy variable to measure firms' working capital financing policies. As shown in the correlation matrix above (**Table 4.2**), current liabilities to total assets ratio has a correlation coefficient of 0.0479 with return on assets. This shows that there is a positive relationship between current liabilities to total assets ratio and profitability of the sample firms. High current liabilities to total assets ratio represents high degree of aggressiveness in working capital financing policy. Thus, in this study a positive relationship is found implying

that the more aggressive the firms are in their working capital financing the higher their profitability will be.

A further issue with regard to the correlation analysis is the correlation between the independent variables. The correlation coefficient among independent variables would have an important bearing on the regression analysis because significant correlation coefficient between two or more independent variables implies a multicolinarity problem. Multicollinarity is a serious problem when there is an exact relationship between two or more independent variables. Upon this, a correlation coefficient of 0.8 is considered as a threshold for the degree of multicollinarity (Gujerati, 2004). Accordingly, a correlation coefficient of greater than 0.8 between independent variables poses a difficulty to the regression coefficient estimation process.

In the correlation analysis conducted for this study relatively higher correlation coefficient are observed between the independent variables of CCC with IHP and APP. The correlation coefficient between CCC and IHP is 0.6642 while the correlation coefficient between CCC and APP is -0.5633. The positive relationship between CCC and IHP is valid because the comprehensive measure of working capital management efficiency, CCC, is an additive gauge of ARP with IHP and deduction of APP from the addition that also reflects the negative association between CCC and APP observed. Thus, increase in inventory holding period leads to longer cash conversion cycle while increasing APP reduces cash conversion cycle are plausible relationships.

4.3. Diagnostic tests of OLS assumptions

This study is sought to examine the impact of working capital management on corporate profitability of selected manufacturing firms. In other words this study is going to examine the relationship between corporate profitability and working capital management efficiency. And an analysis that involves in examining and describing the relationship between two or more variables is known as regression analysis. Owing to its instinct attractiveness and with relatively less mathematical complexity involved, ordinary least squares remained the most extensively used method of regression analysis (Gujerati, 2004).

But, the instinct attractiveness and other spectacular theoretical and practical merits of using OLS in regression analysis are bounded by sets of restrictive assumptions, under which the violations of such bounds impose another threat to the regression analysis and the attractiveness

of OLS is depleted. Thus, in order to have an analysis with sense of rationality and as a result to generate reliable results, a study using this OLS method should pass tests of those restrictive assumptions. In line with the studies by Ncube (2011) and Donkor (2014) the following specific diagnostic tests have been conducted for this study:

4.3.1. Normality Test

One classical assumption of the ordinary least squares regression analysis is the normality of the error terms, in which the error terms are assumed to be normally distributed with a mean of zero and constant variance term, $N \sim (0, \boldsymbol{\delta}^2)$. As Rawlings et al. (1998) stated that the assumption that the error terms are normally distributed is not necessary for estimation of the regression parameters and partitioning of the total variation rather it is needed only for tests of significance and construction of confidence interval estimates of the parameters. Hence, the violation of this assumption would not impartial the parameter estimates and if other assumptions are fulfilled the OLS estimates remain the best linear unbiased estimates. But the confidence intervals and test of significances will be biased and results in unnecessary acceptance or rejection decisions.

To be cautious of those problems a normality test has been conducted for all regression models using the most popular tests of normality, Shapiro-Wilk W test for normal data (results are attached in **Appendix 1**). Based on this test of Normality, if the P value is more than 0.05 ($P \geq 0.05$) there would not be a normality problem. But in this study all the regression models are found with a *Shapiro-Wilk W* test's P value of less than 0.05, showing a normality problem in the error term.

A worth noting to mention here is that, in realistic world, it is almost impossible to find an exactly normally distributed data sets and only reasonable normality is expected. In line with this opinion, Green (2003) explains the normality assumption that, it is often unnecessary and possibly inappropriate addition to the regression model assumptions. Except in some cases in which alternative distribution could be explicitly assumed. Thus, it would be of reasonable to relax this normality assumption and tolerate the departure from the bounding classical assumptions of the ordinary least squares in the encountered circumstances.

Another justification to relax this assumption is also backed up by the Central limit theorem, theory of large sample size. On this study, a sample of 39 cross sections with Five years' time

span, 195 firm-year balanced pooled panel data observations, have been made and thus, it is reasonable to assume a relatively large observation. Indeed, Gujerati (2004) suggests that when the sample size is reasonably large it is possible to relax the normality assumption. Thus, in this study this assumption is relaxed on the base of large samples and the reasonable departure will be tolerated to make further analysis.

4.3.2. Multicollinearity tests

Another classical assumption of the ordinary least squares is that there is no correlation between the independent variables. Because if there is a relationship between two or more independent variables, adding or dropping one variable in a model would result in change of the value of another variable's coefficient, making precision coefficient determination difficult. In practical context, however, value of the linear relationship between the independent variables would be a non-zero and the concern is not in the nature rather in the degree of their relationship.

However, a serious difficulty arises when the relationship between the independent variable is highly strong and this is what the so called problem of multicollinearity in econometrics modeling. In this juncture, as Brooks (2008) explained that two classes of multicollinearity can be identified, perfect multicollinearity and near multicollinearity. Accordingly, perfect multicollinearity happens when there is an exact relationship between two or more independent variables, and in the presence of this perfect multicollinearity it would not be possible to estimate all coefficients of the model. The other class, near multicollinearity, involves when there is minor and not perfect relationship between two or more independent variables, and is not a prime concern as it would not pose a serious difficulty to the precision of the coefficient parameters.

The correlation analysis in the previous section revealed some higher correlation coefficients in CCC with IHP and APP. However, given that CCC is combined measure of the three individual WCM measures (ARP, IHP & APP) and consistent with most preliminary studies on this topic, separate regression models are formulated and run for each independent variables, holding the control variables in all regressions unchanged. Having run the separate models VIF test was made for each model and there were no serious multicolinearity as shown in (**Appendix 2**).

4.3.3. Heteroskedasticity tests

Another main assumption of the ordinary least squares regression is that the homogeneity of the variance of the residuals, i.e. error terms in the model have a constant variance, $\boldsymbol{\delta}^2$. If the variance of the residuals or error terms is non-constant, then the residuals variance is heteroskedastic. In presence of heteroskedasty, as Brooks (2008) stated that, OLS estimators will still give unbiased (and also consistent) coefficient estimates, but they are no longer BLUE, that is, they no longer have the minimum variance among the class of unbiased estimator.

Heteroskedasticity makes ordinary least square estimators not efficient because the estimated variances and covariance of the coefficients (β_i) are biased and inconsistent and thus, the tests of hypotheses are no longer valid. In this study, the presence of heteroskedasticity problem is tested using Breusch-Pagan/ Cook-Weisberg test for heteroskedasticity for all models and the result is displayed in (**Appendix 3).** Based on this test the null hypothesis that states variance is constant, is rejected if p value is less than 0.05. On this study the P value for all regressions are below the threshold ($P \leq 0.05$) and this leads to the rejection of the null hypothesis for all models. Thus, this study is encountered with the problem of heteroskedasticity.

Having detected the presence of heteroscedasticty problem, then what matters is how to deal with it and econometricians have proposed other estimation alternatives to the OLS. According to Brooks (2008) one of those alternatives available in most software packages is the generalized least squares, in which the weighted sum of the squared residuals is minimized instead of the unweighted squared residuals of the OLS. But as Brooks (2008) further maintained that due to inherent technical drawbacks of a researcher this method of estimation is not widely used in practice and using heteroscedasticity consistent standard error estimates, modified standard errors of the OLS adjusted for heteroscedasticity using a robust button, is the advisable means of handling heteroscedasticty.

In line with this view, this study has used the robust standard errors of the regression coefficients. Robust standard errors of the coefficients are employed throughout the regressions of all models. Then as Brooks (2008) added that modifying the standard errors of the slope coefficients relative to the usual OLS standard errors would make the hypothesis testing more conservative, requiring more evidence before rejecting the null hypothesis.

4.4. Regression analysis

A major weakness of Pearson Correlations is that they do not allow identifying causes from consequences. As Mathuva (2010) maintained that, in correlation analysis, it is difficult to identify whether higher Accounts receivable period leads to lower profitability or lower profitability provokes to longer receivable period in order to increase sales. Care must be placed while interpreting the correlation coefficient from a correlation matrix, because this coefficient does not consider the correlation of one variable with the other variables. Therefore, in order to closely examine the impact of working capital management on profitability, regression analysis must be used.

Regression analysis is used in this study to investigate the extent to which the dependent variable changes for each unit change in the explanatory variable, while other independent variables, the control variables, are held fixed. Pooled ordinary least squares method is used in regression analysis, wherein time series and cross-sectional observations are pooled together in examining the underlying relationship between profitability measured by return on assets and independent variables (working capital management efficiency ratios) along with the control variables.

To start with, specific multiple regression models were derived from the general model developed to assess the effect of working capital management on corporate profitability. Underpinned by the studies of Deloof (2003), Padachi (2006), Rahman & Nasr (2007), Mathuva (2010) and many more celebrated articles in the literature, four specific models containing the independent variables ARP, IHP, APP and CCC in isolation were specified. Return on asset was regressed against one independent variable and all control variables at a time in each of the four models.

4.4.1. The impact of accounts receivable period on profitability

The regression analysis started with this first model and it was run to examine the impact of the manufacturing firms' accounts receivable management efficiency as measured by accounts receivable period on their corporate profitability, measured in terms of return on assets. Recall that, a hypothesis claiming a significant negative relationship between accounts receivable period and profitability was developed in the methodological section of this paper. The first regression model of this study was expressed as:

$$ROAit = \beta_0 + \beta_1(\mathbf{ARP}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

Where: ARP is accounts receivable period, CR is current ratio, FS is firm size, DR is debt ratio, CATOTA is current assets to total assets ratio, CLTOTA is current liabilities to total assets ratio and βs are regression coefficients.

The empirical results for this model were generated through the regression analysis as presented in **Table 4.3** below:

Table 4.3: regression results of model specification I

```
. regress ROA ARP CR FS DR CATOTA CLTOTA, vce(robust)

Linear regression                               Number of obs =     195
                                                F(  6,   188) =   15.83
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2858
                                                Root MSE      =  .10806
```

ROA	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
ARP	-.0006166	.0001414	-4.36	0.000	-.0008956	-.0003377
CR	-.0049559	.0023621	-2.10	0.037	-.0096155	-.0002963
FS	-.0110986	.0081081	-1.37	0.173	-.0270931	.0048959
DR	-.2229115	.052375	-4.26	0.000	-.3262296	-.1195933
CATOTA	.3023999	.0353634	8.55	0.000	.2326398	.37216
CLTOTA	.1307262	.0839474	1.56	0.121	-.0348737	.296326
_cons	.270328	.1558756	1.73	0.085	-.037162	.5778181

Source: *financial statements of sample firms (STATA output)*

In **Table 4.3** above, the collection policy measure ARP and control variables of current ratio, firm size, leverage, current assets to total assets and current liabilities to total assets ratios are regressed against ROA. The R^2 in this regression model is 28.58%. This indicates that the explanatory variable ARP along with the control variables in the regression explains the 28.58% of the variation in profitability measure by ROA while the remaining 71.42 percent is accounted for other variables not included in this model. The overall model is significant to explain the variations in return on assets with a significant F statistics of 15.33 and P value of 0.0000, less than the threshold ($P \leq 0.05$). The variables used in this model (ARP and the control variables

jointly) are statistically significant in explaining the profitability variation at the 95 percent confidence interval.

From the regression results displayed in **Table 4.3**, accounts receivable period is found to have a negative coefficient of (-0.0006166). This coefficient is significant at 1 percent significance level suggesting that efficiency in accounts receivable management has a strong influence on ROA of the selected manufacturing firms. The relationship between ROA and ARP from this regression model shows that ARP is significantly and negatively related with profitability and a decrease in accounts receivable period will enhance firms' profitability. From the coefficient column of the table above, it can be inferred that a one day reduction in accounts receivable period will lead to a change of around 0.06166 percent increase in profitability of the firms. This finding is in agreement with the research hypothesis developed and it failed to reject the hypothesized significant negative association between ARP and ROA, thus hypothesis one is accepted.

This finding is similar with previous findings of Deloof (2003), Padachi (2006), Rahman & Nasr (2007), Mathuva (2010), Afeef (2011), Makori & Jagongo (2013), Angahar & Alematu (2014), and Sadiq (2016). But this finding is also in contradiction with prior findings of Ahmad et al. (2014) and Mbawuni et al. (2016), who found positive impact of accounts receivable period on profitability.

A variety of possible explanations have been proposed by the literature of working capital management with regard to the negative relationship between accounts receivable period and profitability. One explanation for this was forwarded by Deloof (2003), according to him the negative relationship between accounts receivable period and profitability arises from the fact that customers demand long time period to assess the quality of products they bought from firms with declining profitability. Another possible explanation for this negative relationship is that, firms that reduce outstanding receivables minimizes the possible delinquencies and bad debt expenses and thereby increases their profitability. Furthermore, minimizing the time period that customers take to pay their bill generates more free cash for further prospective investments, in turns that could expand sales, and thus results in increased firm's profitability.

In this regression model the control variables current ratio, firm size, debt ratio, current assets to total assets, and current liabilities to total assets ratios were also regressed against ROA. As shown in the table above the regression coefficient for CR is -0.0049559 and it is significant at 5

percent significant level. This significant negative relationship supports the theoretical relationship between profitability and liquidity that as a firm is highly liquid it is less profitable. This is also similar with previous findings of (Rahman & Nasr, 2007; Afeef, 2011; Arega et al., 2016) and in contradiction with findings of (Hoang, 2015; Rahman, 2011) who found a positive relationship between current ratio and profitability.

The regression coefficient of FS was also -0-0110986 but it is not significant at the 5 percent significance level. The negative coefficient of firm size, though it is insignificant, suggests that firms larger in size are less profitable due to the diseconomies of scale scenario. This could also be due to fixed asset underutilizations, *i.e.* firms with large fixed assets are not generating higher profit than smaller ones, as there might be excess production capacity in the larger firms while the small ones are operating at full capacity. Similarly, Debt ratio also was found to have a significant negative coefficient of (-0.2229115), significant at 5 percent significance level. This negative regression coefficient of leverage shows that high debt financed firms are less profitable because part of their earnings are taken away by the debt holders, then leaving little cash for further investments that would generate extra profit.

Current assets to total assets ratio and current liabilities to total assets ratio were also used as control variables consistent with Padachi (2006). Then, from the table above CATOTA was found to have a regression coefficient of 0.3023999. This coefficient is significant at 1 percent significance levels suggesting that lesser degree of aggressiveness in working capital investment policy is associated with higher profitability as measured by return on assets in case of those sampled manufacturing firms. Higher current asset to total assets ratio is identified as conservative working capital investment policy, less aggressive WC investment policy.

From the regression results displayed in **Table 4.3**, CLTOTA has a positive regression coefficient of (0.1307262) and it is insignificant at 5 percent significance level. This positive relationship suggests that higher current liabilities to total assets ratio is associated with higher profitability as measured by return on assets in case of those sampled manufacturing firms. Regarding the working capital financing policy, the higher current liabilities to total assets ratio is the more aggressive degree of working capital financing policy is. Thus, the finding of this model reveals that keeping high level of current assets to total assets ratio, CLTOTA, results in increased profitability.

4.4.2. The impact of inventory holding period on profitability

This was the second regression model run to investigate the impact of the firms' inventory management efficiency, as measured by inventory holding period, on their corporate profitability measured in terms of return on assets. Recall that, a second hypothesis that declares significant negative impact of inventory holding period on profitability was developed in the methodological section of this paper. The second regression model was expressed as follow:

$$ROAit = \beta_0 + \beta_1(\mathbf{IHP}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

The empirical results for this model containing inventory holding period along with the selected control variables are generated through the regression analysis as follow:

Table 4.4: regression results of model specification II

```
. regress ROA IHP CR FS DR CATOTA CLTOTA, vce(robust)

Linear regression                               Number of obs =     195
                                                F(  6,   188) =   15.39
                                                Prob > F      =  0.0000
                                                R-squared     =  0.3098
                                                Root MSE      =  .10623

------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         IHP |  -.0002478   .0000489    -5.07   0.000    -.0003442   -.0001513
          CR |  -.0057138   .0024224    -2.36   0.019    -.0104923   -.0009352
          FS |  -.0064046   .0076814    -0.83   0.405    -.0215575    .0087483
          DR |  -.1928502   .0470613    -4.10   0.000    -.2856862   -.1000141
      CATOTA |   .3196491    .037699     8.48   0.000     .2452817    .3940165
      CLTOTA |   .0018213   .0772357     0.02   0.981    -.1505387    .1541812
       _cons |   .2089711   .1485336     1.41   0.161    -.0840357    .5019778
------------------------------------------------------------------------------
```

Source: *financial statements of sample firms (STATA output)*

In **Table 4.4** above, the inventory policy measure, IHP, and control variables of current ratio, firm size, leverage, current assets to total assets and current liabilities to total assets ratios are regressed against ROA. The R^2 in this model specification is 30.98%. This R square indicates that, holding other explanatory variables constant, the explanatory variable IHP along with the control variables in the regression explains 30.98% of variations in the profitability measure

ROA, but the remaining 69.02 percent of the variation in ROA is explained by other variables that are not included in this regression model. The overall model is significant to explain the variations in profitability with a significant F statistics of 15.39 and P value of (0.0000). Thus, the independent variable and all the control variables, collectively, are significant in explaining the profitability variation at 95% confidence interval.

From the regression results displayed in **Table 4.4**, inventory holding period is found to have a negative coefficient of (-0.0002478). This coefficient is significant at 1 percent significance level suggesting that efficiency in inventory management has a significant influence on profitability of the selected manufacturing firms measured in terms of ROA. The relationship between ROA and IHP from this regression model shows that IHP is significantly and negatively affecting profitability and a decrease in inventory holding period will enhance firms' profitability. From the coefficient column of the table above, it can be inferred that a one day reduction in inventory holding period will lead to change of around 00.02478 percent increase in profitability of the sample firms. The finding confirms the research hypothesis developed for the variable IHP, with the expectation of significant negative impact on ROA, therefore the second hypothesis of this study is accepted.

This result is also in agreement with most of the prior findings in the literature of the relationship between working capital management and profitability such as Deloof (2003), Rahman & Nasr (2007), Charitou et al. (2010), Mansoori & Muhammad (2012), Angahar & Alematu (2014), Hoang (2015) and Arega et al. (2016). This result is, however, in conflict with few similar prior studies that found positive relationship between inventory holding period and profitability including Mathuva (2010), Jahfer (2015) and Abenet & Venkateswarlu (2016).

The negative impact of inventory holding period on profitability, revealed in this study, can be explained in many possible ways that prior studies have also suggested. As Rahman & Nasr (2007) justified that if a firm takes more time to sell its inventory, profitability will be affected adversely. This is because investments in inventories represent a capital tied up with less or no returns, which could have generate higher profit had it been invested in other investments, or it could have been used to pay suppliers for the credit purchases which would consume other short term finances. Another reason for declining profit with higher inventory holding period is that,

carrying costs such as obsolescence and other storage and warehousing costs will increase as the inventories are held in shelf for longer time period, hence, result in reduced firms profitability.

In this second model specification too, the control variables of current ratio, firm size, debt ratio, current assets to total assets, and current liabilities to total assets ratios were regressed against ROA. The regression coefficient of current ratio is (-0.0057138) and it is significant at 5 percent significant level. This significant negative relationship supports the theoretical relationship between profitability and liquidity that as a firm is highly liquid it is less profitable. This is also similar with previous findings of (Rahman & Nasr, 2007; Afeef, 2011; Arega et al., 2016) but in contradiction with findings of (Hoang, 2015; Rahman, 2011) who found a positive relationship between current ratio and profitability.

Firm size was also negatively affecting profitability with coefficient of (-0-0110986) but it is not significant at the 5 percent significance level. The negative coefficient of firm size, though it is insignificant, suggests that firms larger in size are less profitable due to the diseconomies of scale scenario. Similarly, debt ratio also was found to have a significant negative coefficient of (-0.1928502), significant at 1 percent significance level. The negative regression coefficient of debt ratio, in this model, shows that high debt financed firms are less profitable.

Current assets to total assets and current liabilities to total assets ratios were found to have positive regression coefficients of 0.3196491 and 0.0018213 respectively. The coefficient of CATOTA ratio is significant at 1 percent significance level while the coefficient of CLTOTA ratio is insignificant at 5 percent significance level. Higher current asset to total assets ratio is identified as conservative working capital investment policy, less aggressive WC investment policy, while higher CLTOTA ratio represents aggressive financing policy. Thus, the positive relationship of ROA with CATOTA and CLTOTA suggests that lesser degree of aggressiveness in working capital investment policy and higher degree of aggressiveness in financing policy are associated with higher profitability as measured by return on assets in case of those sample manufacturing firms. Thus, the finding of this model reveals that keeping high level of current assets to total assets and current liabilities to total assets ratios, results in increased profitability.

4.4.3. The impact of accounts payable period on profitability

Third regression model that contain accounts payable period as independent variable was run to investigate the impact of the firms' accounts payable management efficiency as measured by accounts payable period, on their corporate profitability measured in terms of return on assets. The third hypothesis that states for significant positive impact of accounts payable period on profitability was developed in the methodological section of this paper. The third regression model developed was as follow:

$$ROAit = \beta_0 + \beta_1(\mathbf{APP}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

The results of the third model containing accounts payable period are displayed in the **Table 4.5** below, and ROA is regressed on the payment policy measure, APP, and control variables of current ratio, firm size, debt ratio, current assets to total assets and current liabilities to total assets ratios.

Table 4.5: regression results of model specification III

```
. regress ROA APP CR FS DR CATOTA CLTOTA, vce(robust)

Linear regression                               Number of obs =     195
                                                F(  6,   188) =   12.82
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2638
                                                Root MSE      =  .10972

------------------------------------------------------------------------------
             |               Robust
         ROA |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         APP |  -.0001364   .0000448    -3.04   0.003    -.0002249    -.000048
          CR |  -.0059916   .0023849    -2.51   0.013    -.0106962    -.001287
          FS |  -.0110602   .0079836    -1.39   0.168     -.026809    .0046887
          DR |   -.184388   .0506093    -3.64   0.000     -.284223    -.084553
      CATOTA |   .2840916    .036542     7.77   0.000     .2120067    .3561766
      CLTOTA |   .0458688   .0810356     0.57   0.572     -.113987    .2057247
       _cons |   .2770791   .1519982     1.82   0.070     -.022762    .5769202
------------------------------------------------------------------------------
```

Source: *financial statements of sample firms (STATA output)*

The R square in this model specification is 26.38%. This indicates that the explanatory variable APP along with the control variables in the regression explains 26.38% of the variations in the profitability measure ROA, but the remaining 73.62 percent of the variation in ROA is explained by other variables that are not included in this regression model. The overall model is significant

to explain the variations in profitability with a significant F statistics of 12.82 and P value of 0.0000, showing that the independent variable and all the control variables collectively are significant in explaining the variation of firms profitability at 95% confidence interval.

The result from **Table 4.5** above indicates that, the regression coefficient for the relationship between accounts payable period and return on assets is (-0.0001364). This relationship is significant at 5 per cent level of significance and this indicates that efficiency in accounts payable management has significant impact on return on assets of the selected manufacturing firms. The negative regression coefficient shows that a one day reduction in accounts payable period will increase return on assets by around 0.01364 percent. This refelects the fact stated by Deloof (2003) that, less profitabile firms wait longer to pay their bills. Thus, the result of this regression model refutes the research hypothesis made with regard to this explanatory variable, accounts payable period. This study failed to validate the third hypothesis.

The finding of this study, for the variable accounts payable period, is similar with the previous studies of Deloof (2003), Rahman & Nasr (2007), Charitou et al. (2010), Mansoori & Muhammad (2012), Abenet & Venkateswarlu (2016) and Arega et al. (2016), while it is in conflict with the results of Falope & Ajilore (2009), Mathuva (2010) and Jahfer (2015). This negative relationship can be also explained in many ways. One explanation for this negative relationship between APP and profitability is given by Deloof (2003) that, less profitabile firms wait longer to pay their suppliers. Another explanation could be sometimes suppliers allow some discounts to encourage prompt payment from their customers and in such circumstances the firm will be advantageous of utilizing substantial discount opportunities by making early payment to its suppliers. In addition, making early payments to suppliers could strengthen the supplier-customer business relationships and therefore, the firm would have some privileges in quality of product, shipment terms and other mutual benefits of such business deals.

As regards to the control variables current ratio, firm size and debt ratio are negatively related with return on assets. Current ratio, the traditional measure of liquidity, has a negative correlation coefficient of -0.0059916 and it is significant at 5% significance level. This is also in support of the theoretical trade-off that exists between liquidity position and profitability. On this model firm size is also negatively related with return on assets with a coefficient of -0.0110602 but it is not significant. Even so, this implies that those firms larger in size are less profitable due

to the diseconomies of scale scenario. In addition, debt ratio is negatively related to return on assets with coefficient of -0.184388 and it is significant at 1 percent significance level. This could be due to the existence of idel production capacity that the the servuy by AACCSA (2015) has reaveald. This is to mean that leagrer firms have higher underutilized fixed assets than small firms, because those small firms are more likely to operate at full capacity than the larger ones. On the other hand, the control variables of CATOTA and CLTOTA are positively affecting return on assets. As shown in the table above, CATOTA ratio has a positive coefficient of 0.2840916 and it is significant at 1 percent significance level while the 0.0458688 coefficient of CLTOTA ratio is insignificant at 5 percent significance level.

4.4.4. The impact of cash conversion cycle on profitability

This is the fourth model and it was run to examine the impact of the comprehensive measure of working capital management on return on assets of the sampled firms. The results of the fourth model containing cash conversion cycle, which the literature considers as the most comprehensive measure of working capital management efficiency, are displayed in **Table 4.6**.

In this regression model cash conversion cycle and control variables of current ratio, firm size, debt ratio, current assets to total assets and current liabilities to total assets ratios are regressed against ROA. The fourth regression model developed to test the fourth hypothesis was:

$$ROA_{it} = \beta_0 + \beta_1(\mathbf{CCC}_{it}) + \beta_2(CR_{it}) + \beta_3(FS_{it}) + \beta_4(DR_{it}) + \beta_5(CATOTA_{it}) + \beta_6(CLTOTA_{it}) + e_{it}$$

Table 4.6: regression results of model specification IV

```
. regress ROA CCC CR FS DR CATOTA CLTOTA, vce(robust)

Linear regression                               Number of obs =     195
                                                F(  6,   188) =   13.56
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2689
                                                Root MSE      =  .10934
```

ROA	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
CCC	-.0001128	.00004	-2.82	0.005	-.0001918	-.0000338
CR	-.0049269	.0024451	-2.02	0.045	-.0097502	-.0001036
FS	-.0152599	.0079296	-1.92	0.056	-.0309023	.0003825
DR	-.2300463	.0512724	-4.49	0.000	-.3311896	-.1289031
CATOTA	.3036984	.0378007	8.03	0.000	.2291305	.3782664
CLTOTA	.0460261	.0801629	0.57	0.567	-.1121082	.2041604
_cons	.3566829	.1531164	2.33	0.021	.054636	.6587299

Source: *financial statements of sample firms (STATA output)*

The R square in this model is 26.89%. This indicates that, holding the other independent variables constant, the explanatory variable CCC along with the control variables in the regression explains 26.89 percent of the variation in the profitability measure ROA, but the remaining 73.11 percent of the variation in ROA is attributable to other variables that are not included in this regression model. The overall model is significant to explain the variations in profitability with a significant F test statistics of 13.56 and P value of 0.0000, well below the threshold ($P \leq 0.05$), showing that the independent variable CCC and all the control variables jointly are significant in explaining the variation of firms profitability at 95% confidence interval.

Results from **Table 4.6** above reveal that, the regression coefficient for cash conversion cycle is (-0.0001128). This coefficient is significant at 5 per cent level of significance and it indicates that optimal management of accounts receivable, inventories and accounts payable has significant impact on return on assets of the selected manufacturing firms. The negative regression coefficient indicates that, a one day reduction in the net time interval between actual cash expenditures for purchase of raw materials and other input material, and the final cash collections from sale of finished products will result in 0.01128 percent increase in profitability of the firms, measured by ROA. Thus, by shortening the time lag between cash expenditures for

purchases and cash collections from sales of products managers can maximize their firm's profitability.

The result of this fourth regression model confirms the research hypothesis that has been hypothesized with regard to this explanatory variable, cash conversion cycle, with the expectation of strong negative relationship. Therefore, hypothesis four of this study is accepted. This finding is also consistent with previous results of Rahman & Nasr (2007), Mathuva (2010), Alipour (2011), Mansoori & Muhammad (2012), Makori & Jagongo (2013), Abenet & Venkateswarlu (2016) and Arega et al. (2016), whilst it is in conflict with the results of similar researches by (Padachi, 2006; Gill et al., 2010; Angahar & Alematu, 2014).

This negative relationship between cash conversion cycle and profitability can be justified as; if a firm can reduce the time lag that elapse between cash expenditures for purchase of raw materials and the cash collections from sale of finished goods, it could increase the corporate profitability. This is because of the fact that resources are tied up in each operational activity involving from the start of raw material purchase to sales collection, and shortening the duration of each those activities will free up the resources. Thus, free cash is available whether to make early payments in order to take the discounts provided by suppliers or to make other productive investments that will generate extra future benefits.

What is more from this model specification is the impact of the control variables on return on assets. Accordingly, CR is negatively and significantly affecting return on assets with regression coefficient of -0.049269 showing that a unit increase in current ratio will decrease profitability by 4.93 percent, other things held constant. FS also has a negative coefficient of -0.0152599 but this is not significant at 5 percent significance level. Similarly, DR is found to have significantly negative impact on return on assets with a coefficient of -0.2300463, significant at 1 significance level.

CATOTA and CLTOTA ratios are also found with positive impact on profitability, measured by return on assets. The regression coefficient of CATOTA ratio is 0.3036984 and it is significant at 1 percent. However, the 0.0460261 regression coefficient of CLTOTA ratio is insignificant at the 5 percent significance level. The regression results from **Table 4.6**, shows that conservative investment and aggressive financing policies are suitable for those firms in order to increase their

profitability. This is to say, large investment on current assets and larger usage of short term financing will increase their profitability.

4.4.5. The impact of the control variables on profitability

Throughout the four regression models the impact of the control variables current ratio, firm size, debt ratio, current assets to total assets ratio and current liabilities to total assets ratio were held constant. In all regressions the control variables current ratio, firm size and debt ratio were found to negatively affect return on assets. The negative coefficients on the control variable current ratio shows the fact that as firm' liquidity position is enhanced profitability will diminish, and it is in accordance with the theoretical relationship between profitability and liquidity that, as a firm is highly liquid it is less profitable. This is also similar with previous findings of (Rahman & Nasr, 2007; Afeef, 2011; Arega et al., 2016) and in contradiction with findings of Hoang (2015) and Rahman (2011) who found a positive relationship between current ratio and profitability.

The negative coefficients on the control variable firm size, in all regressions, suggest that firms larger in size are less profitable due to the diseconomies of scale scenario. This could also be due to fixed asset underutilizations, i.e. larger firms with large fixed assets are not generating higher profit than smaller ones, as there might be excess production capacity in the larger firms while the small ones are operating at full capacity. In similar fashion, the negative regression coefficients of debt ratio in all models shows that high debt financed firms are less profitable because part of their earnings are taken away by the debt holders, then leaving little cash for further investments that would generate extra profit.

The control variable CATOTA was found to have positive regression coefficients in all regressions. Those positive coefficients suggests that lesser degree of aggressiveness in working capital investment policy is associated with higher profitability as measured by return on assets in case of those sampled manufacturing firms. Higher current asset to total assets ratio is identified as conservative working capital investment policy, less aggressive WC investment policy. Thus, the finding of this study reveals that keeping high level of current assets to total assets ratio, CATOTA, results in increased profitability.

The results throughout are also consistent with prior findings in the literature of the relationship between working capital management policies and profitability such as Padachi (2006), Nazir &

Afza (2007) who found significant and positive impact of this measure on profitability, and that of the positive but insignificant finding by Tewodros (2010), in Ethiopian case. As Padachi (2006) stated that the positive regression coefficient on this regard is in contrary with the traditional theory of asset management that casted the image of lower profitability for higher liquidity positions when there is high degree of conservativeness in working capital investment.

The explanation for the positive relationship between CATOTA ratio and ROA is that, those firms are heavily reliant on the current assets than fixed assets to generate their profit, thus increasing current assets investment will further enhance their profitability. This could also be due to the existence of idle production capacity, *i.e.* those manufacturing firms might have excess production facility or underutilized fixed assets which are contributing nothing to the corporate profitability. Therefore, investing in current assets to utilize the idle fixed assets or production facilities will contribute to their overall profitability. Indeed, a survey by AACCSA (2015) shows that, due to presence of shortage of imported inputs, low labor productivity, oldness of plants, poor maintenances and low plant productivity, Ethiopian manufacturing firms have large underutilization rate of plant capacity.

CLTOTA also has positive regression coefficients in all regression models. The positive coefficients shows that higher current liabilities to total assets ratio is associated with higher profitability as measured by return on assets in case of those sampled manufacturing firms. Regarding the working capital financing policy, the higher current liabilities to total assets ratio is the more aggressive degree of working capital financing policy is. Thus, the finding of this study reveals that keeping high level of current liabilities to total assets ratio, CLTOTA, results in increased profitability. The result of this study for CATOTA is similar with prior finding of Tewodros (2010) who found positive impact of current liabilities to total assets ratio on profitability, but in contradiction with the similar previous findings of (Padachi, 2006; Nazir & Afza, 2009).

The positive relationship between current liabilities to total assets ratio and return on assets can be explained in such a way that, due to the inexistence of capital markets in the nation and with under developed financial system, the firms are most unlikely to utilize the exhaustive benefits of debt financing. The short term sources of finance or current liabilities with their theoretical advantages over the long term sources are, therefore, significant portion of the external financing

sources. Hence, using more and more of those current liabilities, up to the optimal point of their capital structure, will increase their corporate profitability.

To sum up the discussions of the results, this study has only failed to validate one hypothesis developed for APP but three hypotheses with regard to the variables of ARP, IHP and CCC were accepted. The summary status of the hypotheses is summarized as follow:

Table 4.7: summary status of the hypotheses

Independent variable	Expected impact on profitability (ROA)	Actual impact on profitability (ROA)	Status of the hypothesis
Accounts receivable period (ARP)	Significant and negative	Significant and negative	Accepted
Inventory holding period (IHP)	Significant and negative	Significant and negative	Accepted
Accounts payable period (APP)	Significant and positive	Significant and negative	Failed to accept
Cash conversion cycle (CCC)	Significant and negative	Significant and negative	Accepted

Source: *researchers design*

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter is a continuation of the previous chapter and summarizes the results obtained from the analysis. This chapter presents the recommendations forwarded by the researcher based on the findings.

5.1. Summary and conclusions

Several preliminary works of corporate finance researchers have proven the roles that efficient working capital management plays in value creation endeavors of businesses. Working capital is considered as a blood for any business entity and its efficient management is felt just like a

healthy and well functioning blood vessels. Efficient working capital management mainly plays its prominent role in the interplay between liquidity position and profitability of any firm. On the one hand, high short term asset investments for the sake of higher liquidity position is only achieved by forgoing some profit that would have been generated from other long term investments, had the investment been made elsewhere. On the other hand, higher investment in long term assets with higher profitability in mind will impartial its liquidity position, even would declare bankruptcy if it cannot fulfill recurring business obligations. Thus, firm's working capital management has to direct its attentions towards attaining optimum benefits of its liquidity and profitability, by involving trade-off managerial decisions.

To this end, this study has been designed to examine the impact of working capital management on manufacturing firms' profitability. Financial statements of 39 selected large taxpayer manufacturing firms in Addis Ababa, exclusively from four industry classes of the manufacturing sector, for five years study period from 2011 to 2015 were collected. Four variables; namely,accounts receivable period, inventory holding period, accounts payable period and cash conversion cycle were used to measure WCM efficiency of the manufacturing industries while return on assets was used to measure their corporate profitability. In addition, control variables of current ratio, firm size, debt ratio, current assets to total assets and current liabilities to total assets ratio were included. Data values for those variables have been computed and extracted from balance sheet and income statements of the sample firms. Then the data values have been entered into STATAsoftware package, and statistical results are displayed in the previous chapter with the help of descriptive, correlation and regression analysis.

Correlation analysis was made using the Pearson correlation matrix andresults of the analysis have shown that ROA was negatively related with the independent variables of all working capital management measures (ARP, IHP, APP and CCC) and the control variables of CR, FS and DR. But ROA was positively related with the working capital investment and financing policy measures of CATOTA and CLTOTA ratios. Based on results of the correlation analysis an attempt was also made to explain the negative relationships between ROA and WCM measure of (ARP, IHP, APP and CCC) in such a way that, shortening the time lag that elapses between raw material purchases and sales of finished goods will free up resources for other productive investments. Thus profitability will be generated from those other productive investments.

Finally multiple regression analysis of the model framework developed to examine the impact of WCM on profitability was made after diagnostic tests of OLS assumptions. On the regression analysis four separate models, each containing single WCM measure with the selected control variables, were run turn by turn. In the first model framework containing ARP as a measure of collection policy, ARP and control variables CR, FS, DR, CATOTA and CLTOTA wereregressed againstROA. Statistical results of this model have shown significant negative impact of ARP on profitability and it supported its respective hypothesis developed. The negative impact of ARP on ROA was interpreted as the little the time taken by customers of the firm to pay, the more firm's profitability will be as free cash is available to restock inventories that would increase sales to meet customers demand and thereby increase profitability.

In the second model ROA was regressed on IHP and control variables of CR, FS, DR, CATOTA and CLTOTA. Statistical results of this model too, have shown significant negative impact of IHP on profitability and it supported its respective hypothesis developed earlier. The negative impact on this regard was also interpreted in a manner that as firms reduce the period they keep inventories in store, their profitability will increase in effect because the capital tied up will be freed in a while.

Similarly in the third and fourth model specifications ROA was regressed on APP and CCC respectively, along with the control variables CR, FS, DR, CATOTA and CLTOTA in each. Regression results of the model containing APP have shown a significant negative impact of APP on profitability and it is against the hypothesis developed with the expectation of positive impact. This negative impact was also explained as making early payments for the credit purchases of suppliers' goods and services will increase the profitability of the manufacturing companies as measured by return on assets because this lets the firm to use substantial discounts provided by its suppliers.

In the fourth model CCC was found with significant negative impact on return on assets. And it is in line with the view of efficient working capital management that, reduced working capital cycle leads to higher profitability. Therefore, the result of this model is in confirmation with the research hypothesis developed with the view of efficient working capital management. The results of the study on this comprehensive measure can be explained in such a way that as firms reduce their time lag that elapse between cash expenditures for purchase of raw materials and the

cash collections from sale of finished goods, their corporate profitability will increase. This is because of the fact that resources are tied up in each operational activity involving from the start of raw material purchase to sales collection, and shortening the duration of each those activities will free up the resources. Thus, free cash is available whether to make early payments in order to take the discounts provided by suppliers or to make other productive investments that will generate extra future benefits.

5.2. Recommendations

This study has revealed close association between working capital management efficiency and profitability of the chemical, leather, plastics and rubber, and nonmetallic mineral manufacturing industries. Thus, managers or/and owners of those industries should pay due attention to their working capital investments. In general, based on the empirical results of this study, the researcher forwards the following recommendations to chemical, plastic and rubber, leather and nonmetallic mineral product manufacturing industries of Addis Ababa:

Accounts receivable period is significantly and negatively related with their profitability. Thus, the financial managers of those firms should keep their receivables period to a optimum minimum, a level that would not affect their sales. They would be of beneficiaries if they decrease the average number of days that they are allowing for their customers to pay to an extent that would not compromise sales. Optimum level should be determined by improved trade-off decisions between the opportunity costs of short receivables period shuch as the extra profits from credit sales and the costs of longer recievables period such as delinquencies and bad debt expenses.

Inventory holding period is negatively and significantly affecting their profitability. Thus, they should decrease their inventory holding days, in order to increase their profitability. This holding period reduction could be achieved throughadapting modern inventory management techniques such as just in time manufacturing and purchasing systems. Their production should not be push-through systems that produce high level of finished goods rather they should put into practice and develop the demand-pull kind of production system with improved demand forecast and superior customer linkages.Similarly they have to make strong linkages withtheir supplier to deliver raw materials when required without any delay.

Accounts payable period is also negatively and significantly affecting their profitability. Therefore, they should pay their suppliers as early as they could because this would enable them to benefit from substantial purchase discounts and it would help them strengthen their business relationships with the suppliers. So they would have privileges from their suppliers with regard to price, shipment terms, quality of products and the likes. In addition, such strong business relationships will enable them improve their inventory management too, because of the privileges on shipment terms they could be granted. Thus, the firms would be better-off if they make early payments to suppliers as long as they could.

Cash conversion cycle is found to negatively and significantly impact the corporate profitability of the manufacturing companies. In order to have enhanced profitability, therefore, those firms should manage their receivables, inventories and payables efficiently. They should reduce the time cycle that encompasses all business activities from raw material purchase, production duration, and warehousing to sales and ultimate cash collections from customers. Having reduced this time cycle, they will free up cash tied in each business activities that can be used to pay their suppliers, make further investments and/or to withdraw for personal usages.

Furthermore, the findings of this study have shown that, higher conservativeness in working capital investments and aggressiveness in working capital financing are positively affecting their profitability. Results have revealed that current asset investments are tending to increase their profitability than the fixed asset investment and this could be due to their inefficiency in utilizing their long term assets. Perhaps they have underutilized production capacities and they have to invest in current assets that would use up by the fixed assets in order to generate the intended benefits, from the fixed assets investments. Hence, profitability of those manufacturing companies will increase.

The manufacturing firms' working capital financing policies were also found to positively affect their profitability. From this finding, therefore, it is recommendable that those firms should use more short term sources to finance their business operations. This is derived from the fact that, due to the inexistence of capital markets in the nation and with under developed financial system, the firms are most unlikely to utilize the exhaustive benefits of debt financing. The short term sources of finance or current liabilities with their theoretical advantages over the long term sources are, therefore, significant portion of the external financing sources. Hence, using more

and more of those current liabilities, up to the optimal point of their capital structure, will increase their corporate profitability.

5.3. Future research directions

The issue, the impact of working capital management on profitability, is a recent phenomenon and underexplored research area in Ethiopia. Thus, the growing business environment is in demand of more researches to be undertaken with respect to working capital management. This study tried to investigate the impact of working capital management on profitability by paying due attention to underexplored manufacturing companies from chemical, plastic, leather and nonmetallic mineral product industries.

While examining the case in those industries, this study used particular variables to measure profitability and working capital management. But, there are varieties of variables in the literature to measure both profitability and working capital management. Thus, future research can be undertaken in those industries, simply by adding variables that are not used in this study. In addition, due to sampling criteria employed in this study, companies with missing yearly observations were excluded to arrive at balanced panel data sets. But, the excluded companies could be taken into account by future researchers by employing unbalanced panel observations. And, due to data unavailability this research was delimited to only five years but this could be extended for the future by incorporating data for the upcoming years.

Given that the issue is a recent phenomenon in Ethiopia, there are various unexplored industries classes and sectors calling for related researches and similar studies should be undertaken in the underexplored area of studies. Above all, there is no similar evidence from the service sector in general and financial industry in particular. Therefore, future researchers should consider the service sector also while studying working capital management.

REFERENCES

Abenet, H. Y., & Venkateswarlu, P. (2016). Effect of working capital management on firms profitability evidence from manufacturing companies in Eastern Ethiopia. *International journal of applied research , 2* (1), pp.643-647.

Addis Ababa Chamber of Commerce and Sectoral Assocaitions. (2015). *An overview of Ethiopian manufacturing sector.* Addis Ababa.

Afeef, M. (2011). Analyzing the impact of working capital management on the profitability of SME's in Pakistan. *International journal of business and social science , vol. 2* (no. 22), pp.173-183.

Afrifa, G. A. (2013). *Working capital management and AIM listed SME companies profitability: a mixed research method approach.* Phd. Thesis submitted to Centre for Finance and Risk, Business School, Bournemouth University.

Ahmad, N., Malik, S., Nadeem, M., & Hamad, N. (2014). Impact of working capital on corporate performance a case study from cement, chemical and engineering sectors of Pakistan. *Arabian journal of business and management review , vol. 3* (no.7), pp.12-22.

Akbar, A. (2014). Working capital management and corporate performance: evidences from textile sector of China. *European academic research , vol. Ii* (issue 9), pp.11440 - 11456.

Ali, M., & Ali, S. B. (2014). The impact of working capital management on firm profitability and fixed investment in Pakistan. (64520).

Alipour, M. (2011). Working capital management and corporate profitability: evidence from Iran. *World applied sciences journal , 12* (7), pp.1093-1099.

Angahar, P. A., & Alematu, A. (2014). Impact of working capital on the profitability of the Nigerian cement industry. *European journal of accounting auditing and finance research , vol.2* (no.7), pp.17-30.

Arega, S., Tadele, T., & Tadesse, K. (2016). Working capital management and its impact on profitability evidence from food complex manufacturing firms in Addis Ababa. *International journal of scientific and research publications , 6* (6), 815-833.

Arshad, Z., & Gondal, M. Y. (2013). Impact of working capital management on profitability a case of the Pakistan cement industry. *Interdisciplinary journal of contemporary research in business , vol 5* (no 2), 384-390.

Atrill, P. (2009). *Financial management for decision makers* (5 ed.). Pearson education limited.

Awan, A. G., Shahid, P., Hassan, J., & Ahmad, W. (2014). Impact of working capital management on profitability of cement sector in Pakistan. *International journal of business and management review , 2* (4), 1-20.

Bagchi, B., & Khamrui, B. (2012). Relationship between working capital management and profitability: a study of selected fmcg companies in India. *Business and economics journa* , 1-10.

Baker, H. K., & Powell, G. E. (2005). *Understanding financial management: a practical guide* (1st Ed.). Blackwell publishing.

Baveld, M. B. (2012). 'Impact of working capital management on the profitability of public listed firms in the Netherlands during the financial crisis'. *Master thesis submitted to university of Twente, school of management and governance* , 91.

Bellouma, M. (2011). "the impact of working capital management on profitability: the case of small and medium-sized export companies in Tunisia". *International management , 15* (3), 71-88.

Berk, J., & Demarzo, P. (2014). *Corporate finance* (3rd ed.). Boston, United States of America: Pearson Education, inc.

Bragg, S. M. (2011). *Interpretation and Application of GENERALLY ACCEPTED ACCOUNTING PRINCIPLES.* New Jersey, Hoboken: John Wiley & Sons, Inc.

Brealey, R. A., Myers, S. C., & Allen, F. (2011). *Principles of corporate finance* (10th ed.). New York, USA: Mcgraw-hill companies, Inc.

Brealey, R. A., Myers, S. C., & Marcus, A. J. (2001). *Fundamentals of corporate finance* (3rd ed.). USA: Mcgraw-Hill companies, Inc.

Brigham, E. F., & Houston, J. F. (2007). *Fundamentals of financial management* (11th ed.). Mason, usa: Thomson higher education.

Brigham, E. F., & Houston, J. F. (2007). *Fundamentals of financial management* (11th ed.). USA: Thomson South-Western.

Brigham, E. F., & Houston, J. F. (2009). *Fundamentals of financial management* (12th ed.). Mason, USA: South-Western Cengage Learning.

Brooks, C. (2008). *Introductory econometrics for finance* (second ed.). New york: cambridge university press.

Central Statistical Authority (CSA) of Ethiopia. (2012). *Report on large and medium scale manufacturing and Electric industry survey.* Addis Ababa.

Chan, R. C. (2010). *A working capital theory of the firm with empirical evidence* . Phd dissertation, University of Michigan.

Charitou, M. S., Elfani, M., & Lois, P. (2010). The Effect Of Working Capital Management On Firm's Profitability: Empirical Evidence From An Emerging Market. *Journal Of Business & Economics Research , 8* (12), 63-68.

Damodaran, A. (2004). *Applied corporate finance* (2nd edi.). Online book.

Deeposhree, S. (2013). *The effect of working capital management on the pfofitability of firms an inter:industry analysis.* Unpublished disirtation , Univeristy of Nothingham, Business School.

Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of businessfinance & accounting , 30* (3&4), 573 - 587.

Donkor, A. (2014). *Effects of working capital management on corporate profitability.* Mini-dissertation submitted to graduate school of business and government leadership, North West University.

Endale, T. (2015). *The Impact of Working Capital Management on Firms' Performance: A Study on Breweries in Ethiopia.* MSc. Thesis, St.Mary's University, MBA Program, Addis Ababa.

Enow, S. T., & Brijlal, P. (2014). The effect of working capital management on profitability: the case of Small Medium and Micro enterprises in South Africa. *Jouranal of accounting and management, 4* (2).

Ephrem, W. (2011). *Impact of working capital management on profitability of Small and Medium Scale enterprises (SMEs) in Addis Ababa.* A thesis submitted to school of Business and Public Administration, Addis Ababa Univeristy, Addis Ababa.

Fabozzi, F. J., & Peterson, P. P. (2003). *Financial Management and Analysis* (2nd ed.). Hoboken, New Jersey, USA: John Wiley & Sons, Inc.

Falope, O. I., & Ajilore, O. T. (2009). Working capital management and corporate profitability: evidence from panel data analysis of selected quoted companies in Nigeria. *Research Journal of Business Management , 3* (3), 73-84.

Federal Democratic Republic of Ethiopia Ministry of Trade (MOT). (2013). Ethiopian Standard Industrial Classification (ESIC), first revised edition. Addis Ababa.

Ganesan, V. (2007). An analysis of working capital management efficiency in telecommunication equipment industry. *Rivier academic journal* , 1-10.

Gill, A., Biger, N., & Mathur, N. (2010). The relationship between working capital management and profitability: evidence from the United States. *Business and Economics Journal , 4* (2), 1-9.

Greene, W. H. (2003). *Econometric Analysis* (5th Ed.). Newjersey, USA: Pearson Education Inc.

Gujarati, D. N. (2004). *Basic Econometrics* (fourth ed.). New york: Mcgraw-Hill Companies.

Gupta, S. (2012). *Critical review of working capital management at reliance infrastructure ltd.* Maharshi Dayanand University, Advanced Management and Power Studies. Rohtak: National Power Training Institute.

Henok, Y. (2015). *Impact of working capital management on profitability.* Masters thesis , Addis Ababa Univeristy, Department of Accounting and Finance, Addis Ababa.

Hoang, T. V. (2015). Impact of working capital management on firm profitability: the case of listed manufacturing firms on Ho Chi Minh stock exchange. *Asian economic and financial review , 5* (5), 779-789.

Hoque, A., Mia, A., & Anwar, R. (2015). Working capital management and profitability: a study on cement industry in Bangladesh. *International journal of information technology and business management , vol.36* (no.1), 82-96.

Horne, J. C., & M. Wachowicz, J. (2008). *Fundamentals of financial management* (13 ed.). London, England: Pearson Education Limited.

Jahfer, A. (2015). Effects of working capital management on firm profitability: empirical evidence from Sri Lanka. *Int. J. Managerial and financial accounting , vol. 7* (no. 1), 26-37.

Kadira, B. T. (2010). *Does working capital management affect profitability in companies listed on the Johannesburg stock exchange?* Research thesis, univeristy of Cape Town, South Africa.

Kasiran, F. W., Mohamad, N. A., & Chin, O. (2016). Working capital management efficiency: a study on the Small Medium Enterprise in Malaysia. *7th international economics & business management conference. 35*, pp. 297-303. Elsevier.

Kothari, C. (2004). *Research Methodology: Methods & Techiniques* (2nd Ed.). New Delhi: New Age International (P) Ltd.

Lazaridis, I., & Tryfonidis, D. (2006). *The relationship between working capital management and profitability of listed companies in the athens stock exchange.* Retrieved on november 13, 2016, from http://ssrn.com/abstract=931591.

Madhou, A. K. (2011). *Development of a risk-adjusted working capital model: empirical evidence on its contribution to profitability and credit ratings.* Phd thesis submitted to school of economics, Rmit University, finance and marketing.

Makori, D. M., & Jagongo, A. (2013). Working capital management and firm profitability: empirical evidence from manufacturing and construction firms listed on Nairobi securities exchange, Kenya. *International journal of accounting and taxation , vol. 1* (no. 1), 1-14.

Mansoori, E., & Muhammad, J. (2012). The effect of working capital management on firm's profitability: evidence from Singapore. *Interdisciplinary journal of contemporary research in business , vol 4* (no 5), 472- 486.

Marttonen, S., Monto, S., & Kärri, T. (2013). "Profitable working capital management in industrial maintenance companies" . *Journal of quality in maintenance engineering , vol. 19* (iss 4), 429 – 446.

Mathur, S. N. (2010). *Working capital management of cement industry in India - a comparative analysis of selected units.* Phd thesis, saurashtra university.

Mathuva, D. M. (2010). The influence of working capital management components on corporate profitability: a survey on Kenyan listed firms. *Research journal of business management , 4* (1), 1-11.

Mbawuni, J., Mbawuni, M. H., & Nimako, S. G. (2016). The impact of working capital management on profitability of petroleum retail firms: empirical evidence from Ghana. *International journal of economics and finance , vol. 8* (no. 6), 49-52.

Mclaney, E. (2009). *Business finance theory and practice* (8 ed.). Harlow, England: Pearson Education Ltd.

Mifta, A. (2016). *Impact of working capital management on profitability of manufacturing share companies in ETHIOPIA.* MSc. thesis, Addis Ababa University, Department of Accounting and Finance, Addis Ababa.

Monto, S. (2013). *Towards inter-organizational working capital management.* Doctoral thesis submitted to faculty of industrial engineering and management, Lappeenranta University of technology, department of innovation management, Lappeenranta,Finland.

Moyer, R. C., Mcguigan, J. R., & Kretlow, W. J. (2006). *Contemporary financial management* (10th ed.). Ohio: Thomson South-Western.

Mulualem, M. (2011). *The impact of working capital managemnt on firms' profitability:* A thesis submitted to the school of graduate studies of Addis Ababa Ababa University, department of accounting and finance , Addis Ababa.

Nair, S. R. (2011). Working capital management. *University of Calicut school of distance education: study material* .

Nazir, M. S., & Afza, T. (2009). A Panel Data Analysis Of Working Capital Management Policies. *Business Review , 4* (1), 143-157.

Ncube, M. (2011). *Impact of working capital on the profitability of South African firms listed on the Johannesburg stock exchange.* Msc. Thesis submitted to , University of the Witwatersrand, Faculty of Commerce, Law and Management.

Niresh, J. A. (2012). Trade- off between liquidity and profitability : A study of selected manufacturing firms in Sri- Lanka. *Journal Of Arts, Science And Commerce , 3* (4).

Padachi, K. (2006). Trends in working capital management and its impact on firms' performance: an analysis of Mauritian small manufacturing firms. *International review of business research papers , Vo.2 Pp.* (No. 2), 45 -58.

Panigrahi, A. K. (2014). Understanding the working capital financing strategy (a case study of Lupin Limited). *Journal of management research and analysis , Vol.1* (No.1), 101-112.

Panigrahi, A. (2014). Relationship of working capital with liquidity, profitability and solvency: a case study of Acc Limited. *Asian journal of management research , 4* (2), 308 - 322.

Paramasivan, C., & Subramanian, T. (2009). *"Financial management".* New Age International (P) Limited.

Raheman, A., & Nasr, M. (2007). Working capital management and profitability – case of Pakistani firms. *International review of business research papers , 3* (1), 279 - 300.

Rahman, M. M. (2011). Working capital management and profitability:a study on textiles Industry. *ASA University review , Vol. 5* (No. 1).

Rawlings, J. O., Pantula, S. G., & Dickey, D. A. (1989). *Applied regression analysis: A research tool* (2nd ed.). New York: Springer-Verlag New York, Inc.

Rehn, E. (2012). *The effect of working capital management on company profitability: an industry wise study of Finnish and Swedish public companies.* Masters thesis submitted to department of accounting, Hanken school of economics, Helsinki.

Rezene, G. H. (2004). *Working capital management at keren metal, wood and cement works (a manufacturing firm in Eritrea).* Masters dissertation submitted to graduate school of business, university of Kwa-Zulu Natal, department of business administration.

Rimo, A., & Panbunyuen, P. (2010). *The effect of company characteristics on working capital management: a quantitative study of Swedish listed companies.* MSc. thesis submitted to Umeå School of business, Umeå Univeristy .

Robles, F. (2016). *The impact of working capital management on firm profitability in different business cycles: evidence from the United Kingdom.* Masters dissertation , Universidade De Lisboa, Lisbon school of Economics & Management.

Ross, S. A., Westerfield, R. W., & Jaffe, J. (2008). *Corporate finance* (8th Ed.). New York, USA: Mcgraw-Hill Companies, Inc.

Sadiq, R. (2016). Impact of working capital management on Small and Medium Enterprises' performance in Nigeria. *The International Journal of Business & Management , 4* (5), pp.28-35.

Samiloglu, F., & Demirgunes, K. (2008). The effect of working capital management on firms' profitability: evidence from Turkey. *The International journal of applied Economics and Finance , 2* (1), 44-50.

Samson, A. A., Mary, J., Fakunle, B., & Erekpitan, I. O. (2012). The impact of working capital management on profitability of Small and Medium scale Enterprises in Nigeria. *Research Journal of Business Management , Vol.6* (Iss.2), 61-69.

Samuel, A. (2009). *Working Capital management: a case study of Logs and Lumber Limited (L.L.L).* Masters thesis submitted to department of accounting and finance, Kwame Nkrumah University Of Scince and Technology, Kumasi- Ghana.

Sebhatleab, T. (2002). *Working capital management: the case of government-owned, transitional, and privatized manufacturing firms in Eritrea.* Phd dissertation., Groningen.

Sekaran, U. (2003). *Research methods for business:a skill building approach* (4th ed.). New York, USA: John Wiley & Sons, Inc.

Serrasqueiro, J. N. (2014). Working capital management impact on profitability: empirical study based on Portuguese firms. *Católica Lisbon School of Business and Economics* , 1-38.

Singh, H. P., & Kumar, S. (2014). "Working capital management: a literature review and research agenda". *Qualitative Research in Financial Markets , Vol. 6* . (Iss. 2), pp. 173 – 197.

Takon, S. M. (2013). Effect of working capital management on firm profitability in selected Nigerian quoted companies. *Doctoral thesis submited to University of Nigeria, department of banking and finance* .

Tewodros, A. B. (2010). *The effect of management of working capital policies on firms' profitability: evidence from manufacturing private limited companies in Tigray region, Ethiopia.* Masters thesis, Mekelle University, department of Accounting & Finance, Mekelle, Ethiopia.

The Federal Democratic Republic of Ethiopia Ministry of Trade. (2013). *Ethiopian Standard Industrial Classification (ESIC), Rev. 1.* Addis Ababa.

Tirngo, D. (2013). Impact of working capital management on profitability of Micro and Small Enterprises in Ethiopia: The case of Bahir Dar City administration. *International Journal of Accounting and Taxation , 1* (1), 15-24.

Van Horne, J. C. (1971). *Financial Management and Policy* (2nd ed.). United States of America: Prentice-Hall, Inc.

Vishwanath, S. (2007). *Corporate Finance: Theory and Practice* (2 Ed.). New Delhi, India: response books .

Watson, D., & Head, A. (2007). *Corporate finance: principles & practice* (4th ed.). Harlow, England: Pearson Education Limited.

Wobshet, M. (2014). *Impact of working capital management on firms' performance: the case of selected metal manufacturing companies in Addis Ababa, Ethiopia.* Thesis submitted to department of accounting and finance, Jimma University, Jimma, Ethiopia.

Yasir, M., Majid, A., & Yousaf, Z. (2014). Cash conversion cycle and its impact upon firm performance: an evidence from cement industry of Pakistan. *Global business and management research: an international journal , 6* (2), pp.139-149.

APPENDICES

APPENDIX I: Normality tests

Model specification one: regression containing ARP

```
. swilk resid
                    Shapiro-Wilk W test for normal data
    Variable |     Obs        W           V          z        Prob>z
       resid |     195    0.92363     11.145      5.540     0.00000
```

Model specification two: regression containing IHP

```
. swilk resid
                    Shapiro-Wilk W test for normal data
    Variable |     Obs        W           V          z        Prob>z
       resid |     195    0.93449      9.560      5.188     0.00000
```

Model specification three: regression containing APP

```
. swilk resid
                    Shapiro-Wilk W test for normal data
    Variable |     Obs        W           V          z        Prob>z
       resid |     195    0.92877     10.395      5.380     0.00000
```

Model specification four: regression containing CCC

```
. swilk resid
                    Shapiro-Wilk W test for normal data
    Variable |     Obs        W           V          z        Prob>z
       resid |     195    0.92410     11.076      5.526     0.00000
```

APPENDIX II: Multicollinearity tests

Model specification one: regression containing ARP

```
. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
      CLTOTA |      2.86    0.349117
          CR |      1.75    0.570304
          DR |      1.75    0.572992
         ARP |      1.34    0.743990
     CATOTA |      1.19    0.839373
          FS |      1.12    0.893521
-------------+----------------------
    Mean VIF |      1.67
```

Model specification two: regression containing IHP

```
. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
      CLTOTA |      2.62    0.382005
          DR |      1.76    0.569582
          CR |      1.75    0.571030
     CATOTA |      1.22    0.817778
          FS |      1.17    0.857762
         IHP |      1.13    0.881754
-------------+----------------------
    Mean VIF |      1.61

.
```

Model specification three: regression containing APP

```
. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
      CLTOTA |      2.55    0.392004
          DR |      1.85    0.539141
          CR |      1.77    0.564183
         APP |      1.22    0.820956
          FS |      1.17    0.853773
     CATOTA |      1.17    0.856281
-------------+----------------------
    Mean VIF |      1.62
```

Model specification four: regression containing CCC

```
. estat vif

    Variable |       VIF       1/VIF
-------------+----------------------
      CLTOTA |      2.55    0.392082
          DR |      1.77    0.565621
          CR |      1.76    0.568900
      CATOTA |      1.22    0.822503
         CCC |      1.09    0.913728
          FS |      1.08    0.922858
-------------+----------------------
    Mean VIF |      1.58
```

APPENDIX III: Heterosekedasticity test

Model specification one: regression containing ARP

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =    11.26
         Prob > chi2  =   0.0008
```

Model specification two: regression containing IHP

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =    17.47
         Prob > chi2  =   0.0000
```

Model specification three: regression containing APP

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =    12.05
         Prob > chi2  =   0.0005
```

Model specification four: regression containing CCC

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ROA

         chi2(1)      =    12.27
         Prob > chi2  =   0.0005
```

APPENDIX IV: Raw data used in the study

Co. Code	year	ROA	ARP	IHP	APP	CCC	CR	FS	DR	CATOTA	CLTOTA
10012	2011	0.11411	35.3796	206.4034	66.52007	175.2629	1.990962	17.83068	0.401725	0.566443	0.284507
10012	2012	0.209722	34.243	268.1334	35.08703	267.2894	3.567764	17.87693	0.396999	0.609365	0.170798
10012	2013	0.176724	29.98337	248.1571	18.39449	259.7459	9.492856	18.5033	0.119569	0.366987	0.038659
10012	2014	0.082576	62.24113	292.6332	31.5387	323.3356	4.199591	18.53515	0.146282	0.336207	0.080057
10012	2015	0.139633	94.04377	409.0233	4.867242	498.1998	2.65644	18.03935	0.496045	0.771333	0.290364
10082	2011	0.160775	12.0424	83.37248	2.612935	92.80194	5.060198	18.68426	0.171389	0.259233	0.05123
10082	2012	0.536093	0	93.10552	9.429816	83.6757	4.624335	18.00826	0.27662	0.49394	0.106813
10082	2013	0.473618	21.74875	162.1416	10.54932	173.341	5.909193	18.54148	0.361161	0.594685	0.100637
10082	2014	0.299825	14.00059	139.6346	12.20213	141.433	3.612583	18.8737	0.272663	0.444047	0.122917
10082	2015	0.486101	20.71229	186.2645	1.947996	205.0288	3.542093	18.77882	0.234446	0.596288	0.168343
10188	2011	0.17659	6.373103	146.7057	24.18876	128.89	3.959082	18.40786	0.299273	0.589666	0.14894
10188	2012	0.406527	16.16404	120.2298	9.804746	126.5891	6.09352	18.17596	0.292938	0.861206	0.141331
10188	2013	0.246177	35.92689	114.6116	8.894515	141.6439	7.020762	18.73104	0.167421	0.635387	0.090501
10188	2014	0.211046	30.29374	139.3329	11.74983	157.8768	7.039815	18.54138	0.229441	0.888488	0.126209
10188	2015	0.207439	37.70105	147.4358	10.9732	174.1637	9.440924	18.63768	0.183467	0.839221	0.088892
10259	2011	0.217311	22.26209	113.6319	9.674896	126.219	1.892066	18.596	0.278966	0.379051	0.200337
10259	2012	0.144014	38.22961	189.021	7.556527	219.6941	1.842475	18.77988	0.317806	0.454206	0.24652
10259	2013	0.281588	26.1904	136.1744	10.62644	151.7384	2.278943	19.28621	0.284253	0.374987	0.164544
10259	2014	0.139573	11.46207	130.5236	6.666706	135.319	2.328159	19.47539	0.181244	0.317061	0.136185
10259	2015	0.122977	18.32767	269.2837	4.414784	283.1966	2.932865	19.63328	0.151243	0.355843	0.121329
10343	2011	0.683249	14.70616	126.9839	5.161729	136.5284	4.403566	17.9757	0.214271	0.904181	0.205329
10343	2012	0.605686	9.187344	131.4166	7.563746	133.0402	4.328325	18.27076	0.19133	0.800766	0.185006
10343	2013	0.359716	81.34832	11.35006	73.81415	18.88422	1.260345	18.0717	0.570696	0.71006	0.563385
10343	2014	0.088739	13.0101	175.5209	21.94608	166.5849	3.880776	19.26602	0.216037	0.523965	0.135016
10343	2015	0.157768	10.55169	111.6231	10.68229	111.4925	1.575293	19.30252	0.201597	0.289763	0.183942
12774	2011	0.138546	24.88259	147.7947	28.21996	144.4573	3.003216	17.38095	0.339458	0.587038	0.19547
12774	2012	0.105891	23.99185	106.2763	5.015397	125.2528	3.436955	17.37236	0.258923	0.577667	0.168075
12774	2013	0.124845	6.25802	124.7915	19.10079	111.9487	2.477543	18.33924	0.110669	0.265621	0.107212
12774	2014	0.163792	65.28103	102.1757	11.34253	156.1142	2.030967	17.72435	0.342907	0.669045	0.329422
12774	2015	0.193554	136.1179	136.1078	56.51959	215.7062	3.733827	18.06761	0.531991	0.789679	0.211493

13651	2011	0.19786	9.501526	298.6627	0	308.1642	8.245722	17.42243	0.789983	0.675103	0.081873
13651	2012	0.206296	0	157.6431	18.57574	139.0674	7.49502	17.54847	0.749215	0.694679	0.092685
13651	2013	0.200201	0.03555	144.3844	16.28403	128.1359	3.871258	18.33708	0.212361	0.484292	0.1251
13651	2014	0.235306	5.740104	156.7699	18.98358	143.5264	5.069181	17.78919	0.217772	0.656727	0.129553
13651	2015	0.066079	0	148.9379	1.35E+01	135.4811	20.54127	18.58033	0.088998	0.832839	0.040545
14330	2011	0.145882	29.22723	179.7804	8.398128	200.6095	1.043436	18.26504	0.65945	0.644322	0.6175
14330	2012	0.146104	76.85293	63.45737	5.90004	134.4103	0.994893	19.04039	0.484934	0.377201	0.379137
14330	2013	0.236112	54.03293	63.72949	113.1501	4.612358	0.947655	19.18699	0.511299	0.418416	0.441528
14330	2014	0.186699	138.7524	76.6917	468.3885	-252.944	1.129438	19.41941	0.553396	0.556722	0.49292
14330	2015	0.101643	240.2896	144.5838	183.0493	201.8241	0.731988	19.46113	0.792969	0.558477	0.762959
16481	2011	0.137238	0.145023	221.1935	54.31286	167.0257	5.400005	17.95519	0.472304	0.683058	0.126492
16481	2012	0.113137	0.052932	76.76041	42.97163	33.84171	2.152508	17.92036	0.395489	0.554609	0.257657
16481	2013	0.09035	1.742324	180.5044	33.22027	149.0264	1.345294	17.93236	0.51517	0.489788	0.364076
16481	2014	0.06017	0.767942	194.1626	10.69538	184.2352	1.132897	18.04384	0.604812	0.51829	0.457491
16481	2015	0.053201	2.612119	127.6728	22.07859	108.2063	1.117354	18.09458	0.586101	0.488809	0.43747
16570	2011	0.007721	14.9405	246.0184	9.21124	251.7477	23.74492	18.86091	0.255127	0.430443	0.018128
16570	2012	0.084583	15.69458	144.4816	4.618752	155.5574	23.76057	19.03422	0.295147	0.476676	0.020062
16570	2013	0.033692	4.097851	136.3791	3.210774	137.2662	10.55283	19.17821	0.434614	0.432781	0.041011
16570	2014	0.050087	3.408954	133.3105	15.89082	120.8286	3.396486	19.2239	0.425036	0.493859	0.145403
16570	2015	0.128862	4.531703	172.6155	32.72952	144.4177	5.143149	19.39398	0.42105	0.612038	0.119001
17966	2011	0.033339	13.94962	363.9107	25.90653	351.9538	18.48869	18.77037	0.598122	0.835717	0.045202
17966	2012	0.05538	5.529335	266.5631	31.49328	240.5991	5.359518	18.72047	0.537333	0.836084	0.156
17966	2013	0.042099	5.627036	240.1137	17.12667	228.6141	7.673802	19.18632	0.299206	0.509266	0.066364
17966	2014	0.032961	16.62054	348.3938	100.1237	264.8906	2.921562	18.98758	0.586298	0.794649	0.271995
17966	2015	0.060966	3.921155	248.4818	120.5303	131.8726	1.699844	18.86923	0.489425	0.736212	0.433105
19513	2011	0.020199	79.97215	599.7642	54.10448	625.6319	5.103136	18.86847	0.677037	0.829327	0.162513
19513	2012	0.01795	96.14565	801.3231	103.1442	794.3246	3.876223	19.47461	0.455659	0.501325	0.129333
19513	2013	0.017363	162.4873	795.5794	651.0751	306.9916	1.112158	19.81011	0.427831	0.470932	0.423439
19513	2014	0.025901	59.21639	84.17829	347.2086	-203.814	3.291218	18.87023	0.660853	0.843117	0.256172
19513	2015	0.004818	8.091861	422.1705	457.4136	-27.1513	3.50063	19.29096	0.775076	0.885238	0.25288
22792	2011	0.037038	16.04487	18.74779	4.386656	30.406	9.957983	16.25963	0.742309	0.588215	0.05907
22792	2012	0.06312	20.24373	98.54964	35.86033	82.93304	2.1477	17.04766	0.838577	0.436279	0.203138
22792	2013	0.206758	48.56154	50.14997	20.03597	78.67554	4.867419	16.40403	0.20993	0.218169	0.20993

22792	2014	0.049393	54.05366	29.68659	9.88471	73.85554	2.569967	17.44549	0.089957	0.231186	0.089957
22792	2015	0.03992	12.64884	25.46733	0.058799	38.05737	3.569855	17.45882	0.074251	0.265065	0.074251
34156	2011	-0.02293	37.40262	65.57899	1.057193	101.9244	2.014068	17.6549	0.346447	0.494187	0.245367
34156	2012	0.018859	16.02693	38.68919	3.590126	51.126	4.494799	17.6757	0.178198	0.389147	0.086577
34156	2013	0.042436	27.61726	23.23499	2.300985	48.55126	5.851083	17.67215	0.14215	0.401138	0.068558
34156	2014	0.042124	10.30776	25.71231	13.92929	22.09078	2.714012	17.76755	0.243798	0.514714	0.189651
34156	2015	0.060593	1.492789	30.15667	6.068144	25.58131	2.045354	17.47665	0.373819	0.508891	0.248803
38656	2011	0.301856	74.37855	84.52485	20.80664	138.0968	4.879282	17.69929	0.365618	0.688143	0.141034
38656	2012	0.352812	46.26854	114.9039	7.895989	153.2764	5.465	17.77093	0.280508	0.755234	0.138195
38656	2013	0.324515	37.66468	115.0257	10.12293	142.5674	4.881932	18.05462	0.239224	0.662513	0.135707
38656	2014	0.290828	47.55964	70.82333	10.10386	108.2791	5.286726	18.34664	0.239251	0.605909	0.11461
38656	2015	0.204894	28.82558	107.6098	100.6199	35.81553	1.497241	18.48524	0.584671	0.523522	0.349658
39223	2011	0.354612	55.05925	63.95317	35.34453	83.66788	3.209754	18.87685	0.241955	0.776615	0.241955
39223	2012	0.431746	88.77284	69.7822	24.57893	133.9761	3.275102	19.08084	0.259955	0.851381	0.259955
39223	2013	0.237814	26.09734	109.6942	30.71975	105.0718	3.154609	18.8218	0.263704	0.831882	0.263704
39223	2014	0.161307	65.57359	116.6231	2.743296	179.4534	2.019066	19.06231	0.442718	0.893876	0.442718
39223	2015	0.157265	45.02692	183.8805	64.34286	164.5645	2.64542	18.84448	0.337737	0.893456	0.337737
10383	2011	0.262246	20.79439	24.46702	5.484385	39.77703	16.47301	17.52225	0.54282	0.855372	0.051926
10383	2012	0.297961	25.21521	74.86137	11.89463	88.18194	11.1682	18.10375	0.333253	0.869512	0.077856
10383	2013	0.171857	18.537	41.11192	70.58631	-10.9374	1.867406	18.11272	0.593611	0.694022	0.371651
10383	2014	0.104899	13.6777	51.13146	74.00357	-9.1944	7.801557	18.37192	0.373032	0.545777	0.069957
10383	2015	0.139512	17.2902	81.0964	11.78323	86.60336	2.225656	18.31666	0.493277	0.78917	0.354578
10473	2011	0.001678	21.81104	110.4012	0.206238	132.006	9.45485	16.87808	0.292295	0.409243	0.043284
10473	2012	0.163769	27.87275	64.81899	2.456789	90.23495	9.092918	16.99762	0.208262	0.545819	0.060027
10473	2013	-0.13857	30.09828	2.745842	9.047824	23.7963	17.66208	16.75775	0.208625	0.41192	0.023322
10473	2014	0.016856	26.38819	92.82833	41.23478	77.98173	6.166297	17.42351	0.269367	0.450807	0.073108
10473	2015	0.150391	26.18524	191.9958	23.5219	194.6592	22.43328	17.19876	0.321909	0.666706	0.029719
10758	2011	0.112146	4.849128	130.0396	46.89414	87.99462	5.482815	19.30555	0.185497	0.455881	0.083147
10758	2012	0.080469	11.19997	162.9839	2.74E-06	174.1839	3.364487	19.37511	0.150241	0.461314	0.137113
10758	2013	0.031734	10.8018	197.5448	0.763778	207.5828	3.75925	19.40352	0.155315	0.461604	0.122792
10758	2014	0.014494	23.12584	213.3838	0.83013	235.6796	3.342396	19.48111	0.1693	0.468479	0.140163
10758	2015	0.014426	25.27135	336.5358	1.140216	360.667	4.002157	19.50169	0.139561	0.452194	0.112988
10957	2011	0.108829	41.47214	130.0933	88.01681	83.54864	1.747504	18.71225	0.421077	0.735833	0.421077
10957	2012	0.215394	142.2192	112.068	155.2232	99.0641	1.670456	19.19754	0.494519	0.826073	0.494519

10957	2013	0.111657	77.1462	103.3647	75.27497	105.2359	2.159278	18.99354	0.377514	0.815158	0.377514
10957	2014	0.090257	77.53006	135.6199	123.9501	89.19988	1.537398	19.14382	0.563209	0.806646	0.524683
10957	2015	0.104345	99.99551	172.6455	151.7088	120.9322	1.672644	19.39231	0.606847	0.826537	0.49415
10963	2011	0.353142	5.942214	73.21199	20.444	58.71021	2.549444	18.56075	0.319109	0.664643	0.260701
10963	2012	0.315498	9.327518	76.41395	30.96316	54.77831	2.411721	18.6573	0.301586	0.679258	0.281649
10963	2013	0.325611	11.90984	57.86204	23.92837	45.84351	2.559184	18.56531	0.319718	0.779634	0.304642
10963	2014	0.246537	14.46115	58.14537	13.12468	59.48183	2.080416	19.02196	0.501909	0.891902	0.428713
10963	2015	0.306375	20.83189	145.1899	0	166.0218	1.977435	19.10659	0.397263	0.785563	0.397263
10981	2011	0.262059	26.07577	151.508	17.7203	159.8634	3.383905	18.99753	0.278206	0.577806	0.170751
10981	2012	0.336487	25.81724	121.2914	27.81214	119.2965	3.980335	19.17318	0.286387	0.781108	0.196242
10981	2013	0.394204	19.45438	136.0335	18.55179	136.9361	4.709183	19.43766	0.17613	0.829428	0.17613
10981	2014	0.32767	11.57247	102.9647	3.170315	111.3668	5.180418	19.90854	0.24743	0.857238	0.165477
10981	2015	0.377789	7.033447	121.2236	32.50383	95.7532	4.283743	20.20044	0.206646	0.872622	0.203706
10986	2011	0.085277	70.2714	83.08572	34.65307	118.7041	2.569652	18.2646	0.416006	0.535043	0.208216
10986	2012	0.246097	19.901	63.67611	143.605	-60.0279	7.020342	18.32089	0.522436	0.656293	0.093484
10986	2013	0.197866	29.59497	92.16885	214.1218	-92.358	5.665591	18.63216	0.352503	0.543305	0.095895
10986	2014	0.439853	37.32046	50.07816	129.6416	-42.2429	2.733728	18.54372	0.598684	0.607209	0.222117
10986	2015	0.251342	39.15033	140.3326	105.2137	74.26925	5.324726	18.67825	0.586889	0.637927	0.119805
11057	2011	0.06725	9.604103	119.7809	327.5392	-198.154	0.766085	19.47259	0.690038	0.217624	0.284073
11057	2012	0.092279	9.562222	82.23559	63.61972	28.17809	1.622926	19.67237	0.552461	0.2111	0.130074
11057	2013	0.064541	3.477932	128.1005	149.8066	-18.2282	0.494826	19.80606	0.519123	0.216602	0.437733
11057	2014	0.022916	41.79831	267.5033	191.3819	117.9198	8.405418	20.21506	0.061276	0.307476	0.036581
11057	2015	0.021283	27.27355	122.9919	288.9539	-138.688	4.251352	20.2602	0.099161	0.321499	0.075623
13590	2011	0.112388	76.72102	320.3288	445.9121	-48.8623	2.053039	19.30002	0.420595	0.753256	0.366898
13590	2012	0.064493	105.2728	220.0727	457.1455	-131.8	1.886702	19.87739	0.252004	0.425181	0.225357
13590	2013	0.067799	99.76747	241.3203	286.9706	54.11715	1.755328	19.95595	0.269294	0.428908	0.244346
13590	2014	0.061997	140.9865	252.4601	471.2109	-77.7643	1.707456	19.50723	0.515206	0.768469	0.450067
13590	2015	0.129901	153.748	122.6359	347.7833	-71.3993	5.885982	20.33916	0.648127	0.893575	0.151814
16569	2011	0.123735	19.94887	169.1776	395.41	-206.284	0.993111	19.05245	0.610626	0.574406	0.578391
16569	2012	0.249612	8.902753	71.67618	456.4631	-375.884	0.804363	19.04214	0.741741	0.570431	0.709171
16569	2013	0.082092	110.8473	83.59909	253.8604	-59.4141	1.160175	19.71013	0.560922	0.615214	0.530277
16569	2014	0.003	60.8665	133.5119	295.2842	-100.906	1.350665	23.38499	0.014567	0.019675	0.014567
16569	2015	0.106437	32.05078	154.2639	309.716	-123.401	1.11399	20.04885	0.536773	0.57363	0.514933
22310	2011	0.114527	10.50091	126.5199	713.3657	-576.345	3.412594	17.05433	0.467022	0.671193	0.196681

22310	2012	0.110718	20.56829	103.1256	142.326	-18.6321	3.088569	17.07662	0.402427	0.688711	0.222987
22310	2013	0.078856	14.50982	108.0974	279.3544	-156.747	4.925781	17.59685	0.275778	0.417628	0.084784
22310	2014	0.157051	18.08042	87.98654	348.5766	-242.51	3.032159	17.22572	0.306702	0.630133	0.207816
22310	2015	0.092142	20.10538	0	368.2309	-348.125	1.011921	16.97315	0.743533	0.415468	0.410574
31298	2011	0.049067	0.546973	103.7554	232.8427	-128.54	1.962336	17.48626	0.358676	0.454298	0.231509
31298	2012	0.032176	0.47536	138.6486	176.2373	-37.1134	5.874823	18.12651	0.67127	0.348358	0.059297
31298	2013	0.013509	0.175623	53.14655	261.5345	-208.212	3.551797	18.74232	0.310997	0.374626	0.105475
31298	2014	0.038139	2.466613	41.28526	90.71345	-46.9616	2.140148	17.69399	1.056745	0.366049	0.171039
31298	2015	0.011958	2.571613	51.77236	136.1953	-81.8513	4.803842	18.69936	0.407193	0.224692	0.046773
10071	2011	0.468127	18.62649	92.26461	151.1001	-40.209	2.67095	18.37346	0.281608	0.752162	0.281608
10071	2012	0.291795	46.3481	72.07302	120.6152	-2.19411	4.544466	18.47951	0.247234	0.837892	0.184376
10071	2013	0.230768	49.51636	49.59902	103.5981	-4.48274	2.075326	18.12203	0.304215	0.631345	0.304215
10071	2014	0.092549	257.4969	134.5893	130.0548	262.0315	1.832088	18.67727	0.522587	0.957425	0.522587
10071	2015	0.104911	118.4051	169.0562	164.023	123.4382	3.808425	19.07158	0.473651	0.972248	0.255289
10260	2011	0.187605	42.23003	208.9196	266.5853	-15.4357	1.248817	19.22042	0.662284	0.748612	0.599457
10260	2012	0.089705	19.02692	326.7583	159.3293	186.4559	1.378263	19.68115	0.37018	0.510205	0.37018
10260	2013	0.115782	44.93512	418.5005	196.3267	267.1089	1.451387	19.36169	0.515008	0.747476	0.515008
10260	2014	0.129972	91.52182	0	246.0903	-154.568	1.680855	19.60284	0.533065	0.896004	0.533065
10260	2015	0.282887	55.77061	178.7298	136.3885	98.11187	2.875653	19.34874	0.279582	0.803982	0.279582
10459	2011	0.071086	18.93461	143.605	168.6708	-6.13123	2.325359	18.37829	0.570003	0.678508	0.291786
10459	2012	0.042821	15.31537	214.1218	381.9476	-152.51	1.902828	18.5954	0.632801	0.618896	0.325251
10459	2013	0.069582	16.12554	129.6416	280.3513	-134.584	1.548676	18.65645	0.610309	0.646317	0.417335
10459	2014	0.037163	37.87142	105.2137	306.1569	-163.072	1.428906	19.34189	0.29908	0.321208	0.224793
10459	2015	0.089112	49.95939	327.5392	315.6001	61.89848	2.179175	19.04274	0.509011	0.673413	0.309022
10475	2011	0.193492	29.95425	456.4631	357.8787	128.5386	3.939243	17.09965	0.497806	0.833692	0.211638
10475	2012	0.261878	64.5174	253.8604	36.72998	281.6478	3.903367	17.1502	0.342991	0.856037	0.219307
10475	2013	0.360131	72.83641	295.2842	53.01466	315.1059	3.859579	17.46177	0.286201	0.856236	0.221847
10475	2014	0.123451	37.43489	309.716	70.45017	276.7007	4.249506	17.54079	0.292558	0.659653	0.155231
10475	2015	0.043627	68.3787	713.3657	85.41894	696.3254	3.902495	17.76907	0.265808	0.726364	0.186128
12934	2011	0.117825	68.53581	142.326	50.53102	160.3308	1.410179	18.08623	0.54741	0.623729	0.442305
12934	2012	0.008453	61.40469	279.3544	9.167451	331.5916	1.175583	18.81147	0.388347	0.373393	0.317624
12934	2013	0.00087	90.5479	348.5766	9.395233	429.7292	1.136607	18.92974	0.390008	0.378354	0.332881
12934	2014	0.004196	41.26284	368.2309	7.466167	402.0275	1.278754	18.42746	0.720205	0.741487	0.579852

12934	2015	0.039843	47.62083	232.8427	0.104985	280.3585	1.059866	18.37959	0.708568	0.720888	0.680169
10040	2011	0.194754	9.748692	176.2373	10.95942	175.0266	5.961509	17.32509	0.282746	0.754652	0.126587
10040	2012	0.162011	17.82608	261.5345	0	279.3606	8.177883	17.32833	0.242456	0.699639	0.085553
10040	2013	0.158463	0.999575	90.71345	35.19639	56.51663	4.377032	18.30682	0.174051	0.322142	0.073598
10040	2014	0.254225	3.053303	136.1953	29.4542	109.7944	7.919249	17.75867	0.280109	0.834424	0.105367
10040	2015	0.262853	16.71405	151.1001	21.80548	146.0086	6.995553	17.94205	0.266293	0.857341	0.122555
10303	2011	0.180285	68.5338	381.9476	52.70724	397.7742	6.522477	18.53912	0.478333	0.877833	0.134586
10303	2012	0.123486	37.62674	280.3513	51.94729	266.0308	4.942798	19.02808	0.287337	0.701309	0.141885
10303	2013	0.192187	73.75285	306.1569	8.708327	371.2014	3.738427	19.18125	0.236598	0.728991	0.194999
10303	2014	0.225133	49.41184	315.6001	91.84669	273.1652	3.705187	19.514	0.187606	0.635516	0.171521
10303	2015	0.201777	57.02284	357.8787	84.35906	330.5425	5.058554	19.85921	0.27224	0.56782	0.112249
10989	2011	0.222865	32.87769	12.31807	0	45.19576	0.936135	16.86714	0.481392	0.340816	0.364067
10989	2012	0.073441	38.80438	9.364711	0	48.16909	0.784239	18.06664	0.317683	0.14624	0.186473
10989	2013	0.058015	28.03489	16.31307	0	44.34796	0.592699	18.19537	0.300137	0.100511	0.169582
10989	2014	0.054162	22.79906	46.1164	52.04086	16.8746	0.654077	18.23939	0.289947	0.135459	0.207099
10989	2015	0.269802	24.52681	18.1006	50.32652	-7.69912	0.795974	17.38161	0.601665	0.362414	0.455309
11022	2011	0.165983	38.7159	156.6197	53.04515	142.2905	2.617217	19.37481	0.481073	0.825226	0.315307
11022	2012	0.170536	48.9451	132.6561	17.10203	164.4992	3.118471	19.49302	0.422897	0.85987	0.275734
11022	2013	0.178906	46.71062	134.7615	4.718338	176.7538	10.76749	19.71034	0.243275	0.898071	0.083406
11022	2014	-0.0698	75.66537	104.1848	3.643156	176.207	5.897925	20.14825	0.177309	0.435271	0.073801
11022	2015	0.120677	81.3606	219.3989	10.14824	290.6112	5.24653	19.75825	0.308424	0.803057	0.153064
14909	2011	0.105473	13.72743	62.0808	0	75.80822	2.139447	18.58093	0.271223	0.294021	0.137429
14909	2012	0.123401	232.3847	0	120.5956	111.7891	2.412825	19.3411	0.341957	0.825083	0.341957
14909	2013	0.044509	37.19074	38.72705	129.4445	-53.5267	0.510554	19.77969	0.265206	0.119661	0.234376
14909	2014	0.063984	8.135602	781.959	85.28003	704.8145	3.990045	20.26887	0.139748	0.452741	0.113468
14909	2015	0.044123	2.299403	26.35391	85.84109	-57.1878	0.231614	20.18824	0.268651	0.062223	0.268651
40544	2011	0.084431	153.5737	4.770762	0	158.3444	0.866547	18.02754	0.727118	0.605182	0.698383
40544	2012	0.038911	260.6383	0	0	260.6383	0.88364	18.53643	0.480641	0.409449	0.463367
40544	2013	0.074273	196.4497	0	2.366274	194.0835	0.740674	18.18636	0.92143	0.650824	0.878691
40544	2014	0.171938	57.24427	0	0	57.24427	0.639907	18.03148	0.749123	0.459914	0.718721
40544	2015	0.172804	50.98465	7.434475	0	58.41912	0.720161	18.167	0.773845	0.538173	0.747296