Determinants of Working Capital Requirements: A Study on Ethiopian Public Enterprises

Prof. D. M. Sheaba Rani[1], Haftu Arefe Abreha[2]
[1, 2] Dept of Commerce & Management Studies
[1, 2] Andhra University, Visakhapatnam, India

Abstract- *The present study is trying to find out the variables that determine working capital requirement of Ethiopian Public Enterprises. . Thus, this study examined the determinant factors of working capital requirements of Ethiopian Public Enterprises by using audited financial statements of a sample of 16 public enterprises for the period of 2011 to 2015. For the selection of the sample enterprises from the target population, Non-probability sampling technique called purposive sampling was adopted. Data were collected from the audited financial statement of the sample enterprises. Analysis was conducted using descriptive statistics and the econometric model of random effect estimates to test literature-driven hypothesis. Both the descriptive and the regression of study found that the , return on assets, operating cycle, firm growth and operating cash flow are the significant determinant and positively related to the working capital requirements, while leverage and firm size are significant but negatively related to the working capital requirements. On the other hand economic variables such as: the interest rate on loans and advances and real GDP growth rate has no significant impact on the working capital. These findings are consistent with several previous studies, for other countries such as Jordan, Brazil, Pakistan, India, Greece, Thailand, Cyprus, Sri Lanka and Palestinian. So, it can be concluded that the public enterprises in Ethiopia change their working capital requirements based on the size they have, leverage, operating cash flow, return on assets, operating cycle and their growth. The implication of this is that financial managers should take cognizance of these factors whenever they want to develop and achieve optimum working capital level for their organizations.*

Keywords- Ethiopia, Public Enterprises, Determinant, working capital, return on Asset, cash conversion cycle, operating cash flow, leverage.

I. INTRODUCTION

The purpose of this study is to find the factors that influence the working capital requirements in Ethiopian public enterprises. Working capital management deals with current assets and current liabilities. The working capital meets the short term financial requirements of a business enterprise. The working capital requirement, in the context of this study, is defined as the minimum amount of resources that an enterprise requires to effectively cover the usual costs and expenses necessary to operate the business. According to Ganesan, (2007)[1], the lesser requirements of working capital leads to less need for financing and less cost of capital, which in turn, increases the availability of cash for shareholders.

According Taleb *et al., (*2010)[2] the effective management of working capital is very important because it affects the profitability and liquidity of the firm. The main objective of working capital management is to maintain an optimal balance between each of the working capital components. The efficient management of working capital is a fundamental part of the overall corporate strategy to create shareholders' value (Nazir & Afza, 2008, p. 294)[3]. Therefore, firms try to keep an optimal level of working capital that maximizes their value (Deloof, 2003)[4].

Many financial executives are struggling to identify the basic working capital drivers and the appropriate level of working capital (Lamberson, 1995)[5]. The lack of understanding about the impact of working capital requirements on profitability, the lack of clarity about its determinants, and the lack of management's ability to plan and control its components may lead to insolvency and bankruptcy. Theoretically, working capital management concepts may be simple and straight forward for the financial executives such as Chief Financial Officers (CFOs), but in practice, it has become one of most important issues in the organizations.

Smith (1973)[6] argues that a large number of business failures may come from the inability of financial managers to plan and control current assets and current liabilities of their respective firms. Nazir and Afza (2008) also explained that companies can minimize risk and improve overall performance by understanding the role and drivers of working capital.

Therefore, it is important to understand the components of working capital to have an optimal level of working capital. The optimal level of working capital is the

one in which a balance is achieved between risk and efficiency. However, an optimal level of working capital requires continuous monitoring of various components of working capital such as accounts receivables, accounts payables, inventory, cash, and marketable securities.

The efficient management of working capital does not only immunize firms from financial upheaval, but also improves the competitive position and profitability. For example, an increment in the speed of a cash cycle through receivables and payables management helps generating more profitability and liquidity. In addition, effective inventory management is critical to the management of liquidity and profitability of the firm (Taleb *et al.,* 2010). Therefore, it is important to maintain an optimal balance between each of the working capital components.

The main objective of the present study was to investigate determinants of working capital requirement of Ethiopian public sectors. Ethiopia is one of the countries found in Sub-Saharan region, a region known mostly for its scarce financial resources and the consequence of it. Although there are not enough empirical studies that deal with the determinants of working capital requirement of the Ethiopian public Enterprises, one can't conclude the results of other studies which are conducted abroad are applicable for all cases. The dual nature of Ethiopian public enterprise gives it the features of a business enterprise. The entities preserve their public features without at the same time undermining their enterprising dimension. The reason why a government opts to set up the entities in this form is to enable them to operate as business entities. They operate in the same manner as private enterprises engaged in commercial activities and they contribute an indispensable amount to the GDP of the country. In order to carry out their economic activity through increasing their profitability, the enterprises needs to have a proper determinant of Working capital management.

The current study contributes to the existing literature on the determinants of working capital requirements in different ways. First, it focuses on Ethiopian public enterprises while no research has been conducted on such firms recently. Second this study validates some of the findings of previous authors by testing the relationship between working capital requirements and operating cycle, operating cash flows, sales growth, return on assets, leverage, firm size GDP and interest rate on loans and advances of the sample firms. Thus, this study adds substance to the existing theory developed by previous authors.

The present paper is structured as follows: the second section deals with brief review of important empirical literature on the determinants of working capital requirement of different firms; the third section indicates the objectives of the study. The fourth section shows formulating research hypotheses. While the fifth and sixth sections present the methodology employed for this study; and the data analysis and findings of the study respectively. Finally, the main conclusions are discussed in the seventh section.

II. LITERATURE REVIEW

Studies on the determinants of working capital requirement in other countries have found many financial and economic variable that drive working capital requirement of firms such as operating cycle, operating cash flow, cash conversion cycle, sale growth, return on assets, firm size, leverage, interest rate, real GDP growth rate and industry classification.

Chiou and Cheng (2006)[7] study the determinants of working capital management using different variables, such as industry effect, operating cash flows, growth opportunities, firm performance and size. The result shows that leverage and operating cash flows are the only variables that affect working capital management proxy of the firms during the period of study. Other variables (size, growth opportunities, firm performance) have insignificant relationship with working capital management proxy (net liquid balance).

Nazir and Afza (2008) using 204 manufacturing firms from 16 industrial groups listed on Karachi Stock Exchange (KSE) for a period of 1998-2006 found the factors that determine working capital requirements. The study used working capital requirement as a dependent variable and operating cycle of firm, level of economic activity, leverage, growth of firm, operating cash flows, firm size, industry, return on assets and Tobin's q as independent variables. The study using regression analysis on panel data demonstrated that operating cycle, leverage, return on assets and Tobins' q significantly influence the working capital requirements.

Nazir and Afza (2009) used 132 manufacturing firms from 14 industrial groups listed on Karachi Stock Exchange (KSE) between periods of 2004-2007. The study used working capital requirement (WCR) as the dependent variable. Operating cycle of the firm, level of economic activity, leverage, growth of the firm, operating cash flows, firm size, industry, return on assets, and Tobin's q were used as the determining factors of working capital requirements. Regression analysis on the panel data revealed positive relationships between i) operating cash flow and WCR, ii) Tobin's q and WCR, iii) return on assets and WCR, and iv leverage and WCR. No statistically significant relationships

between i) size of the firm and WCR and ii) sales growth and WCR was found. The study also indicates that the level of economic activity does not have any significant effect on WCR practices of firms in Pakistan.

Talebet al. (2010) tested the relation between working capital requirement on one hand and operating cycle of firm, level of economic activity, leverage, growth of firm, operating cash flows, firm size, return on assets, and Tobin's q on the other. Using regression analysis, the study found statistically significant relationship between working capital requirements and operating cash flows. They also found statistically significant relationships between all independent variables and working capital requirements at every year and all period years of the study.

A study by **Gill, (2011)**[8] examined the factors that influence working capital requirement of Canadian manufacturing and service firms. The study used a sample of 166 Canadian firms listed on the Toronto stock exchange and applied co-relational and non-experimental research design. The results indicated that overall, working capital requirement is positively correlated with operating cycle, return on assets, Tobin's q and industry but negatively correlated with firm size.

Akino Olayinka Olufisayo (2012)[9] carries out a detailed study of the determinants of working capital requirements – both internal and external of 66 firms in Nigeria. The study covers the period from 1997 to 2007. On the basis of the results it was found that sales growth, firm‟s operating cycle, economic activity, size and permanent working capital are the firms‟ specific characteristics that positively drive working capital policy. Leverage, however, is inversely related to working capital requirements. The results concluded that traditional valuation methods used to quantify the efficiency of corporate working capital policy may be suspect as increased investments in operating working capital may be necessitated by increase in business uncertainties.

Nakamura Palombini (2012)[10] focus on the key factors of working capital management by exploring the internal variables of a number of companies. 2976 Brazilian Public Companies data from 2001 to 2008 were used for the study. And it was found that debt level, size in growth rate could affect the working capital management of the companies. The study aimed at contributing to the understanding of the short term financial decisions by investigating the key factors of working capital management. At the end of the study, it was found that companies with a high level of working capital were consistent with previous studies (CHIOU, CHENG and WU, 2006; NAZIR and AFZA, 2008). These findings corroborate the Pecking Order Theory and suggest that as companies increase their financial leverage, they tend to assume a more restrictive policy in working capital management in order to prevent capital consumption in accounts receivable and inventory and to avoid issuing new bonds and shares.

Wasiuzzaman and Arumugam (2013)[11] explore the determinants of the level of investment in net operating working capital by firms in Malaysia using data from 192 companies for 2000-2007. The study finds that in times of economic expansion, younger and smaller firms with less tangible assets, low leverage, high immediate sales growth, high operating cash flows less volatile revenues and low levels of asymmetric information are likely to have the highest investments in operating working capital. The study, however, could not find a strong relationship between working capital management and board characteristics (size and the independence of the board).

From the review of previous studies it is concluded that working capital management is the foundation factor of every business or economic activity so it needs much deliberation and focus to improve profitability, liquidity, efficient working at lowest cost and better return. For this sake the problem statement of this study is "What are the determinants factors of working capital requirements: A study on Ethiopian public enterprises."

III. OBJECTIVE OF THE STUDY

The main objective of the present study is to investigate the internal and external determinants factors of working capital requirements: A study on Ethiopian public Enterprises and to draw conclusion about these determinants of working capital management requirements.

IV. RESEARCH HYPOTHESES

The hypotheses of this study are hereunder:

1. There is positive and significant relationship between operating cycle and working capital requirements of Ethiopian public enterprises.
2. There is positive and significant relationship between operating cash flow and working capital requirements of Ethiopian public enterprises.
3. There is positive and significant relationship between sales growth and working capital requirements of Ethiopian public enterprises.
4. There is positive and significant relationship between return on assets and working capital requirements of Ethiopian public enterprises.

5. There is negative and significant relationship between leverage and working capital requirements of Ethiopian public enterprises.
6. There is negative and significant relationship between firm size and working capital requirements of Ethiopian public enterprises.
7. There is positive and significant relationship between Gross domestic product of the country and working capital requirements of Ethiopian public enterprises.
8. There is negative and significant relationship between interest rate on loan and advance and working capital requirements of Ethiopian public enterprises.

V. RESEARCH METHODOLOGY

5.1 Study Design

A research design is a master plan specifying the methods and procedures for collecting and analyzing the data. The quantitative research approach is more desirable in this study, because there is much emphasis on precise measurement of variables and the testing of hypothesis derived from the existing theory and empirical studies. In addition, the study tries to examine causality and measure the relationship among quantitative variables by using some statistical techniques.

The study also uses the explanatory research approach since the problems that encounter is properly identified and there are many theories that are intend to rely on. As it fits to the purpose of the study, the above research designs was used to provide empirical evidence on the determinants of working capital requirements from Ethiopian public enterprises.

5.2 Data source and collection procedure

In this study, the data required for the purpose of analysis were collected from secondary sources: article of association and audited financial statements basically of balance sheet, Income statement and statement of cash flow of sample companies for a period of five years (2011-2015). Most of the required data was obtained from the financial statements submitted to the Ethiopian Revenues and Customs Authority (ERCA) Addis Ababa Large Taxpayers Office (LTO), for income tax purpose. However, due to incompleteness of data obtained from ERCA some of the data used was obtained directly from the respective enterprises and Ministry of Ethiopian Public enterprises- Corporate Finance and Administrative Directorate Office.

5.3 Sampling Design

To mitigate sample selection bias from working population and reducing the effect of abnormal samples, different levels of sample restriction criteria were imposed on firms in order to be included in the sample. The first criterion to be fulfilled by a firm to be included in the sample frame was the company need to hold the legal status of 'Share Company and Private company' from the six type of business organization i.e. *ordinary partnership, limited partnership, general partnership, joint venture, share company and private limited, company, according to the classification of the commercial code of Ethiopia (1960)*[12].

The second level of sampling criteria was that the total study population includes only 'large taxpayer share companies' engaged in different class of economy and listed in Ethiopian Revenues and Customs Authority (ERCA) large taxpayer branch office. According to ERCA taxonomy, large taxpayers share companies include all bank and insurance companies, and others firms with a minimum annual turnover of Birr 15 million.

The researcher then made two stage sample restriction criteria to arrive at a definite study population. Firstly, firms belonging to bank, insurance or other financial industries owned by the government are deliberately excluded from the analysis. All firms belonging to bank, insurance or other financial industries because of their specific financial behavior and particular nature exclude from this research analysis. Subsequently, the researcher made the second level of sample restriction those firms with missing financial data for a period covering five years from 2011-2011 are also excluded from the study so as to examine the trend of firms financing decision. The data pertinent to year 2010 is used only to compute the variable growth for the year 2011 of all observation, i.e. percentage change in total asset.

After the researcher investigated the financial statement of 28 public enterprises mainly from ERCA large taxpayers' branch office in Addis Ababa, only 16 firms that satisfy the above criterion were included purposively in the sample study.

5.4 Method of Data Analysis and Presentation

The data collected from secondary sources is classified, summarized and presented using text, tables, and analyzed using the descriptive statistical tools like percentages, ratios, mean and standard deviation. Besides to the econometric analysis of random effect estimates were used to test the relationships between and among variables and to draw conclusions. STATA version 14 was used for both descriptive and econometric analysis purpose.

5.5 Proxy Variables, Definitions, Measurements and Predicted Relationships

In this study, the selection of endogenous and exogenous variables is based on alternative theories related to working capital requirements and additional variables that were studied in reported empirical work. The choice is sometimes limited, however, due to lack of relevant data. As a result, the final set of proxy variables includes nine factors: working capital requirements, return on assets, operating cycle, operating cash flows, sales growth, real GDP growth rate, leverage, firm size, and interest rate on loans and advances. However, the other measures of working capital requirements commonly used in similar studies, such as Tobin's Q and volatility can't be utilized for this study due to the absence of organized stock market and dominance of family owned business in Ethiopia. The variables, together with theoretical predictions as to the direction of their influence on working capital requirements are summarized in the following table no. 1.

Table no. 1: Proxy Variables, Definitions, Measurements and Predicted Relationships

Variables	Definitions	Measurements	Predictive Signs
Dependent Variable			
WCR_TA_i	Working capital requirements deflated by total assets for firm i	[(Cash and equivalents + Marketable securities + Inventories + Accounts receivables) - (Accounts payables + Other payables)] / Total assets	+/-
Independent Variable			
OC_i	Operating cycle in days of firm i	Sum of days in inventory plus sum of days in accounts receivables [Days in inventory = average inventory / (Annual sales/365days); Days in accounts receivables = Average accounts receivables / (Annual sales/365days)]	+/
OCF_TA_i	Operating cash flows deflated by total assets of firm i	Cash flows generated from the routine operations of the firm and obtained directly from the cash flow statement as well as deflated by total assets (operating cash flow / total assets)	+/
$Growth_i$	Sales growth of firm i	Sales variability measured by changes in annual sales (Current year's sales minus previous year's sales divided by previous year's sales)	+/
ROA_i	Return on assets for firm i	Net income of the firm divided by the total assets	+/
Lev_i	Leverage as measured by debt to total assets ratio of firm i	Total debt to total assets ratio for the firms (total debt / total assets)	-/
$LNSize_i$	Natural log of total assets as proxy for the size for firm i	The natural log of total assets of firm	-/
GDP_i	Gross Domestic Product	Annual changes in the real GDP	+/
$INTR_i$	Interest Rate on Loans and Advances	Cost of borrowing money	-/

5.6 Definition of Variables

A review of the literature of determinants of working capital management reveals that both firm specific variables (internal variables) and macroeconomic variables (external variables) would affect the efficiency of working capital management (Zariyawati et al., (2010)[13]; Caballero et al., 2009)[14]; Lamberson, 1995). Firm specific variables related to the firm's operational capacity and the capability of the corporations to access external financing. This research takes into consideration six firm specific variables as well as two macroeconomic variables (GDP) as explanatory variables. To remain consistent with previous studies, all the measures (except the real GDP growth and Interest Rate on Loans and Advances) pertaining to the factors that influence the working capital requirements were taken from Nazir and Afza (2009, p. 32 and 33) and Gill, A. (2011, p. 33). Though the present study was used panel data, these researchers were used cross sectional yearly data and measured the variables as follows:

Dependent Variable: This study utilizes Net working capital deflated by total assets of the firm (NWC_TA) as only the dependent variable. The deflation is necessary to control for firm size. This is a modified version of the dependent variable as used by Shulman and Cox (1985)[15] and Nazir and Afza (2009).

Independent Variable: The study makes use of both firm-specific and economic variables as explanatory variables. In all, 6 firm- specific variables (size, leverage, growth opportunities, return on assets, operating cycle and industry classification) and one economic variable (level of economic activity) are utilized.

Operating Cash flow: Pecking order theory (Myers and Majluf, 1984)[16] demonestrate that companies prioritize their sources of financing from internal financing to equity since internal sources are cheaper than other finance alternatives. As a result, working capital management would be sensitive to the cash flow and firms with more cash flow would afford to have more investment in working capital requirement. Fazzari et al., (1993)[17] did argue that firms with larger cash flow have more working capital because these firms have more internal sources to financing working capital and enable to have higher current asset levels. Thus, a positive relationship between operating cash flow and working capital requirements should be expected.

Operating cycle: operating cycle for a firm can be long or short. Ceteris paribus, if it is long, the firm's working capital requirements will be large, and vice versa. Thus, a positive relationship between operating cycle and working capital requirements should be expected.

The **size (LNS)** of a company is considered to be an important determinant of a firm's working capital management. Theoretically, a larger sized firm is expected to have a greater investment in working capital. Thus, a positive relationship is expected between working capital management and size, as shown in the study of Almeida, Campello and Weishbach (2004)[18]. On the other hand, a larger sized firm may have better concessions or favorable terms from its suppliers, thus necessitating spending lesser amounts in working capital items. Hence, under this situation, a negative relationship between size and working capital management should be expected.

Following the prediction of Pecking Order Theory (Myers and Majluf, 1984), a negative relationship between **leverage (LEV.)** and working capital level should be expected. This suggests, according to Nakamura and Palombini (2010), that leveraged companies aim to work with low level of current assets, to avoid issuing new debt and equity securities.

ROA is the variable that is mostly used in empirical studies to proxy financial performance. Following the prediction of the Pecking Order Theory, a negative relationship between ROA and working capital management should be expected. However, Nazir and Afza (2008) posit that since highly profitable firms have the cash to invest in investment activities, they would not be concerned with efficient working capital management. Thus, they submit a positive relationship between ROA and working capital level. Thus, the effect of ROA on working capital requirements can be either positive or negative.

A firm's sales expectation (**growth**) is also considered to be an important variable of working capital management. Nunn (1981)[19] posits that a firm that anticipates growth in sales is likely to increase the investment in inventories (working capital item). A positive relationship between sales growth and working capital management is expected.

Level of economic activity (GDP) is exogenously determined and can affect a firm's working capital requirements. Lamberson (1995) provides evidence that liquidity slightly increased during economic expansion with no noticeable change in liquidity during economic slowdowns. Zariyawati et al (2010) confirm that Malaysian firms' investment in net operating working capital increased with better economic condition.

Interest Rate on Loans and Advances (IR) which is the cost of borrowing money. Filbeck and Kruger (2005)[20] observed that the changes in interest rates has an effect on working capital management, because firms have less desire to make payments early when interest rate increase, this will stretch account payable. A negative relationship between sales growth and working capital management is expected.

5.7 Model Specification: *Fixed Vs. Random effect panel data model*

One of the most crucial questions in panel data modeling concerns the choice between fixed and random effect panel data model. A variety of arguments have been proposed in different literatures on choosing between the two formulations, but none of them makes a clear cut case or circumstances under which each of these models will be appropriate. To decide which model is most appropriate, many economists and financial analysts use the following criterion. If the individual-specific dependent unobserved effects (u_i) are

correlated with one or more of the explanatory variables, then the correct model is the fixed-effect model. If the Individual-specific dependent unobserved effect (u_i) are not correlated with one or more of the independent variables, and if they can be viewed as outcome of a random variable, then the correct model is the random-effect model. Because, the random-effect model assumes that the individual-specific dependent unobserved effect *(w)* are not correlated with the independent variables. If this assumption is violated, the random-effect estimator will yield biased and inconsistent estimates. In addition, Housman (1978)[21] argues that the fixed-effect model should be used when market data are considered, while the random-effect model should be preferred when using book values. As it was discussed in section 4.5 of this research, the unavailability of active secondary market forces the researcher to proxy the independent variables in terms of book value rather than market value. Therefore, following the line of reasoning by Housman (1978) the random-effect panel data model was used to test the working capital management requirement of the public enterprises.

$$NWC_{it} = \beta 0 + \beta_1 OC_{it} + \beta_2 OCF_{it} + \beta_3 GR_{it} + \beta_4 ROA_{it} + \beta_5 LEV_{it} + \beta_6 LNS_{it} + \beta_7 GDP_{it} + \beta_8 INR_{it} + \mu_i$$

Where:

Yi = the i^{th} observation of dependent variables (WCR_TA); β0= the intercept of the equation; βi = coefficients of Xi variables; Xi = the different independent variables (OC, OCF, GR, ROA, LEV, LNS, GDP and INR) and μit = the error term. The data was tested to detect omitted variable bias. VIF test, Multicollinearity, Heteroscedasticity, and neglected non-linearity problem through *hettest*, & *OV test* respectively. Finally, the robust regression was used for the analysis purpose which was made the data free from autocorrelation problem.

VI. RESULTS AND DISCUSSIONS

6.1. Descriptive Statistics

In this part of the paper, the results from descriptive statistics are discussed. The descriptive statistics was used in order to get insight into the trend of working capital requirements, return on assets, operating cycle, operating cash flows, sales growth, real GDP growth rate, leverage, firm size, and interest rate on loans and advances among the companies and it is used as base to forward recommendations after determining the relationship between the variables from correlation and regression analyses.

Table No.2 Summary of descriptive statistics

Descriptive statistics					
Variables	**N**	**Mean**	**Std. Dev.**	**Maximum**	**Minimum**
WCR_TA	80	0.182	0.311	0.721	-0.612
OC	80	167.496	134.573	530.101	30.12
OCF	80	.0796	.0642	0.2757	0.029
GR	80	0.050	.0821	0.405	-0.361
ROA	80	0.056	0.941	00.514	-0.217
LEV	80	0.239	0.698	0.823	0.000
LNS	80	10.117	0.821	8.451	-0.591
GDP	80	10.1600	0.9005	11.4000	10.3000
INR	80	9.211	0.91	16.25	5.5

Source: SPSS Output from the financial reports for the period 2011-2015

Table no. 2 presents the descriptive statistics of the study for the survey period of five years (2011-2015) of Ethiopian public enterprises. All variables were calculated using ratios. To make the analysis and interpretation more precise, the values of maximum, minimum, mean and standard deviations was computed from the ratio. It also presents the minimum and maximum values of the variables which help in getting a total picture about maximum and minimum values a variable can get. A total of 80 public enterprises year observation (16 companies x 5 years data = 80 companies' years observation) were used.

The average Net working capital deflated by total assets, as shown in table no. 2 is 0.182, while the leverage is 0.239. This indicates that the sample firms utilized on the average less amount of debt (low leverage), though some

firms do not used debt at all as indicated by the minimum debt ratio of 0% and high levered firm has 82.3% debt ratio. The growth rate is about 5.0% on the average, while the ROA is mere 5.6%. The average operating cycle is about 167 days, with maximum of about 530 days. The standard deviation of ROA is about 70%, indicating that profit can deviate from either side by 70%. In the same context we checked the interest rate and the real GDP growth rate. The interest rate has a mean of 9.2% with a standard deviation of 0.91; While GDP growth rate mean is 10.16% with a standard deviation of 0.90. These ratios are high relative to the sub-Sahara less developed countries.

6.2. Correlation Analysis using Pearson's Correlation Coefficient

Despite the descriptive statistics, it is advisable to check whether there is a perfect correlation among the independent variables and between the dependent and the independent variables. Hence, the following Pearson correlation matrix shows the correlation between the determinant of working capital requirement and independent variables which measures determinant of working capital requirements of Ethiopian public enterprises.

Table no. 3: Pearson's Correlation Matrix

	NWC_TA	OC	OCF	GR	ROA	LEV	LNS	GDP	INR
WCR_TA	1								
OC (sig-2 tailed)	0.0.452* (0.001)	1							
OCF (sig-2 tailed)	0.431* (0.001)	0.462* (0.001)	1						
GR (sig-2 tailed)	-0.109 (0.788)	0.383* (0.002)	0.229* (0.002)	1					
ROA (sig-2 tailed)	0.475* (0.0002)*	0.807* (0.000)	0.321* (0.001)	0.479* (0.006)	1				
LEV (sig-2 tailed)	-0.929** (0.045)	0.278* (0.000)	0.057* (0.002)	0.271** (0.025)	0.460* (0.0001)	1			
LNS (sig-2 tailed)	-0.846* (0.000)	0.260* (0.000)	0.261 (0.214)	0.224* (0.001)	0.469* (0.000)	0.977* (0.002)	1		
GDP (sig-2 tailed)	0.742** (0.150)	0.574 (0.674)	0.0749 (0.0512)	0.319 (0.056)	0.271** (0.012)	0.073 (0.617)	0.487* (0.002)	1	
INR (sig-2 tailed)	0.921 (0.513)	0.512 (0.491)	0.467 (0.045)**	0.798 (0.917)	0.074 (0.675)	-0.057* (0.001)	0.613 (0.314)	0.079 (0.049)**	1

***Source**: STATA result from the financial reports of Ethiopian Public Enterprises, (2011-2015)*

Note: * Denotes Significant at 1 percent level of significance (2 tailed), ** Denotes Significant at 5 level of significance (2 tailed)

Table no.3 correlation matrix result shows that working capital requirements (dependent variable) is i) positively correlated with operating cycle, return on assets, Operating cash flow and firm growth, and ii) negatively correlated with Leverage and firm size. However, the dependent variable hasn't any statistical significant relationship with GDP and interest rate on loan and advance of the public enterprises.

6.3 Regression Analysis: The Determinants of Working Capital requirements

This study established the framework of literature and data analysis including descriptive statistics and correlation with the aim to investigate the relationships between the dependent and independent variables. A limitation of Pearson's correlation is that they do not allow identifying causes from consequences. Therefore, regression analysis is used to investigate the determinant of working capital requirement.

Before carrying out the regression analysis, the data has been checked for multicollinearity, heteroscedasticity, omitted variable bias and neglected normality problems using VIF, hottest and OV test after the correct remedial measures have taken to come up with remarkable result. Moreover, the Huasman test for random effect and fixed effect estimates, and the Breusch and pagan Lagrangian Multiplier Test for the random effect and pooled OLS were made. Taking this test result robust random effect estimates are used to investigate the determinant of working capital requirements, measured by *return on assets, operating cycle, operating cash flows, sales growth, real GDP growth rate, leverage, firm size, and interest rate on loans and advances* were used.

Table no.4: Regression Analysis of Determinants of Working Capital Requirements

Random-effect GLS REGRESSION				**Number of obs**		**= 80**
Group Variable : FIRM id				**Number of groups**		**= 16**
R-sq: within = 0.4727				**Obs per group: min**		**= 5**
Between = 0.4400				**avg.**		**= 5.0**
Overall = 0.5653				**max**		**= 5**
Random effect u_i ~ Gaussian				**Wald chi2(9)**		**= 144.33**
Cross(u_i, x) = 0 (assumed)				**Prob.>chi2**		**= 0.0000**
WCR_TA	**COEF**	**Std. Err**	**t**	**P> | t |**	**[95% Conf**	**Interval]**
OC	**0.16745**	**.482535**	**1.0.**	**0.002***	**.2408155**	**-0516653**
OCF	**.0185408**	**.0080065**	**2.32**	**0.021****	**.0028483**	**.0342333**
GR	**.0865018**	**.0510988**	**1.69**	**0.030****	**-.0136501**	**.1866537**
ROA	**1.083716**	**.2400074**	**4.52**	**0.000***	**.6133098**	**1.554121**
LEV	**-.13352**	**.0124241**	**-1.12**	**0.000***	**-.0458121**	**.0143178**
LNS	**-.001636**	**.0008451**	**1.94**	**0.023***	**-.0000205**	**.0032925**
GDP	**.0074797**	**.0020778**	**3.60**	**0.431**	**.0034073**	**.011552**
INR	**-.04275**	**.4879112**	**2.23**	**0.412**	**.0645128**	**.034123**
-cons	**.2765546**	**.1526358**	**1.81**	**0.070**	**.5757152**	**.0226061**

***Source**: STATA regression result based on the financial statements of sample companies, 2011-2015.*

Note: **Denotes Significant at 1% level, ** Denotes Significant at 5% level*

The above table no. 4 portrays the regression results using random effect as estimation technique. The size of the enterprise has a negative and significant effect on working capital. The larger the firm the less working capital to total assets is required. Large firms may require larger investment in working capital because of larger volume of revenues or because they use their market power to force relationship with suppliers and get a reduction in payment term (Mousawi et al. 2006)[22]. But here it found that larger firms require lower investment in working capital which may be due to their power over suppliers and thus can have longer period for their payables.

The above table also shows that **leverage** is found to be negative and significantly related with working capital management at 1% level. It posits that financial manager can practice efficient working capital management by reducing the firm's debt level so as to avoid unnecessary tying up of capital in accounts receivables and inventories. This outcome is concedes with the prediction of Pecking Order Theory and find support in the studies conducted by Chiou and Cheng (2006), Nazir and Afza (2009), Deesomsak and Chau (2011)[23], Nakamura and Palombini (2012), Akinlo (2012), Asmawi and Faridah (2013)[24] and Wasiuzzaman et al (2014).

Operating cash is positively significant, which implies that Ethiopian public enterprises have enough cash from operation activities to finance their working capital. These findings are consistent with Ranjith (2008)[25] and Hill et al. (2009)[26].

The Table no.4 also indicates a strong positive and significant relationship at 1% level between ROA and working capital requirements. Is suggests that firms with high profitability can also keep high working capital requirements without any problem whatsoever. This is consistent with the findings of Wu (2001)[27], Nazir and Afza (2008) and Wasiuzzaman et al (2013).

Operating cycle is seen to be positive and significantly related with working capital requirements at 1% level. This indicates that firm with high operating cycle will require high investment in working capital items. To manage a firm's working capital requirements efficiently, will require optimum control of its operating cycle. This outcome has the support of the findings in the studies conducted by Chiou et al (2006), Nazir and Afza (2008), Nazir and Afza (2009), Akinlo (2012) and Wasiuzzaman et al (2013).

The relationship between working capital requirements and both Interest on loan and advance is negative but not significant. And the level of economic activity is positive but insignificant to determine the level of working capital management. This insignificant relationship is also confirmed in the study conducted by Nazir and Alfza (2006), Chiou et al (2006) and Appuhami (2008) but with insignificant positive relationship. It is however in contrast to the finding of Akinlo (2012) which showed both positive and negative relationships regarding level of economic activity for different models used and positive relationship for sales growth.

It can be deduced from this study that six factors-firm's size, leverage, ROA, operating cycle and operating cash flow and firm growth are the determinants of the sample enterprises during the period of study.

6.4 Summary of Findings and Testing of Hypotheses

The present study is to investigate the determinants of working capital requirements of Ethiopian public enterprise. In light of this, the study adopts quantitative method of researches to test the formulated research hypotheses. Specially, the study used survey of documentary review of audited financial statement of 16 selected public enterprises engaged in different economic sectors for the period of 2011 to 2015 with total of 80 observations.

Table no. 5: Summary of actual and expected signs of explanatory variables on the dependent variables.

Hyp.	***Independent Variables***	**Predicted sign on WCR_TA**	***Actual Sign on WCR_TA***	***Accepted/ Rejected H_1***
1	Operating cycle	Positive and significant	Positive and significant	*Accepted*
2	*Operating Cash flow*	Positive and significant	Positive and significant	*Accepted*
3	*Firm Growth*	Positive and significant	Positive and significant	*Accepted*
4	*Return on Assets*	Positive and significant	Positive and significant	*Accepted*
5	*Leverage*	Negative and significant	Negative and significant	*Accepted*
6	*Firm Size*	Negative and significant	Negative and significant	*Accepted*
7	*Gross Domestic Product*	Positive and Significance	Positive and insignificant	*Rejected*
8	*Interest rate on loan and advance*	Negative and Significance	Positive and insignificant	*Rejected*

Source: STATA result from financial reports of the sample Companies, (2011-2015).

VII. CONCLUSIONS

This study tries to find the variables that determine the level of working capital requirement that the Ethiopian public enterprise holds. On the basis of the findings of the research, out of eight examined independent variables-, operating cash flow, size of the firm, return on assets, debt ratio (leverage), growth rate, operating cycle, interest rate and real GDP, the first six variables are found statistically significant determinants of working capital requirements for Ethiopian public enterprises. Beta coefficients associated with all of them are statistically significant at less than 5% level of significant and have the right sign. So, it can be concluded that the public enterprises in Ethiopia change their working capital requirements based on the size they have, leverage, operating cash flow, return on assets and operating cycle and their growth. The implication of this is that financial managers should take cognizance of these factors whenever they want to develop and achieve optimum working capital level for their organizations.

The above results are consistent with earlier studies of Lamberson (1996), Wu (2001), Chiou and Cheng (2006), Mahomet and Eda (2009)[28], and Nazir and Afza (2009) on Pakistan, Lazaridis and Tryfonidis (2006)[29] on Greece, Nakamura et al.(2003) on Brazil, Ranjth (2008) on Thailand firms, Pendey and Parera (1977)[30] on SriLanka, Al-Mwalla, Muna (2012)[31], and Hayagneh and Yassin (2011)[32] on Jordan. On the other hand, some of our findings contradict with some earlier studies on the issue like Narender et al (2009)[33] who found that the size has a positive effect on working capital in the cement industry in India, and Al-Muwalla (2012) in Jordan who found that leverage and firm size have a positive impact on both value and profit.

This research has opened many avenues for future research especially in context of Ethiopia. The future research can be extended in the area of working capital management is, the working capital practices followed in different economic sectors using the primary data collected directly from the financial managers of different firms. Such type of study will provide a fresh understanding of respective managers that how they perceive and manage the working capital of the firm.

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