

## **CHAPTER TWO**

### **Literature Review and Research Methodology**

#### **2.1 Introduction**

This chapter is divided into two sections - first one is 'review of literature' that examines the researches and studies in the field of working capital management conducted by various eminent national and international authors so far so that research gaps could be identified, and the other section outlines or describes the scientific steps that have been adopted to achieve the objectives of the study. Research design or the blue print of the research has been discussed in the sub-section 2.4. Sub-sections 2.4.2 to 2.4.5 discuss the population, sample size, sampling technique, time period, sources and collection of data used in the research. Section 2.5 consists of sub-sections 2.5.1 and 2.5.2 that deliberate on the research variables and their measurement as adopted in the study; section 2.6 elaborates the various accounting and statistical techniques for data analysis. Diagnostic tests have been elucidated in the section 2.7 and finally a conclusion has been drawn and presented in the section 2.8.

#### **2.2 Literature Review**

Sinku (2015) undertook a study on the impact of liquidity management on profitability performance of SAIL based on secondary data during 2000-01 to 2009-10 by using financial & statistical techniques such as profitability ratios, Karl Pearson correlation & Student t-test to assesses the relationship between liquidity and profitability. The study revealed that the current ratio was having the most significant influence on the profitability of SAIL. The researcher in study emphasized on liquid assets to be maintained in a proper way.

Maheswari (2014) made a study on the working capital efficiency with the data taken from Indian Steel companies for the period 2008-2013; according to her, working capital was the most

crucial factor of liquidity & performance of any organization. Every company requires an adequate amount of working capital irrespective of its size, nature and for continued survival and performance of any organization. Her research study employed various financial ratios and statistical tools to assess objectives. The study concluded that there were insignificant differences between the ratios of selected Indian companies.

Yadav, Srinivas, and Sai (2014) scrutinized the impact of working capital management on profitability. The research study used a sample size of 10 large Indian manufacturing companies, depending on secondary data collected from annual reports and CAPITALINE database over a period of 10 years from 2003 to 2013. The authors showed in the study, the return on assets (measurement of profitability) as the dependent variable and cash conversion cycle, interest coverage ratio, debt-equity ratio, the age of inventory, age of debtors, and age of creditors as independent variables. The study employed the accounting ratios and ordinary least squares regression analysis to test the study's hypothesized objectives. The authors found in the study that working capital must be managed with due care and caution, though it did not significantly affect profitability. Steel industries must maintain a balance between liquidity and profitability and that could be achieved by maintaining the components of working capital at the desired level.

Palanivelu & Devi (2014) made a pragmatic study of working capital management in Steel Authority of India Limited, Salem during the study period of 2009-2013. i.e., the time period of 5 years. The study adopted ratio analysis as financial tools to assess the effect of running capital on firm's liquidity and profitability. The researchers found that liquid ratios (current ratio, quick ratio, operating ratios) were high as compared to the respective ideal ratios. They suggested that the firm's profit management could be improved by the release of excess funds to other

alternative investment areas. Also, they emphasized that the excessive block of funds in inventory could be brought down with the application of the technique of economic order quantity. Researchers concluded that current assets should be financed by short term financing sources.

Madhavi (2014) undertook a comparative study on working capital management of two paper mills i.e., Andhra Pradesh Paper Mills Ltd. and Seshasayee Paper & Board Ltd. The study covered the period of 2002-2011, consisting of primary and secondary data to explore the adequacy of working capital and its impact on firms' profitability and net worth. The financial data of both the paper mills were analyzed with ratio analysis tool and concluded that current assets in the Andhra Pradesh paper mill must be utilized in a more efficient way to pay off short-term liabilities. The study also suggested that cash and bank balance should have been effectively utilized.

Babu and Chalam (2014) observed the relationship between profitability and components of working capital in the Indian leather industry. The study adopted Return on Assets (ROA) as dependent variable and inventory conversion period, average payment period, average collection period and cash conversion cycle as independent variables. The statistical techniques like ANOVA, correlation analysis, multiple regression analysis, and "F" test were used in the study to examine the relationship. Researchers found results through statistical tools that ROA was positively and insignificantly related with the inventory conversion period. The results also showed that there existed a statistically significant positive relationship between profitability and average collection period. Based on the results of statistical analysis in the study, the researchers concluded that Indian leather firms' management could increase shareholders' value by maintaining a sound trade credit policy and increasing the average payment period to suppliers; also, inventory should have been maintained at a reasonably maximum level. They further

concluded that working capital was having a significant impact on the earnings; so the various components of it should have been managed properly.

Sharma (2013) conducted a study to find out the relationship between working capital management efficiency and profitability in Steel Authority of India Limited & TISCO. The objective of her study was to investigate the impact of working capital management on corporate profitability. She measured the working capital efficiency by various financial ratios - current assets to total assets, current assets to fixed assets, and working capital to sales. Pearson correlation used in her study identified a negative relationship between working capital management and profitability. The study revealed that liquidity position and profitability can be improved by maintaining a suitable ratio.

Vijaya and Rama (2013) investigated on working capital management of Indian cement companies. The study was conducted on 19 private and public Indian cement companies with the data collected over the period from 2003-04 to 2008-09. The study's aim was to evaluate and assess the liquidity position of cement companies for which statistical technique, one-way ANOVA was used. Through investigation, the study found that the cement companies' liquidity position was well managed that maintained current and quick ratios at an average level. The study suggested Indian cement companies not to avoid the working capital management and management must change their attitude in respect of working capital management in an aggressive way.

Makori and Jagongo (2013) conducted the study on the relationship between working capital management and profitability of manufacturing and construction firms in Kenya taking a sample of 10 firms listed in Nairobi Securities Exchange, Kenya. Average Collection Period, Inventory Conversion Period and Cash Conversion Cycle were taken as independent variables and Return

on Assets as dependent variable in the study. To establish a relationship between the two, multiple regression analysis and Pearson correlation analysis had been employed. The authors observed a negative association between return on assets and average collection period and cash conversion cycle. The study also found a positive impact of average payment period, firm size, and sale growth on the profitability. The authors suggested that firms could create shareholders' value by effective and efficient utilization of working capital.

Singh (2013) evaluated trends in working capital management in Tata Steel Ltd. during the period from 2008-09 to 2012-13. To analyse the overall working capital management in the selected unit various financial ratios as current ratio, quick ratio, inventory turnover ratio had been used to find that current liabilities of the selected unit increased during the study period that resulted in poor financial position. The author recommended that the executives could improve and control the components of working capital (inventory in days, account receivable in days, accounts payable) more efficiently that might have improved the profitability.

Dimple and Jain (2013) investigated working capital management efficiency in Infosys Ltd. and TCS Ltd. To measure the relationship between the degree of the risk factor and the profitability, the study used various accounting ratios and statistical tools as Spearman's correlation and t-test applied on secondary data collected from published financial statements over a period of 10 years i.e. 2002-03 to 2011-12. The study revealed that TCS's profitability position was better than that of Infosys. The latter IT giant company made a large investment in current assets that reduced the risk of the inability to meet payment obligation and at the same time blocked unnecessary funds in stock as a resulting decline in earnings. A positive relationship was found between liquidity and profitability in company TCS. The researchers recommended Infosys to

manage the elements of working capital at an optimum level. Also, desired level of liquidity could be achieved by a tradeoff between liquidity and profitability.

Bhunia and Das (2012) examined the relationship between working capital management and profitability by taking a sample of 50 small & medium size Indian private steel companies. The study used various financial ratios and statistical techniques, Karl Pearson Correlation test to confirm a low degree of association between liquidity and profitability. They observed a strong relationship between working capital management including working capital cycle and profitability of steel companies.

Ray (2012) investigated the effect of variables in working capital management on the profitability of Indian manufacturing firms taking a sample of 311 firms for the period during 1996-1997 to 2008-2010 by using accounting ratios and multiple regression analysis models to achieve the objectives of the study. The study found a strong negative relation between variables of working capital management and corporate profitability. The researcher suggested that an adequate level of working capital could be maintained in the firm by a tradeoff between working capital and profitability. He also suggested that shareholders value could be increased if the firms maintained the variables of working capital management in an efficient manner.

Joshi and Ghosh (2012) examined working capital management of Indian Pharmaceutical company, namely, Cipla Ltd. during the period 2004-05 to 2008-09 based on secondary data to unlock working capital trend growth rate during the study period and its impact on profitability. The researcher in the study used financial ratios and statistical techniques such as MOTAAL test and Spearman's Rank co-relation to attain the objectives of the study. The study found that the selected company maintained excess liquidity during the period under study and there existed a negative relationship between liquidity and profitability of Cipla Ltd. The researcher suggested

that there was a need for further improvement in both the working capital turnover ratio and current assets turnover ratio for maintaining liquidity efficiently.

Bagchi and Khamrui (2012) made an inquiry into the relationship between working capital management and profitability in 10 (ten) Indian FMCG companies. The study covered a period of 10 years from 2001-01 to 2009-10 to reveal the relationship between the above two; the study used financial ratios and multivariate techniques to relate. The study found that there existed a significant inverse relationship between cash conversion cycle, debt, and profitability. Various factors in working capital affected the return of firms. The study suggested that the firms' value could be increased by optimum utilization of resources.

Malviya (2012) evaluated working capital management requirement in Indian public and private steel industries. The study undertook six steel plants (namely, TISCO, Jindal Steel, Essar Steel, Ispat, MUSCO, and Sunflag) with both primary and secondary data collected from audited financial reports during the period 2002-03 to 2008-09. Various management techniques for handling the components of working capital were emphasized in the study. The author presented cost accounting techniques to manage inventory, cash, and accounts receivables to maintain a tradeoff between profitability and liquidity.

Nandi (2012) examined the effects of liquidity management on profitability in Bharat Heavy Electrical Ltd. during the period 1999-2000 to 2009-10 based upon the secondary data collected through published annual reports. The objective of the study was to examine the efficiency of working capital management. Various statistical tools like F test, Chi-square, Durbin-Watson were used to test the result. He observed in the study that the selected company maintained an amount of investment in different components of working capital. The study also observed that the selected company used long term funds in order to finance current assets. He concluded in

study that the management should have maintained a proportionate amount of investment in current assets which could have been possible by use of the previous learning experience.

Rahman (2011) examined the position of working capital management and profitability in the textile industry. The author collected both primary and secondary data over a period of 3 years i.e. 2005-06 to 2007-08 from a sample of 9 textile industries in Bangladesh. To assess the study's main objective, the author employed various accounting ratios and statistical techniques like the econometric model to show the relationship between working capital and profitability. In the study, the researcher used ROTA (Return On Total Assets) as the dependent variable and cash conversion cycle, inventory turnover, and accounts payable turnover as dependent variables. The author found that the liquidity and performance position were not at all satisfactory. The firm could have further improved its profitability by proper utilization of cash and bank balances, moving out inventory quickly, and reducing liabilities.

Chandrabai,T., Rao,Dr.K.Venkata Janardhan,(2011) made a study on working capital management in ACC cement company. The authors used secondary data collected from annual reports over a period of 6 years i.e. 2004-05 to 2009-10. To achieve study's objectives, the study employed various financial ratios (Current ratio, Quick ratio, Return on Total Assets, Return on Equity) and statistical tools like correlation analysis to get a view about the relationship between working capital management (profit earning capacity by proper plan and control of working capital in ACC Cement Company) and profitability. The authors concluded that the firm invested the adequate amount in current assets i.e. in inventory, accounts receivable, and cash balances. The study found that liquidity position of ACC Company was at a satisfactory level due to proper investment and control of short term assets.

Quazi, Shah Abbas & Nadeem (2011) investigated the effect of working capital management of two sectors (Oil and Natural Gas & Automobiles industry) on companies' profitability by analyzing secondary data collected from annual reports covering the time period from 2004-2009. The primary aim of the research study was to examine the impact of working capital on firm's profitability for which the authors used various statistical techniques like regression analysis and the coefficient of correlation in the study. Variables affecting the profitability are inventory turnover in days, average accounts receivable, and financial assets to total assets as independent variables and profit after tax as dependent variable in the study. The study's results revealed the positive impact of working capital on profitability. The recommended focussing on cash cycle management was the crucial factor in increasing the value of the firm.

Quayyum (2011) investigated working capital management and liquidity effects on corporate profitability of Cement Industry in Dhaka. To conduct this study researcher undertook four cement companies listed in the Dhaka Stock Exchange where from secondary reliable financial data were collected over the period from 2005 to 2009. The study employed traditional ratios and statistical techniques as Pearson correlation and multiple regression analyses and found a significant negative relationship between cash conversion cycle and the firm's profitability. The researcher recommended that firms should have forecasted their future sales and kept cash in hand accordingly that resulted in better utilization of cash in a bargaining position and helped in reducing cost.

Bhunja & Khan (2011) observed liquidity management efficiency in Indian private steel companies. By taking a sample size of 230 firms, based upon secondary financial data collected for a period from 2002 to 2010 to measure liquidity management efficiency, various accounting ratios and descriptive statistics were used. Data analyzed through multiple regression test found a

lower degree of association between liquidity management and profitability. The study revealed that the solvency and liquidity position were quietly at a satisfactory level but had no effect on profitability. The authors advised the managers of the firms to give due concern to unexplained variables in liquidity management for the creation of shareholders value.

Bhunja (2010) made another study under the title liquidity management of selected Indian private-sector steel companies over the period of 9 years i.e. from 1997-98 to 2005-06 by using accounting ratios and descriptive statistical methods to assess the overall efficiency of liquidity management. He tested the effects of working capital management on Indian private steel companies' profitability by employing multiple correlations and multiple regression analyses. Analysis of data found poor and inefficient management of various components of working capital, and as a result, it harmed profit. None of the components was managed at symphony level. He suggested Indian private steel players to improve their liquidity position by the proper composition of current assets with the help of indexes of Indian steel companies.

Gill, Bigger, and Mathur (2010) tested the relationship between working capital management and profitability of American manufacturing firms during 2005-2007, and a sample size of 88 listed firms had been undertaken in the study that used Ratio analysis, Pearson correlation, and Multiple regression analysis in the study. It found a negative relationship between accounts receivable and firm's profitability. The study used the cash conversion cycle (CCC) as a proxy for working capital management that showed a significant negative relationship existing between the two. The authors suggested that the firms could increase the firms' value by reducing accounts collection period and cautious maintenance of the cash conversion cycle.

Huynh Ngoc Trinh (2012) presented a thesis in University of Twente under the title "The Influence of Working Capital Management on Profitability of Listed Companies in the

Netherlands” wherein the research aimed to examine the effect of determinants of working capital management on Dutch non-financial companies’ profitability across the period from 2006-2010. The study chose a sample size of 62 companies divided into two major sectors including 39 from manufacturing and 23 from service sectors. He used statistical techniques as multivariate models (Fixed Effects Models, Ordinary Least Square), regression analysis, Pearson correlation, etc. to evaluate how significantly working capital management influenced liquidity and profitability. The test confirmed that companies’ profitability was negatively affected by accounts receivable, accounts payable, and cash conversion cycle whereas sales growth and firm size had positive direction on companies’ profitability under study. He suggested Dutch non-financial companies’ profitability might have been improved through better trade credit management policy. Surplus cash should have been efficiently invested to increase shareholders’ value and also to assist companies in managing their working capital efficiently.

Charitou,Elfani,and Petros (2010) conducted a study on the effect of working capital management on corporate profitability of a sample size of 43 firms listed in the Cyprus Stock Exchange during period 1998-2007. The primary aim of the study was to assess the liquidity position of firms in an emerging market. Data analyzed by multivariate regression indicated that cash conversion cycle was negatively associated with firm’s financial health. The study concluded that the firms could have had a stream of earnings by better utilization of working capital components that might have led to the reduction in default risks and improvement of profitability.

Lamberg and Valming (2009) inquired about the impact of liquidity management on profitability in two time points i.e. before the financial crisis and afterwards. The study framed a sample size of 34 firms selected from NASDAQ OMX Stockholm. The primary purpose of inquiry or

research was to know the effect of the change in liquidity strategies on corporations' profitability for which they used statistical models as descriptive statistics, Pearson correlation and multiple regressions. They found empirical evidence that adaption of liquidity strategies had no significant effect on the profitability of the selected firms in the study at two points of time as there was no relationship existing between the change in liquidity strategy and corporation profitability measure (ROA). Researchers suggested that the firms in order to attain profit, should have focused on cash management policies and continuous forecasting of working capital requirement in the economic downturn period so that profitability was not hampered.

Bhunja (2007) in his study found that the efficiency of working capital management depended on its adequate level. He used different accounting ratios to measure the liquidity position of two central irons & steel companies in India. The study concluded that short-term liquidity can be controlled by better estimation of working capital requirement.

Ganesan (2007) conducted a study on working capital management efficiency in the telecom equipment industry. A sample of 349 firms was chosen for the study; secondary data were collected over the period 2001-2007 from published annual financial statements to reach the study's conclusion. To conduct the study, the researcher employed various statistical approaches like ANOVA one factor, correlation, regression, and F-test to find an association between working capital and profitability. He took Income to Total Assets and Income to Sales as dependent and Days in Inventory, Days Payable, and Cash conversion cycle as independent variables. On the basis of statistical analysis in the study, he found none of the components contributing to working capital management efficiently and that led to a negative impact on profit. It was also observed that the firm's inventory was managed inefficiently. He

recommended that management could efficiently manage working capital by decreasing inventory level and get more credit support from suppliers.

Padachi (2006) studied the trends in working capital management and its effect on the profitability of Mauritian small manufacturing firms during 1998-2003. The author's aim in the study was an inquiry about the impact of working capital on corporate profitability. Based on secondary data collected from annual published financial reports, the author identified Return on Total Assets (ROTA) as dependent variable and inventory days, account receivables, and account payables as independent variables in the study. The researcher, by application of statistical technique like regression analysis, found that working capital management, excepting cash cycle management, significantly affected the firm's profitability. He also found that excessive investment in inventories resulted in lower profitability. He concluded that the owner-managers adopted best working capital management practices so that a balanced approach between assets and liabilities was ensured.

Deloof (2003) carried out a study on the association between working capital management and profitability by using 1009 large Belgian firms for the period of 1992 to 1996. The study adopted the statistical tools as Pearson correlation and Multiple regression analyses which found a negative relationship between firms profitability and the major components of working capital management i.e., accounts receivable in days, inventory conversion in days and accounts payable in days. The study concluded that the selected sample firms could increase the value for shareholders by reducing accounts receivable and inventories to a minimum level.

## **2.3 Research Gaps**

In most of the studies as above, authors assessed various composition of working capital management and presented its relationship with profitability either considering a particular firm or a few companies. A limited or very small number of studies on working capital management had been conducted wherein the ingredients were compared with benchmark or standard ratios to evaluate the operating efficiency of the company. The above gaps were specially evident in the public sector iron and steel units operating under SAIL in India. Moreover, it is observed in many studies that the time period undertaken was short which may not provide reliable results. However, in the present study a long time period of twelve years i.e., 2001-2013 have been taken to reach a valid conclusion. Thus, it is expected that the present research would be able to fill the gaps found in the existing literature related to working capital management.

## **2.4 Research Methodology**

### **2.4.1 Research Design**

Sketching out a study helps the researcher to plan and implement the study in a way that will help the researcher to attain intended results, thus increasing the chances of obtaining information that could be associated with the real situation (Burns & Grove, 2001). Research design is an outline for the researcher from writing the hypothesis and its operational implications to the final analysis of data (Kothari, 2014). In other words, it is a conceptual arrangement of conditions for the collection, measurement and analysis of data to attain the objectives of the study. Orodho (2003) states that research design is a programme that guides the researcher in collecting, analyzing and interpreting observed facts. Research design involves the logical steps and procedures to carry out the study to answer or address the research questions.

Amongst the number of research designs available, the one adopted in the study is exploratory and empirical in nature since it assists the researcher to “open up” the problem and look around. It helps diagnose a problem situation in identifying the responsible factors therein. Exploratory research design used in the present study helps in finding out the possible causes to the symptoms as well as in formulating and developing the research problem and objectives of the study. The study used exploratory research design because this research design attempts to explore causes or factors related to working capital management that affects profitability of the selected manufacturing companies. The study also employed empirical research design because the results and findings of the present study could be attained through direct observation of the past or historical quantitative information i.e., audited annual reports of the selected units for the period from 2001-02 to 2012-13. The study aims to determine efficiency of working capital components to earnings. Working capital components include accounts collection period in days (ACP), inventory conversion period in days (ICP), accounts payable period in days (APP) and cash conversion cycle (CCC).

#### **2.4.2 Population and Sample size**

Population refers to aggregate of all the objects, groups, people that conform to a set of specifications. Out of total population or universe, selected elements of objects and participants people or groups for the study is known as sample of the population.

In this study target population is all manufacturing units of iron and steel public companies under Steel Authority of India Limited located in west bengal. Manufacturing industry was chosen because it is significant in contribution to economic growth and development of the country. Manufacturing sectors are considered as the central to the economy. The rise of economy is fuelled by manufacturing industries. The strength of any economy is judged by the development

of manufacturing units. According to the World Trade Organization (WTO), 80 % of inter-regional trade is in goods, and only 20 % is in services that contributes an economy to the path of development and growth. Thus, Selected sample units of aggregate population under study are the three giant manufacturing units located in the Durgapur industrial belt and Asansol subdivision area in West Bengal, namely, (a) Alloy Steel Plant (ASP), (b) Durgapur Steel Plant (DSP), and (c) Indian Iron & Steel Company (IISCO). These selected sample companies are subsidiaries, wholly operating under SAIL, New Delhi.

#### **2.4.3 Sampling Technique**

Convenience sampling procedure has been adopted to identify or select the public units in the study area. All the three public units located in the study area are chosen due to following reasons.

- (a) Because of availability of relevant financial data of the chosen units in the study area.
- (b) Public Units are involved in the manufacturing in iron and steel industry.
- (c) Companies are wholly operated under the central government regulations.

#### **2.4.4 Time frame of the Study**

The present study covers a period of twelve years commencing from 2001-2002 to 2012-2013. Selected units in the study followed the financial year that started on 1<sup>st</sup> April and ended on 31<sup>st</sup> March every year. The main reason behind choosing the period of twelve years is the expectation that the efficiency of working capital management, if any, is expected to be captured well in the long time horizon. So, audited financial data for a continuous period of twelve years have been collected.

#### **2.4.5 Sources of Data and Data Collection**

The present study is based on an analysis of secondary data collected from selected companies. Relevant data for the study have been extracted from the audited annual reports of subsidiaries of SAIL (selected units are ASP, DSP, and IISCO) located in the study area, by personal visit to the company offices. Secondary sources of data are annual balance sheet, profit and loss account, and financial ratios mentioned in the financial statements. Reason for choosing the secondary data is the availability of all required accounting data and its reliability as these annual reports were mandatorily audited by recognized audit firms.

The study solely uses secondary data to gain new insight which is in consistence with the Duru, 2014; Kasuku, 2014, who used exclusively secondary data for their respective studies.

#### **2.5 Research Variables and Their Measurement**

Anything (objects, events, and people) that has quantity or quality that varies is known as variable. A variable could be manipulated to know the effect of another variable. In this study, variables are chosen based upon the previous literature on working capital management. Research variable has been categorized into two one is independent or explanatory variable and the other is dependent variable. These variables are in consistence with the studies of (Deloof, Marc, 2003), (Singh, 2013).

##### **2.5.1 Independent Variables**

Independent variables are those variables that remain standalone and does not change with another variable that we measure. Independent variables are control variables that could be manipulated as per studies' requirement. It does not depend on the dependent variable. Generally, independent variables (IV) and dependent variables (DV) are used to study the relationship between two or more factors. Independent variables are the inputs that represent

valid causes or reasons for variation in the output variable or dependent variable whose variation being studied.

In this present study, chosen independent variables are accounts conversion period in days (ACP), inventory conversion period in days (ICP), accounts payable period in days (APP) and cash conversion cycle (CCC). These chosen independent variables are in line with the previous or past studies on working capital management (Padachi,2006; Gill, Biger,and Mathur, 2010; Rahman, 2011; Makori and Jagongo,2013; Babu and Chalam, 2014).

Efficient working capital management can be identified by a comprehensive method i.e. cash conversion cycle (CCC) and by its elements as accounts collection period in days, inventory conversion period in days and accounts payable period in days.

### **Cash conversion cycle**

Cash conversion cycle (CCC) is an average period of time or period of gap between the payment made to suppliers for purchase of raw materials and the recovery of debt collection out of sale of finished goods from customers. It is calculated by:  $CCC = (\text{Accounts collection period in days} + \text{inventory holding period in days} - \text{accounts payable period in days})$ .

### **Accounts Collection Period**

Accounts collection or receivable period in days is the mean time period that a firm takes to collect amount from its debtors. It is computed by dividing the average debtors or accounts receivables by net sales multiplied by 365 days.

### **Inventory Conversion Period**

Inventory conversion or turnover period is the average number of days the firms hold its inventories. It is computed by dividing average stock by cost of goods sold multiplied by 365 days.

### **Accounts Payable Period**

Accounts payable period in days is the average number of days the firm has been allowed by the creditors to pay off its debts. The computation is made by dividing average trade creditors by net purchase multiplied by 365 days.

### **Fixed Assets Turnover Ratio**

It is commonly used activity ratio that measures the efficiency with which a company uses its permanent assets to generate revenue. In other words, an activity ratio is one that determines the success of a company based on how it has been using its fixed assets to earn income. A high ratio indicates better utilization of the permanent assets whereas a low one signifies poor employment of the resources. It is computed by dividing net sales by average fixed assets of the company.

### **Working Capital Turnover ratio**

Profitability could be affected, if a company fails to utilize its current assets to generate revenue. It represents how efficiently a firm employs its gross working capital (current assets) to fetch earning to the organization. Generally, it builds a relationship between cost of sales and net working capital. A declining ratio implies over investing of working capital that results in low earnings; on the other hand, a high ratio indicates well utilization of current assets in bringing revenue for the firm. This efficiency ratio could be assessed by dividing net sales by working capital.

### **Capital Employed Turnover ratio**

Capital employed turnover ratio entails the ability of the firm to generate sales revenue from the capital employed; signifies the company's efficiency in employing the capital in the business to gain from turnover. A higher capital turnover ratio means the company is sound in acquisition of maximum profits with low amount of capital. It is computed by dividing net sales by capital employed.

### **Total Assets turnover ratio**

It is an efficiency ratio that determines the company's ability in producing maximum sales by deploying all of its assets. It can be expressed as a ratio between two variables - one is revenue or sales and the other is total assets of the company. Total turnover ratio is identified as a determinant of company's performance. A high ratio indicates the satisfactory performance of the company and a low one implies under utilization of total assets in promoting sales or revenue. This could be ascertained by dividing net sales by capital employed.

### **2.5.2 Dependent variables**

An outcome variable or dependent variable is a variable that depends on the independent variables. Variation in dependent variable is measured in scientific experiment by input variables. Due to response by the independent variables, the value of outcome variable changes.

### **Return on Assets**

Profitability of any company is measured by various accounting ratios. Among accounting ratios, Return on Assets (ROA) is the best indicator of measuring firm's performance as it determines earnings based on the total assets and resources employed in the business; it is also identified as a barometer of working capital efficiency. Other accounting measures are R.O.C.E (Return on Capital Employed), R.O.E (Return on Equity), G.O.P (Gross Operating Profit) that is also used

to evaluate the earning capacity of an organization. ROE reflects performance of business by considering the capital structure i.e. the choice between equity and debt. ROA is the simplest accounting measure of ascertaining earning capacity of business enterprises which has been adopted widely in several empirical studies on the working capital management and firm's profitability. This study employs ROA to measure the profitability, which is in consistence with the prior studies of (Yadav, *et al*, 2014: that study used a sample size of 10 Indian large manufacturing companies; Babu and Chalam,2014: that observed the relationship between profitability and components of working capital in Indian leather industry). R.O.A is calculated by dividing Earnings Before Tax (EBT) by Total Assets multiplied by 100.

## **2.6 Tools adopted for analyzing working capital management**

After collection of all financial data, the relevant data are arranged in accordance with the objectives of the study and then entered into the statistical package of social science (SPSS) version 15.0 program to analyze the data. To analyze the working capital position of selected units various well known accounting tools and statistical techniques have been used in the study such as ratio analysis, mean, standard deviation, coefficient of variation, minimum and maximum. A brief detail of the tools used in the research study to attain the objectives have been discussed below:

### **2.6.1 Ratio Analysis**

Ratio analysis is a mathematical technique to determine interrelationship between any two quantitative data or information contained in the financial statement that indicates the financial conditions of the business. Accounting ratios assist organization in comparison of financial facts to recognize the improvement or declining position of companies i.e. strengths and weaknesses. Overall performance of the organization such as solvency, profitability, efficiency, credibility,

etc. can be measured with the help of key ratios. Ratio analysis tool has been used for unit wise comparison of working capital management components i.e. ACP, ICP, APP, and CCC to recognize the improved or deteriorating position of the selected companies i.e., strengths and weaknesses in respect of working capital. Ratio analyses have been used in many past studies on the same theme by Duru (2014); Barad (2010); Tingbani (2015).

### **2.6.2 Descriptive Statistics**

Descriptive statistics are the principal tools in any statistical analysis because that describes the basic features of data and observations in the study. It provides the basic information about the sample by summarizing it together with graphical presentation. To study working capital position of sample units, collected data have been analysed and presented by mean, standard deviation, coefficient of variation, minimum and maximum. Descriptive analysis like mean, standard deviation, minimum and maximum (descriptive in nature) was used to know the basic information about the selected manufacturing units on working capital management position. Various graphs and charts were used to represent the movement or direction of the working capital management variables during the study period in order to provide a brief information about the variables used in the study.

### **2.6.3 Bivariate Analysis**

Bivariate analysis is the simplest form of statistical analysis that measures the differences or association between two variables. Bivariate analysis measures the direction of linear relationship between the variables, also indicates the strengths of association between the two attributes. It is useful in testing the research hypothesis on association between the variables. Correlation coefficient values range from -1 to +1. Zero (0) indicates that there exists no relationship between the variables. Value either close to -1 or +1 signifies that a strongly negative or positive association prevails between the measured variables. In this piece of thesis,

Pearson correlation has been employed/applied to ascertain the relationship between all chosen variables. This is done for establishing the relationship between working capital management variables (viz.Accounts Collection Period, Inventory Conversion Period, Accounts Payable Period, and Cash Conversion Cycle) and firm's profitability measured by R.O.A.(Return on Assets). This statistical tool was adopted in several past studies of (Rimo and Panbunyuen,2010; Afrifa,2013;Duru,2014;Sinku,2015;Makori and Jagongo,2013).Pearson correlation can be computed by the following formula:

$$r = \frac{\sum XY - \frac{(\sum X)(\sum Y)}{n}}{\sqrt{\left(\sum X^2 - \frac{(\sum X)^2}{n}\right) \left(\sum Y^2 - \frac{(\sum Y)^2}{n}\right)}}$$

n = number of pairs of scores

$\sum XY$ = sum of the products of paired scores

$\sum X$ = sum of X scores

$\sum Y$ = sum of Y scores

$\sum X^2$ = sum of squared X scores

$\sum Y^2$ = sum of squared Y scores

#### **2.6.4 Multivariate Analysis**

Multivariate analysis consists of statistical methods that are used to examine two or more phenomena at the same time (Afrifa, 2013). Profitability (dependent variable), in this study, may be affected by several factors or independent variables. To investigate about how working capital components affect profitability, multivariate analysis has been applied due to its multidimensional nature. In this study, time series data analysis has been chosen to test the study's hypothesis i.e., the impact of working capital management on profitability. Linear regression analysis has been employed to scrutinize the effect of working capital management

variables i.e., accounts collection period and cash conversion cycle (in days) on profitability of the organization. A general linear regression model is presented below:

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon_t$$

In the above equation, Y indicates dependent variable; “a” imply a constant which represents the value of y when all the explanatory values are zero. The subscript t denotes the time dimension i.e., t<sup>th</sup> period such as (t equals to 1, 2,....., 13), X<sub>1</sub>, X<sub>2</sub>,.....,X<sub>n</sub> represent explanatory variables.  $\beta_1$ ,  $\beta_2$  and  $\beta_n$  are the slopes of coefficients to be measured and  $\varepsilon_t$  denotes the residual disturbance term.

### **2.6.5 Analysis of Variance (ANOVA)**

Analysis of Variance, in short ANOVA, is a widely used statistical method employed to determine the mean differences between the groups of three or more. According to Ostertagova and Ostertag (2013), it is an extension of t-test for two independent samples to more than two groups. It investigates the effect of one or more factors by comparing the means of different samples (Singh, Gurchetan, 2018). The main purpose of one-way ANOVA is to test for significant mean differences between levels which is done by variance analysis. In this research study, One-way ANOVA is applied to examine the mean difference in the working capital management variables in each company and also to examine the effect or impact of Cash Conversion Cycle (CCC) and Accounts Conversion Period (ACP) on firm’s profitability of the selected public sector companies. The advantages of using one-way ANOVA arise for the following reasons:

Firstly, it is a robust design technique used to check the class mean differences without raising the degree of Type I errors. Or in simple words, it controls the Type I errors which arise in conducting mean difference by “t” test.

Secondly, it checks whether the mean of one group is statistically different from other or not; but it does not show in which way they i.e., mean of one sample, are different from one another. However, to determine which way the mean is different, Post-Hoc test is conducted if the mean is found to be significantly different. F-ratio in one-way ANOVA is the variance ratio which indicates whether sample means are significantly different or not. The lower the ratio, more is the sample mean; whereas, high F-ratio shows that the difference in the mean of the group is statistically significant. The F test is defined as:

$$F \text{ calculated} = \frac{\text{Between Group Variability}}{\text{Within Group Variability}}$$

Where,  $k-1$  and  $n-k$  indicate degree of freedom of numerator and denominator respectively. The approach of accepting the alternative hypothesis if the computed value of F is greater than the critical value of F and if the computed value of F is lesser than the critical value then the null hypothesis is to be accepted.

#### **2.6.6 Post-Hoc Multiple Comparison test (Games Howell)**

One-way ANOVA simply suggests whether the mean of groups is different or similar and signals the decision to accept or reject a hypothesis based on the key statistic i.e., F-ratio. However, it does not point out the way sample's mean is significantly different; therefore, Post-Hoc multiple comparison test is used. Several multiple comparison tests are available in statistics. But in this study, Post-Hoc comparison test using "Games Howell" is used to study statistical significance of groups' mean score differences in terms of working capital management efficiency and to analyze the causes or reasons for mean score differences among the selected companies.

## 2.7 Diagnostic test

Before applying the proposed statistical techniques, the necessary assumptions of the methods have been checked. Test of the underlying assumptions along with their results is presented below.

### 2.7.1 Test for Heterogeneity of Variance

In order to identify whether variances are equal among the groups or not, this study has employed 'Levene Statistic test 1960'. According to this test, if p-value is greater than 0.05, it indicates that there is absence of heterogeneity of variance. The study obtained significant values in both the selected variables (ACP and CCC) i.e., p-values of .061 and .105 respectively. It implies that variance among the selected companies is equal or there is homogeneity of variances among the selected groups. The results of the tests for the selected variables are given in the Table 2.1 and Table 2.2 below.

**Table 2.1**  
**Test of Homogeneity of Variances**

ACP			
Levene Statistic	df1	df2	Sig.
3.763	1	34	.061

**Table 2.2**  
**Test of Homogeneity of Variances**

CCC			
Levene Statistic	df1	df2	Sig.
2.420	2	33	.105

### **2.7.2 Test for Autocorrelation**

As the data used in this research study is in time series form, it raises suspicion about the presence of serial or autocorrelation in the errors in the linear regression model. Therefore, the study uses 'Durbin-Watson 1950' test to measure the presence of serial correlation. A test statistic of Durbin-Watson ranges from 0 to 4; value less than 2 indicates positive autocorrelation and value more than 2 signifies negative autocorrelation and a value of 2 marks that there is no autocorrelation. In this study, the result of Durbin-Watson test for serial correlation in time series data reports the values of 2.133 and 2.04 for the variables ACP and CCC respectively, which reveal that there is absence of serial correlation in the errors in the regression model. From the Table 2.3 and Table 2.4 given below, it can be confirmed that serial correlation or autocorrelation is not an issue in the present study.

**Table 2.3**  
**Test for Autocorrelation (ACP)**

Model Summary<sup>a</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.878 <sup>a</sup>	.767	.760	.23859	.767	111.902	1	34	.000	2.133

a. Predictors: (Constant), ACP

b. Dependent Variable: ROA

**Table 2.4**  
**Test of Autocorrelation (CCC)**

Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df	Df	Sig.F Change	
1	.726(a)	.527	.513	.33349	.527	37.934	1	34	.000	2.04

a Predictors: (Constant), CCC

b Dependent Variable: ROA

## 2.8 Conclusion

An extensive review of past studies related to the area of working capital management and its association with the profitability has been carried out to find out the research gaps in the existing literatures. A time series data set of three large companies (subsidiaries of SAIL) located in Durgapur industrial belt and Asansol sub-division area in West Bengal, India for a period of twelve years i.e., 2001-02 to 2012-13 is selected based on convenience sampling technique. Selected samples include DSP (Durgapur Steel Plant), ASP (Alloy Steel Plant), and IISCO (Indian Iron & Steel Company), all of which are situated in the above mentioned region. Data

have been collected from these three units as stated above, by personal visit. The data collected includes audited income statement, balance sheet, and financial ratios. All the secondary financial data have been analyzed by using SPSS version 15.0. ROA (Return on Assets) is used as dependent variable and Accounts Collection Period (ACP), Inventory Conversion Period (ICP), Accounts Payable Period (APP), Cash Conversion Cycle (CCC), Fixed Assets Turnover Ratio (FATR), Working Capital Turnover Ratio (WCTR), Capital Employed Turnover Ratio (CETR), and Total Assets Turnover Ratio (TATR) have been used as independent variables in the study.