WORKING CAPITAL MANAGEMENT OF CEMENT INDUSTRY IN INDIA – A COMPARATIVE ANALYSIS OF SELECTED UNITS

A THESIS

Submitted to

Saurashtra University

for the award of the degree of

Doctor of Philosophy in Management

Submitted by:
Suraj Narain Mathur

Under the Guidance of
Dr Sanjay J. Bhayani
Associate Professor
Department of Business Management (MBA Programme)
Saurashtra University
Rajkot

March 2010

DECLARATION

I declare that the conceptual framework of the thesis has been developed based on the detailed literature review as shown in the bibliographical references. I have quoted several statistics, notes, opinions and other information directly from various books, journals, periodicals and other reference material with clear mention of the source of information in the references. Apart from these, all other opinions, hypothesis, remarks, inferences, analysis and interpretations in this thesis are my own and original creations.

I also declare that the work done in the thesis entitled "**Working Capital Management of Cement Industry in India – A Comparative Analysis of Selected Units"** is a record of independent research work carried out by me under the supervision and guidance of Dr Sanjay J. Bhayani, Associate Professor, Department of Business Management (MBA Programme), Saurashtra University, Rajkot.

This work has not been previously submitted for the award of any diploma, degree, associateship or other similar title.

Place: Rajkot **Suraj Narain Mathur**
Date:

Dr Sanjay J. Bhayani
Associate Professor
Department of Business Management
(MBA Programme)
Saurashtra University
Rajkot

Date:

CERTIFICATE

It is certified that the thesis entitled **"Working Capital Management of Cement Industry in India – A Comparative Analysis of Selected Units"** is a record of research work done by **Mr Suraj Narain Mathur** during the period of study under my supervision and that the thesis has not been formed the basis for the award of any degree, diploma, associateship, fellowship or similar title to the candidate and that the thesis represents independent work on the part of the candidate.

(Dr Sanjay J. Bhayani)
Research Supervisor

Acknowledgements

In my efforts to make this study successful the biggest source of inspiration was my able guide Dr Sanjay J. Bhayani. He made valuable suggestions at every stage of the study and without his guidance, support and encouragement it would not have been possible to complete the work. I am grateful to Dr Sanjay J. Bhayani for his painstaking guidance by sparing his valuable time.

I am indebted to large number of company executives who threw light on various aspects of working capital management without providing data of their companies. This has greatly helped me to formulate views on many issues. I am thankful to them all.

Cement Manufactures Association is main source for information on cement industry. The Secretary General of CMA, and Joint Secretaries were very helpful and cooperative who provided all the available statistics of the industry and the publications of CMA which were source of great help. I have no words to express thanks to them.

My wife has been constant source of inspiration and support, without her cooperation and encouragement it would not have been possible to complete this work.

A number of friends provided support. It would not have been possible to complete the work without their cooperation. I am grateful to all of them.

Suraj Narain Mathur

Preface

Working and fixed capital are necessary financial requirement to run any industrial or service enterprise through their relative share and importance varies according to the nature of the industry. In heavy capital intensive industries like cement fixed capital requirement is much more than working or floating funds. But over the years with inflation in the prices of inputs, the share of working capital in total assets has gone up and gradually problem of resources is becoming more serious than ever before.

In order to properly understand the working capital needs of cement industry and its management, this study has selected certain companies whose main activity is "manufacture of cement".

The major components of working capital are cash and bank balances, sundry creditors or receivables, inventory and miscellaneous current assets (which in many cases had been found of larger significance than others).

The study reveals that there are wide year to year fluctuations in all component of working capital. These variations have not dependent merely upon economic factors but have been greatly influenced by indifferent management of current assets. It appears from the study that most of the matters have been left to chance. Modern techniques of management which call for detailed evaluation of cost benefit

analysis is not often employed in decision-making for various components of working capital.

The management of cash requires reduction and lowering cash current ratio to 2 to 4 per cent and proper utilization of surplus cash to earn interest by investing them in short-term profitable securities. There is also great scope to economise in cash balances by more accurate forecast of inflows and outflows and timely receipt of funds due from sundry debtors.

In the matter of receivables companies have depended generally on the judgement of marketing department and proper credit assessment is not done by finance department, nor limits are fixed on scientific basis. There are increasing over-dues and bad debts due to faulty system of collection besides defects in existing system of assessment of financial position of customers.

Inventory is not properly managed in India in general and cement industry management is no exception. The economics of scale in inventory management have not been achieved with enlargement of capacities. In certain areas there is cluster of factories, which provides opportunity for reduction in inventory through joint efforts. A number of factories belong to a limited number of business groups but no effort has been to take its advantage to reduce inventories.

The two major limitations of the study have been multifarious activities of many big cement units belonging to

large companies. Therefore, they had to be left out irrespective of their share in cement production because separate financial data are not available for cement operations. Secondly, the study had to be restricted to the data published in annual accounts, as no one was willing to provide any further information. But in spite of these limitations the research has come out with important results and suggestions.

The study has been divided into seven chapters. The first chapter "Management of Working Capital" is introductory giving the meaning, theory, objectives and importance of working capital, its concepts, principles, factors determining the need of working capital, techniques, adequacy and structure of working capital and at last hypotheses, methodology and plan of the study.

The second chapter is on 'Review of Literature'.

The third chapter is on "History and Growth of Cement Industry in India" highlights an introduction, historical background an growth of the industry in India, its position, trends, performance appraisal, nature, imports, exports, financial ratios, financial aggregates and problem of cement industry in India. It also contains the sources of its raw material, prices and regulation of prices.

The fourth chapter "Analysis of Cash and Liquidity Management" incorporates the functions of cash management, cash planning and control in the research study. Liquidity Analysis contains the meaning and importance of trends analysis, methods of expressing trends and limitations of

trends and liquidity analysis. Working capital trends, current assets trends, current liabilities trends and working capital turnover ratio are also calculated of selected cement units in this chapter.

The fifth chapter "Accounts Management" evaluated in addition to practise and procedure, size composition analysis of the efficiency of granting credit and collection in selected units during the period under study.

The sixth chapter "Inventory Management and Control" assesses the size and growth on inventory on the selected units. Further, the practice and procedure of inventory control being adopted in the cement industry have been also studied.

Conclusion and significant suggestions have been made in the last chapter.

CONTENTS

Chapter-I

Working Capital Management

- Concept of Working Capital Management

  - Current assets
  - Current Liabilities
  - Circulating Capital

- Structure of Working Capital
- Circulation of Working Capital
- Classification of Working Capital
- Importance of Working Capital Management
- Meaning of Working Capital Management
- Significance of Working Capital Management
- Difference between Working Capital Management and the Fixed Assets Management
- Theory of Working Capital Management
- Factors influencing Working Capital Requirements
- Principles of Working Capital Management
- The Operating Cycle
- Duration of Operating Cycle
- Determinants of Working Capital
- Forecasting of Working Capital
- Control of Working Capital
- Adequacy of Working Capital
- Sources of Working Capital
- Structure of Working Capital

- The Present Study and Methodology

The uses of funds of a concern can be divided into two parts namely long-term funds and short-term funds. The long – term investment may be termed as 'fixed investment.' A major part of the long-term funds is invested in the fixed assets. These fixed assets are retained in the business to earn profits during the life of the fixed assets. To run the business operations short–term assets are also required.

Concept of Working Capital Management

There are two concepts of working capital *viz.* **quantitative** and **qualitative.** Some people also define the two concepts as gross concept and net concept. According to quantitative concept, the amount of working capital refers to 'total of current assets'. What we call current assets? Smith[1] called, 'circulating capital'. Current assets are considered to be gross working capital in this concept.

The qualitative concept gives an idea regarding source of financing capital. According to qualitative concept the amount of working capital refers to "excess of current assets over current liabilities."[2] L.J. Guthmann defined working capital as "the portion of a firm's current assets which are financed from long–term funds."[3]

The excess of current assets over current liabilities is termed as 'Net working capital'. In this concept "Net working

capital" represents the amount of current assets which would remain if all current liabilities were paid. Both the concepts of working capital have their own points of importance. "If the objectives is to measure the size and extent to which current assets are being used, 'Gross concept' is useful; whereas in evaluating the liquidity position of an undertaking 'Net concept' becomes pertinent and preferable.

It is necessary to understand the meaning of current assets and current liabilities for learning the meaning of working capital, which is explained below.

Current assets – It is rightly observed that "Current assets have a short life span. These type of assets are engaged in current operation of a business and normally used for short–term operations of the firm during an accounting period *i.e.* within twelve months. The two important characteristics of such assets are, (i) short life span, and (ii) swift transformation into other form of assets. Cash balance may be held idle for a week or two, account receivable may have a life span of 30 to 60 days, and inventories may be held for 30 to 100 days."[4]

Fitzgerald defined current assets as, "cash and other assets which are expected to be converted in to cash in the ordinary course of business within one year or within such longer period as constitutes the normal operating cycle of a business."[5]

Current liabilities – The firm creates a Current Liability towards creditors (sellers) from whom it has purchased raw materials on credit. This liability is also known as accounts payable and shown in the balance sheet till the payment has been made to the creditors.

The claims or obligations which are normally expected to mature for payment within an accounting cycle are known as current liabilities. These can be defined as "those liabilities where liquidation is reasonably expected to require the use of existing resources properly classifiable as current assets, or the creation of other current assets, or the creation of other current liabilities."[6]

Circulating capital – working capital is also known as 'circulating capital or current capital.' "The use of the term circulating capital instead of working capital indicates that its flow is circular in nature."

Structure of Working Capital

The different elements or components of current assets and current liabilities constitute the structure of working capital which can be illustrated in the shape of a chart as follows:

Structure of Current Assets and Current Liabilities

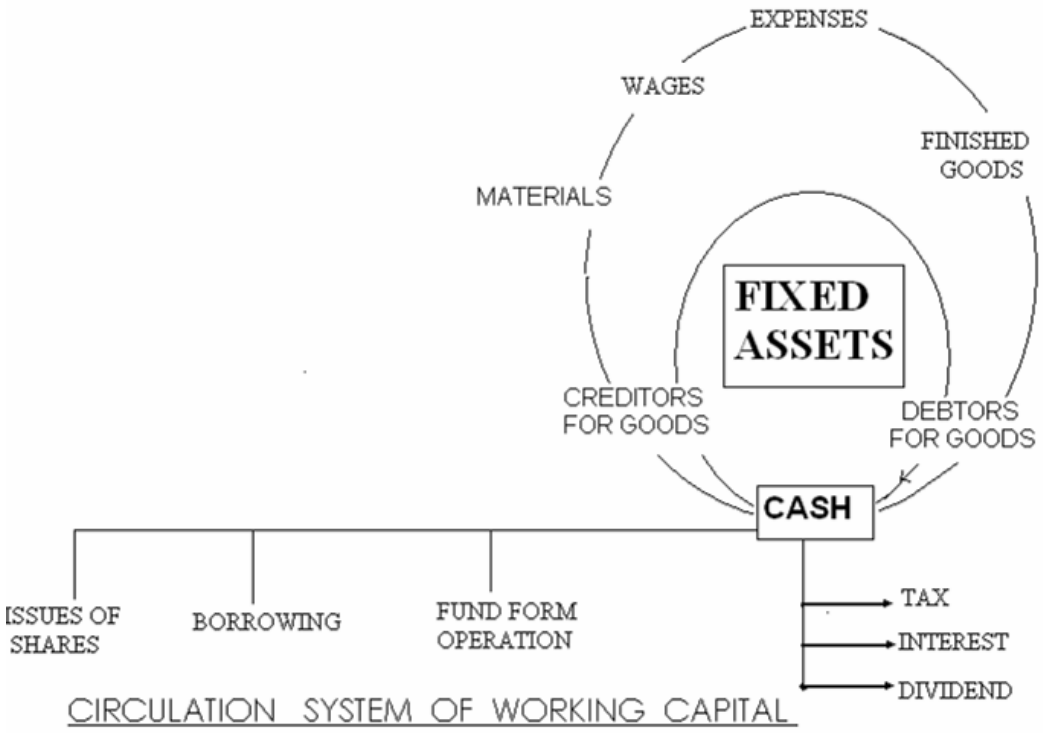
Current Liabilities	**Current Assets**
Bank Overdraft	Cash and Bank Balance
Creditors	Inventories: Raw-Materials Work-in-progress Finished Goods
Outstanding Expenses	Spare Parts
Bills Payable	Accounts Receivables
Short-term Loans	Bills Receivables
Proposed Dividends	Accrued Income
Provision for Taxation, etc.	Prepaid Expenses Short-term Investments

Circulation of Working Capital

At one given time both the current assets and current liabilities exist in the business. The current assets and current liabilities are flowing round in a business like an electric current. However, "The working capital plays the same role in the business as the role of heart in human body. Working capital funds are generated and these funds are circulated in the business. As and when this circulation stops, the business becomes lifeless. It is because of this reason that he working capital is known as the circulating capital as it circulates in the business just like blood in the human body."[7]

Figure No.1 depicting 'Working Capital Cycle' makes it clear that the amount of cash is obtained mainly from issue of shares, borrowing and operations. Cash funds are used to purchase fixed assets, raw materials and used to pay to creditors. The raw materials are processed; wages and

overhead expenses are paid which in result produce finished goods for sale.



CIRCULATION SYSTEM OF WORKING CAPITAL

The sale of goods may be for cash or credit. In the former case, cash is directly received while in later case cash is collected from debtors. Funds are also generated from operation and sale of fixed assets. A portion of profit is used for payment of interest, tax and dividends while remaining is retained in the business. This cycle continues throughout the life of the business firm.

Classification of Working Capital

The quantitative concept of Working Capital is known as gross working capital while that under qualitative concept is known as net working capital.

Working capital can be classified in various ways. The important classifications are as given below:

Conceptual classification – There are two concept of working capital *viz.,* quantitative and qualitative. The quantitative concept takes into account as the current assets while the qualitative concept takes into account the excess of current assets over current liabilities. Deficit of working capital exists where the amount of current liabilities exceeds the amount of current assets. The above can be summarised as follows:

(i) Gross Working Capital = Total Current Assets

(ii) Net Working Capital = Excess of Current Assets over Current Liabilities

(iii) Working Capital Deficit = Excess of Current Liabilities over Current Assets.

Classification on the basis of financial reports – The information of working capital can be collected from Balance Sheet or Profit and Loss Account; as such the working capital may be classified as follows:

(i) **Cash Working Capital –** This is calculated from the information contained in profit and loss account. This concept of working capital has assumed a

great significance in recent years as it shows the adequacy of cash flow in business. It is based on 'Operating Cycle Concept's which is explained later in this chapter.

(ii) **Balance Sheet Working Capital** – The data for Balance Sheet Working Capital is collected from the balance sheet. On this basis the Working Capital can also be divided in three more types, *viz.*, gross Working Capital, net Working Capital and Working Capital deficit.

Classification on the Basis of Variability – Gross Working Capital can be divided in two categories *viz.*, (i) permanent or fixed working capital, and (ii) Temporary, Seasonal or variable working capital. Such type of classification is very important for hedging decisions.

(i) **Temporary Working Capital** – Temporary Working Capital is also called as fluctuating or seasonal working capital. This represents additional investment needed during prosperity and favourable seasons. It increases with the growth of the business. "Temporary working capital is the additional assets required to meet the variations in sales above the permanent level."[8] This can be calculated as follows:

Temporary Working Capital = Total Current Assets – permanent Current Assets

(ii) **Permanent Working Capital –** It is a part of total current assets which is not changed due to variation in sales. There is always a minimum level of cash, inventories, and accounts receivables which is always maintained in the business even if sales are reduced to a minimum. Amount of such investment is called as permanent working capital. "Permanent Working Capital is the amount of working capital that persists over time regardless of fluctuations in sales."[9] This is also called as regular working capital.

Importance of Working Capital Management

For smooth running an enterprise, adequate amount of working capital is very essential. Efficiency in this area can help, to utilize fixed assets gainfully, to assure the firm's long-term success and to achieve the overall goal of maximization of the shareholders, fund. Shortage or bad management of cash may result in loss of cash discount and loss of reputation due to non-payment of obligation on due dates. Insufficient inventories may be the main cause of production held up and it may compel the enterprises to purchase raw materials at unfavourable rates.

Like-wise facility of credit sale is also very essential for sales promotions. It is rightly observed that "many a times business failure takes place due to lack of working capital."[10] Adequate working capital provides a cushion for bad days, as

a concern can pass its period of depression without much difficulty.

O' Donnel *et al.* correctly explained the significance of adequate working capital and mentioned that "to avoid interruption in the production schedule and maintain sales, a concern requires funds to finance inventories and receivables."

The adequacy of cash and current assets together with their efficient handling virtually determines the survival or demise of a concern.[11] An enterprise should maintain adequate working capital for its smooth functioning. Both, excessive working capital and inadequate working capital will impair the profitability and general health of a concern.

The danger of excessive working capital are as follows:

Heavy investment in fixed assets – A concern may invest heavily in its fixed assets which is not justified by actual sales. This may create situation of over capitalisation.

Reckless purchase of materials- Inventory is purchased recklessly which results in dormant slow moving and obsolete inventory. At the same time it may increase the cost due to mishandling, waste, theft, etc.

Speculative tendencies - Speculative tendencies may increase and if profit is increased dividend distribution will also increase. This will hamper the image of a concern in future when speculative loss may start.

Liberal credit - Due to liberal credit, size of accounts receivables will also increase. Liberal credit facility can increase

bad debts and wrong practices will start, regarding delay in payments.

Carelessness - Excessive working capital will lead to carelessness about costs which will adversely affect the profitability.

Paucity of working capital is also bad and has the following dangers:

1. Implementation of operating plans becomes difficult and a concern may not achieve its profit target.
2. It is difficult to pay dividend due to lack of funds.
3. Bargaining capacity is reduced in credit purchases and cash discount could not be availed.
4. An enterprise looses its reputation when it becomes difficult even to meet day-to- day commitments.
5. Operating inefficiencies may creep in when a concern cannot meet it financial promises.
6. Stagnates growth as the funds are not available for new projects.
7. A concern will have to borrow funds at an exorbitant rate of interest in case of need.
8. Sometimes, a concern may be bound to sale its product at a very reduced rates to collect funds which may harm its image.

Meaning of Working Capital Management

The management of current assets, current liabilities and inter-relationship between them is termed as working capital management. "Working capital management is concerned with

problems that arise in attempting to manage the current assets, the current liabilities and the inter-relationship that exist between them."[12] In practice, "There is usually a distinction made between the investment decisions concerning current assets and the financing of working capital."[13]

From the above, the following two aspects of working capital management emerges:

(1) To determine the magnitude of current assets or "level of working capital" and

(2) To determine the mode of financing or "hedging decisions."

Significance of Working Capital Management

Funds are needed in every business for carrying on day-to-day operations. Working capital funds are regarded as the life blood of a business firm. A firm can exist and survive without making profit but cannot survive without working capital funds. If a firm is not earning profit it may be termed as 'sick', but, not having working capital may cause its bankruptcy working capital in order to survive. The alternatives are not pleasant. Bankruptcy is one alternative. Being acquired on unfavourable term as another. Thus, each firm must decide how to balance the amount of working capital it holds, against the risk of failure."[14]

Working capital has acquired a great significance and sound position in the recent past for the twin objects of profitability and liquidity. In period of rising capital costs and scare funds, the working capital is one of the most important

areas requiring management review. It is rightly observed that, "Constant management review is required to maintain appropriate levels in the various working capital accounts."[15] Mainly the success of a concern depends upon proper management of working capital so "working capital management has been looked upon as the driving seat of financial manaser."[16]

It consumes a great deal of time to increase profitability as well as to maintain proper liquidity at minimum risk. There are many aspects of working capital management which make it an important function of the finance manager. In fact we need to know when to look for working capital funds, how to use them and how measure, plan and control them.

A study of working capital management is very important foe internal and external experts. Sales expansion, dividend declaration, plants expansion, new product line, increase in salaries and wages, rising price level, etc., put added strain on working capital maintenance. Failure of any enterprise is undoubtedly due to poor management and absence of management skill.

Importance of working capital management stems from two reasons, *viz.,* (i) A substantial portion of total investment is invested in current assets, and (ii) level of current assets and current liabilities will change quickly with the variation in sales. Though fixed assets investment and long-tem borrowing will also response to the changes in sales, but its response will be weak.

Difference between the Working Capital Management and the Fixed Assets Management

In fact management of working capital is similar to that of fixed assets management in the sense that in both cases a firm analyses their effects on its profitability and risk. However, fixed assets management and working capital management differ in three important ways. Firstly, in managing fixed assets time is very important. Consequently, discounting and compounding aspects of time element play a significant role in capital budgeting and a minor one in the working capital management. Secondly, large holdings of current assets specially cash, strengthen a firm's liquidity position (and reduce risks), but they also reduce overall profitability. Thirdly, the level of fixed as well as current assets depends upon the expected sales, but it is only current assets, which can be adjusted with sales fluctuations in the short-run.

Theory of Working Capital Management

The interaction between current assets and current liabilities is, therefore, the main theme of the theory of working capital management. Working capital management is concerned with the problem that arises in attempting to manage the current assets, the current liabilities and the inter-relationship that exist between them. The goal of working capital management is to manage a firm's current assets and current liabilities in such a way that a satisfactory level of working capital is maintained.

Factors Influencing Working Capital Requirement

Numerous factors can influence the size and need of working capital in a concern. So no set rule or formula can be framed. It is rightly observed that, "There is no precise way to determine the exact amount of gross or net working capital for every enterprise. The data and problem of each company should be analysed to determine the amount of working capital.

Briefly, the optimum level of current assets depends upon following determinants.

Nature of business--Trading and industrial concerns require more funds for working capital. Concerns engaged in public utility services need less working capital. For example, if a concern is engaged in electric supply, it will need less current assets, firstly due to cash nature of the transactions and secondly due to sale of services. However, it will invest more in fixed assets.

In addition to it, the investment varies concern to concern, depending upon the size of business, the nature of the product, and the production technique.

Conditions of supply-- If the supply of inventory is prompt and adequate, less funds will be needed. But, if the supply is seasonal or unpredictable, more funds will be invested in inventory. Investment in working capital will fluctuate in case of seasonal nature of supply of raw materials, spare parts and stores.

P**roduction policy--** In case of seasonal fluctuations in sales, production will fluctuate accordingly and ultimately requirement of working capital will also fluctuate. However, sales department may follow a policy of off-season discount, so that sales and production can be distributed smoothly throughout the year and sharp, variations in working capital requirement are avoided.

Seasonal Operations-- It is not always possible to shift the burden of production and sale to slack period. For example, in case of sugar mill more working capital will be needed at the time of crop and manufacturing.

Credit Availability-- If credit facility is available from banks and suppliers on favourable terms and conditions, less working capital will be needed. If such facilities are not available more working capital will be needed to avoid risk.

Credit policy of enterprises-- In some enterprises most of the sale is at cash and even it is received in advance while, in other sales is at credit and payments are received only after a month or two. In former case less working capital is needed than the later. The credit terms depend largely on norms of industry but enterprise some flexibility and discretion. In order to ensure that unnecessary funds are not tied up in book debts, the enterprise should follow a rationalized credit policy based on the credit standing of the customers and other relevant factors.

Growth and expansion-- The need of working capital is increasing with the growth and expansion of an enterprise. It is difficult to precisely determine the relationship between volume of sales and the working capital needs. The critical fact, however, is that the need for increased working capital funds does not follow growth in business activities but precedes it. It is clear that advance planning is essential for a growing concern.

Price level change— With the increase in price level more and more working capital will be needed for the same magnitude of current assets. The effect of rising prices will be different for different enterprises.

Circulation of working capital— Less working capital will be needed with the increase in circulation of working capital and *vice-versa*. Circulation means time required to complete one cycle *i.e.* from cash to material, from material to work-in-progress, form work-in-progress to finished goods, from finished goods to accounts receivable and from accounts receivable to cash.

Volume of sale-- This is directly indicated with working capital requirement, with the increase in sales more working capital is needed for finished goods and debtors, its *vice versa* is also true.

Liquidity and profitability-- There is a negative relationship between liquidity and profitability. When working capital in relation to sales is increased it will reduce risk and

profitability on one side and will increase liquidity on the other side.

Management ability — Proper co-ordination in production and distribution of goods may reduce the requirement of working capital, as minimum funds will be invested in absolute inventory, non-recoverable debts, etc.

External Environment — With development of financial institutions, means of communication, transport facility, etc., needs of working capital is reduced because it can be available as and when needed.

Principles of Working Capital Management

The following are the principles of working capital management:

Principles of the risk variation— Risk here refers to the inability of firm to maintain sufficient current assets to pay its obligations. If working capital is varied relative to sales, the amount of risk that a firm assumes is also varied and the opportunity for gain or loss is increased. In other words, there is a definite relationship between the degree of risk and the rate of return. As a firm assumes more risk, the opportunity for gain or loss increases. As the level of working capital relative to sales decreases, the degree of risk increases. When the degree of risk increases, the opportunity for gain and loss also increases. Thus, if the level of working capital goes up, amount of risk goes down, and *vice-versa,* the opportunity for gain is like-wise adversely affected.

Principle of equity position— According to this principle, the amount of working capital invested in each component should be adequately justified by a firm's equity position. Every rupee invested in the working capital should contribute to the net worth of the firm.

Principle of cost of capital— This principle emphasizes that different sources of finance have different cost of capital. It should be remembered that the cost of capital moves inversely with risk. Thus, additional risk capital results in decline in the cost of capital.

Principle of maturity of payment— A company should make every effort to relate maturity of payments to its flow of internally generated funds. There should be the least disparity between the maturities of a firm's short-term debt instruments and its flow of internally generated funds, because a greater risk is generated with greater disparity. A margin of safety should, however, be provided for any short-term debt payment.

Operating Cycle

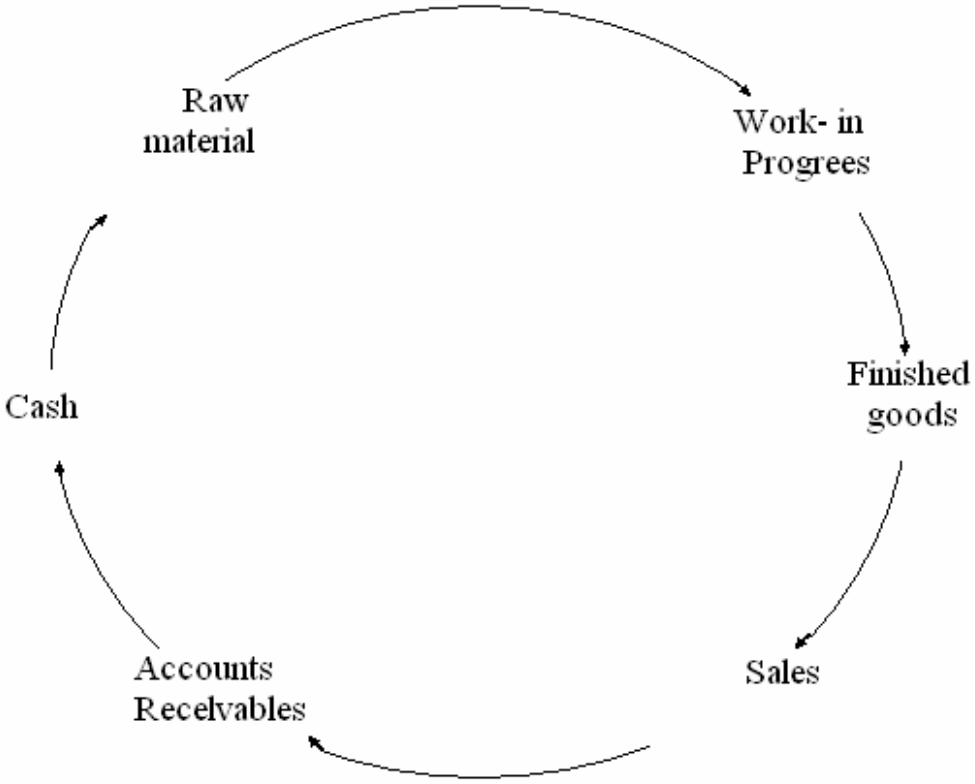
The duration of time required to complete the following sequence of events, in case of manufacturing firm, is called the operating cycle:

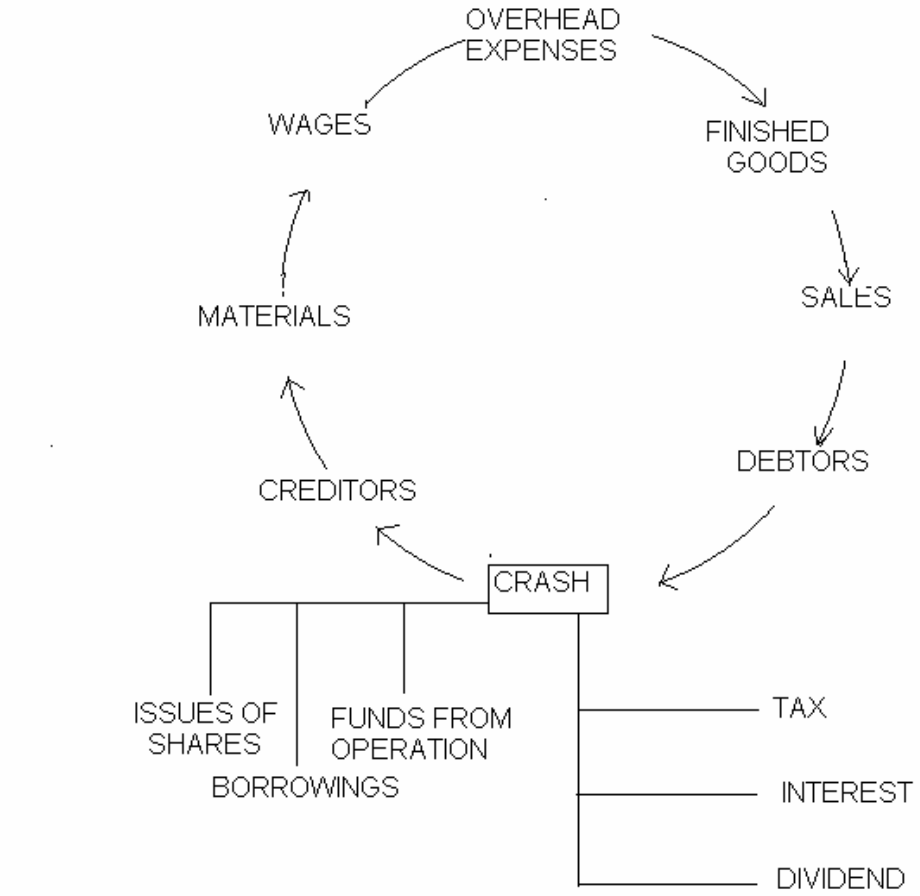
1. Conversion of cash into raw materials.
2. Conversion of raw materials into work-in-progress.
3. Conversion of work in process into finished goods.

4. Conversion of finished goods into debtors and bills receivables through sales.
5. Conversion of debtors and bills receivables into cash.

The length of cycle will depend on the nature of business. Non manufacturing concerns, service concerns and financial concerns will not have raw material and work-in-process so their cycle will be shorter. Financial Concerns have a shortest operating cycle.

Operating Cycle of Manufacturing Concerns





Duration of the Operating Cycle

The duration of the operating cycle is equal to the sum of the duration of each of these stages less the credit period allowed by the suppliers of the firm. In symbols,

$$O = R + W + F + D - C$$

Where,

O = duration of operating cycle.

R = raw material storage period.

W= work-in-process period.

F= finished goods storage period.

D=debtors collection period, and

C = creditors payment period.

The components of the operating cycle may be calculated as follows:

$$R = \frac{\text{Average stock of raw materials and stores}}{\text{Average raw material and stores consumption per day}}$$

$$W = \frac{\text{Average work-in-process inventory}}{\text{Average cost of production per day}}$$

$$F = \frac{\text{Average finished goods inventory}}{\text{Average cost of goods sold per day per day}}$$

$$D = \frac{\text{Average book debts}}{\text{Average credit sales per day}}$$

$$C = \frac{\text{Average trade creditors}}{\text{Average credit purchase per day}}$$

Determinants of Working Capital

There are no set rules or formulas to determine the working capital requirement of a firm. A number of factors influence the need and quantum of the working capital of a firm. These are discussed below:

Nature of industry– The composition of an asset is related to the size of a business and the industry to which it belongs. Small companies have smaller proportion of cash, requirements and inventory than large corporations. Need of

working capital is thus determined by the nature of an enterprise.

Demand of creditors– Creditors are interested in the security of loans. They want their advances to be sufficiently covered. They want the amount of security in assets which are greater than liabilities.

Cash requirements– Cash is one of the current assets which are essential for the successful operations of the production cycle. Cash should be adequate and properly utilized. A minimum level of cash is always needed to keep the operations going.

General nature of business– The general nature of a business is an important determinant of the level of the working capital. Working capital requirements depends upon the general nature and its activity on work. They are relatively low in public utility concerns in which inventories and receivables are rapidly converted into cash. Manufacturing organisations, however, face problems of slow turn-over of inventories and receivables, and invest large amount in working capital.

Time- The level of working capital depends upon the time required to manufacture goods. If the time is longer, the amount of working capital required is greater and *vice-versa.* Moreover, the amount of working capital depends upon inventory turnover and the unit cost of goods that are sold. The greater this cost, the larger is the amount of working capital.

Volume of sales– This is the most important factor affecting the size and component of working capital. A firm maintains current assets because they are needed to support the operational activities which results in sales. The volume of sales and the size of the working capital are directly related to each other. As the volume of sales increases, there is an increase in the investment of working capital in the cost of operations, in inventories and in receivables.

Terms of purchases and sales– If the credit terms of purchases are more favourable and those of sales less liberal, less cash will be invested in inventory. With more favourable credit terms, working capital requirements can be reduced as a firm gets time for payment to creditors or suppliers.

Inventory turnover– If the inventory turnover is high, the working capital requirements will be low. With good and efficient inventory control, a firm is able to reduce its working capital requirements.

Receivables turnover– It is necessary to have effective control over receivables. Prompt collection of receivables and good facilities for setting payables result into low working capital requirements.

Business cycle– Business expands during periods of prosperity and decline during a period of depression.

Consequently, more working capital is required during periods of prosperity and less during the periods of depression.

Variation in sales– A seasonal business requires the maximum amount of working capital for a relatively short period of time.

Production cycle– The time taken to convert raw material into finished products is referred to as the production cycle or operating cycle. The longer the duration of production cycle, the greater is the requirement of working capital. Utmost care should be taken to shorten the period of the production cycle in order to minimize working capital requirements.

Liquidity and profitability– If a firm desires to take a greater risk for bigger gains or losses, it reduces the size of its working capital in relation to its sales. If it is interested in improving its liquidity, it increases the level of its working capital. However, this policy is likely to result in a reduction of sales volume and, therefore, of profitability. A firm, therefore, should choose between liquidity and profitability and decide about its working capital requirements accordingly.

Profit planning and control– The level of working capital is decided by management in accordance with its policy of profit planning and control. Adequate profit assists in the generation of cash. It makes it possible for management to

plough back a part of earnings into the business and substantially build up internal financial resources.

Activities of the firm– A firm's stocking of heavy inventory or selling on easy credit term calls for a higher level of working capital than a firm selling services or making cash sales.

Forecasting of Working Capital

To forecast the working capital requirement for the next year the following formula may be used :

(Estimated cost of goods sold x Operating Cycle) + Desired Cash Balance

Control of Working Capital

Working capital requirement depends upon the level of operation and the length of operating cycle. Monitoring the duration of the operating cycle is an important ingredient of working capital control. In this context, the following points should borne in mind:

1. The duration of the raw material stage depends on regularity of supply, transportation time, price fluctuations and economy of bulk purchase. For imported materials it takes a longer time.

   Example – X Ltd. Expects its cost of goods sold for the forthcoming year to be Rs. 2 crore. The present operating cycle of the firm is 78 days. The firm plans to reduce its

operating cycle to 73 days and desired cash balance is Rs. 5 lakh.

The expected working capital requirement would be,

$$2,00,00,000 \times \frac{73}{365} + 5,00,000 = \text{Rs. } 45,00,000$$

2. The duration of the work-in-process depends on the length of manufacturing cycle, consistency in capacities at different stages, and efficient coordination of various inputs.

3. The duration of the finished goods depends on the pattern of production and sales. If production is fairly uniform throughout the year but sales are highly seasonal or *vice versa.* The duration of finished goods tends to be long.

4. The duration at the debtors stage depends on the credit period granted, discounts offered for prompt payment, and efficiency and rigour of collection efforts.

It is helpful to monitor the behaviour of overall operating cycle and its individual components. For this purpose time series analysis and cross section analysis may be done. In time series analysis the duration of the operating cycle and its individual components is compared over a period of time for same firm. In cross section analysis the duration of the operating cycle and its individual components is compared with that of other firms of a comparable nature.

Adequacy of Working Capital

The importance of adequacy of working capital can hardly be over-emphasized. John L. O. Donnell and Milton S. Gladberg observe "Many a times business failure takes place due to lack of working capital."[19] Hence, working capital is considered as the life blood and the controlling nerve centre of a business. Inadequate working capital is business ailment.[20] Therefore, a firm has to maintain a sound working capital. It should be adequate foe the following reasons:

(1) It protects a business form the adverse effects of shrinkage in the values of current assets.

(2) It is possible to pay all the current obligations promptly and to take advantage of cash discounts.

(3) It ensures, to a greater extent, the maintenance of a company's credit standing and provides for such emergencies as strikes, floods, fires etc.

(4) It permits the carrying of inventories at a level that would enable a business to serve satisfactorily the needs of its customers.

(5)` It enables a company to extend favourable credit terms to its customers.

(6) It enables a company to operate its business more efficiently because there is no delay in obtaining materials, etc., because of credit difficulties.

(7) It enables a business to withstand periods of depression smoothly.

(8) There may be operating losses or decreased retained earnings.

(9) There may be excessive non-operating or extraordinary losses.

(10) The management may fail to obtain funds from other sources for purposes of expansion.

(11) There may be an unwise dividend policy

(12) Current funds may be invested in non-current assets

(13) The management may fail to accumulate funds necessary for meeting debentures on maturity.

(14) Increasing price may necessitate bigger investments in inventories and fixed asset.

Source of Working Capital

Conventional generalizations relating to financing of working capital suggest that an amount equal to the basic minimum of current assets should be financed from long-term source and that only seasonal needs of working capital should be financed from short-term sources.[21] It is obvious that such an arrangement helps to keep the cost of working capital finance to the minimum for an enterprise and gives a rise to its rate of return on the total funds employed. Viewed thus, the sources of working finance can be classified into permanent and the current sources of working capital finance.

Structure of Working Capital

The study of structure of working capital is another name for the study of working capital cycle. In other words, it can be said that the study of structure of working capital is the study of the elements of current assets *viz.* inventory, receivable, cash and bank balances and other liquid resources like short-term or temporary investments. Current liabilities usually comprise bank borrowings, trade credits, assessed tax and unpaid dividends or any other such things. The following points mention relating to various elements of working capital deserves:

Inventory– Inventory is major item of current assets. The management of inventories – raw material, goods-in-process and finished goods is an important factor in the short-run liquidity positions and long-term profitability of the company.

Raw material inventories– Uncertainties about the future demand for finished goods, together with the cost of adjusting production to change in demand will cause a financial manager to desire some level of raw material inventory. In the absence of such inventory, the company could respond to increased demand for finished goods only by incurring explicit clerical and other transactions costs of ordinary raw material for processing into finished goods to meet that demand. If changes in demand are frequent, these order costs may become relatively large. Moreover, attempts to purchases hastily the needed raw material may necessitate payment of premium

purchases prices to obtain quick delivery and, thus, raises cost of production. Finally, unavoidable delays in acquiring raw material may cause the production process to shut down and then re-start again raising cost of production. Under these conditions the company cannot respond promptly to changes in demand without sustaining high costs. Hence, some level of raw materials inventory has to be held to reduce such costs. Determining its proper level requires an assessment of costs of buying and holding inventories and a comparison with the costs of maintaining insufficient level of inventories.

Work-in-process inventory– This inventory is built up due to production cycle. Production cycle is the time-span between introduction of raw material into production and emergence of finished product at the completion of production cycle. Till the production cycle is completed, the stock of work-in-process has to be maintained.

Finished goods inventory– Finished goods are required for reasons similar to those causing the company to hold raw materials inventories. Customer's demand for finished goods is uncertain and variable. If a company carries no finished goods inventory, unanticipated increases in customer demand would require sudden increases in the rate of production to meet the demand. Such rapid increase in the rate of production may be very expensive to accomplish. Rather than loss of sales, because the additional finished goods are not immediately available or sustain high costs of rapid additional

production, it may be cheaper to hold a finished goods inventory. The flexibility afforded by such an inventory allows a company to meet unanticipated customer demands at relatively lower costs than if such an inventory is not held.

Thus, to develop successfully optimum inventory policies, the management needs to know about the functions of inventory, the cost of carrying inventory, economic order quantity and safety stock. Industrial machinery is usually very costly and it is highly uneconomical to allow it to lie idle. Skilled labour also cannot be hired and fired at will. Modern requirements are also urgent. Since requirements cannot wait and since the cost of keeping machine and men idle is higher, than the cost of storing the material, it is economical to hold inventories to the required extent. The objectives of inventory management are:

(1) To minimize idle cost of men and machines causes by shortage of raw materials, stores and spare parts.

(2) To keep down:

   (a) Inventory ordering cost.

   (b) Inventory carrying cost,

   (c) Capital investment in inventories.

   (d) Obsolescence losses

Receivables – Many firms make credit sales and as a result thereof carry receivable as a current asset. The practice of carrying receivables has several advantages *viz.,* (i) reduction

of collection costs over cash collection, (ii) Reduction in the variability of sales, and (iii) increase in the level of near-term sales. While immediate collection of cash appears to be in the interest of shareholders, the cost of that policy may be very high relative to costs associated with delaying the receipt of cash by extension of credit. Imagine, for example, an electric supply company employing a person at every house constantly reading electricity meter and collecting cash from him every minute as electricity is consumed. It is far cheaper for accumulating electricity usage and bill once a month. This of course, is a decision to carry receivables on the part of the company. It may also be true that the extension of credit by the firm to its customers may reduce the variability of sales over time. Customers confined to cash purchases may tend to purchase goods when cash is available to them. Erratic and perhaps cyclical purchasing patterns may then result unless credit can be obtained elsewhere. Even if customers do obtain credit elsewhere, they must incur additional cost of search in arranging for a loan costs that can be estimated when credit is given by a supplier. Therefore, extension of credit to customers may well smooth out of the pattern of sales and cash inflows to the firm over time since customers need not wait for some inflows of cash to make a purchase. To the extent that sales are smoothed, cost of adjusting production to changes in the level of sales should be reduced.

Finally, the extension of credit by firms may act to increase near-term sales. Customers need not wait to accumulate necessary cash to purchase an item but can acquire it immediately on credit. This behaviour has the effect of shifting future sales close to the present time.

Therefore, the extension of credit by a firm and the resulting investment in receivables occurs because it pays a firm to do so. Costs of collecting revenues and adapting to fluctuating customer demands may make it desirable to offer the convenience associated with credit to firm's customers. To the extents that near sales are also increased, extension of credit is made even more attractive for the firm.

Cash and interest-bearing liquid assets– Cash is one of the most important tools of day-to-day operation, because it is a form of liquid capital which is available for assignment to any use. Cash is often the primary factor which decides the course of business destiny. The decision to expand a business may be determined by the availability of cash and the borrowing of funds will frequently be dictated by cash position. Cash-in-hand, however, is a non-earning asset. This leads to the question as to what is the optimum level of this idle resource. This optimum depends on various factors such as the manufacturing cycle, the sale and collection cycle, age of the bills and on the maturing of debt. It also depends upon the liquidity of other current assets and the matter of expansion. While a liberal maintenance of cash provides a sense of

security, a lack of sufficiency of cash hampers day-to-day operations. Prudence, therefore, requires that no more cash should be kept on hand than the optimum required for handling miscellaneous transactions over the counter and petty disbursements etc.

It has not become a practice with business enterprises to avoid too much redundant cash by investing a portion of their earnings in assets which are susceptible to easy conversion into cash. Such assets may include government securities, bonds, debentures and shares that are known to be readily marketable and that may be liquidated at a moment's notice when cash is needed.

The Present Study and Methodology

The importance of the study is emphasized by the fact that as pointed out earlier in this chapter, the manner of administration of working capital determined to a very large extent, the success or failure of overall operations of an enterprise. Many times, in the event of the failure of a business concern, shortage of working capital is given out as its main cause. However, in the ultimate analysis, it may be mismanagement of resources of the firms that converted, otherwise successful business into an unsuccessful one "Inadequacy of working capital is a symptom, and sometimes an excuse of business failure."[22] The proper management of working capital is, therefore, of crucial importance, for the

success of an enterprise which involves the administration of all current assets.

Methodology– There were many cement companies in India. The annual reports of these companies have been collected from financial statement data of companies given in CMIE-Prowess-Database-Package. In addition, the author visited some of the companies and discussed various issues with the management of the respective companies. The collected data have been analysed with the help of statistical techniques and computer software. The analysis, findings, conclusions and suggestions have been presented in the form of this study.

Analysis of working capital methods– Various reasons may make it essential to analyse the working capital position of a business enterprise. One reason for analyzing the working capital position of a company is to see what will be found when financial statements are examined. A second reason is to enable management to detect trends and take corrective steps when the analysis indicates need for them. A third reason is to see what changes have taken place in the company over a period of time so that this knowledge may be used in setting guidelines. There are two important tools for analyzing the working capital position of an enterprise. One is the funds flow analysis and the other is ratio analysis.

1. **Funds Flow Analysis of Working Capital–** This analysis shows how funds have been procured for a business and

how they have been employed. This technique helps to analyse changes in working capital components between two data. The comparison of current assets and current liabilities, as shown in the balance sheet at the beginning and at the end of a specific period, shows changes in each type of current assets as well as the sources from which working capital has bean obtained. However, this technique does not throw light on the question whether the working capital is being used most effectively and whether the current financial position of the enterprise has improved.

2. **Ratio Analysis of Working Capital–** This is the most commonly used technique which deals practically with each and every aspect of working capital analysis. In this technique, for each aspect of analysis certain ratios are computed and then results are drawn on the basis of trends shown by them against those fixed as guide–posts. Various ratios are used in analyzing the various aspects of the working capital position of an enterprise:

(a) **Liquidity of Working Capital–** An analysis of the liquidity of working capital is of use for both the short-term creditors and internal management or a business enterprise. To the former it communicates - the chances of receiving payment at the time of maturity, the margin of safety, if the unexpected should arise which may indicate whether the working capital is sufficient, the

extent to which a concern has over- or under-invested the cash in its operating cycle. Two appropriate tests of this important feature of the working capital analysis are to be found in the computation of current and quick ratios. The details of the current and quick ratios have been discussed in the chapter where ratios have been computed and analysed.

(b) Circulation of working capital– An analysis of circulation of working capital highlights the efficiency which working capital is being utilised. For this purpose various turnover ratios such as inventory turnover ratio, Receivables turnover ratio, cash turnover ratio etc. are calculated which show efficiency of the use of working capital in each or its components as well as on the whole. Generally the higher the level of these turnover ratios, the smaller would be the working capital requirements of an enterprise. The details of the above ratios have been given in the respective chapters.

This aspect of the analysis of working capital focuses on the level of working capital. It helps an analyst to know whether the size of working capital maintained by an enterprise is excessive or short of or adequate to its requirements.

Various ratios can be computed to know the sufficiency of the size of working capital and movements in the quantum of working capital in successive periods. The two most important tools in this connection are the computation of the size of working capital in terms or "months' cost of production" and "months' average sales turn-over." The results of these ratios when compared with the quide-posts (as prevailing in the enterprise or in the industry), show whether the size or working capital maintained is of sufficient, inadequate or of an excessive order. A comparison of working capital with other variables such as the output and sales over various years may also give a hint to an analyst about the trends in the growth of working capital. The use of index numbers, percentages and ratios may help to accomplish this task.

Scope and Purpose of Present Study

The present study "Working Capital Management in Cement Industry In India" analyses the efficiency of the working capital management and its components *i.e.* inventory amount, cash and bank balances and various current liabilities. The study attempts to determine the efficiency and effectiveness of management in each segment of working capital. Since the net concept of working capital has been taken

in the present study, management of both current assets and current liabilities will be critically reviewed

The importance of the study is emphasized by the fact that the manner of administration of current asset and current liabilities determined to a very large extent the success or failure of a business. The efficient and effective management of working capital is of crucial importance for the success of a business, which involves the management of the current assets and the current liabilities. The business concern has therefore to optimize the use of available resources through the efficient and effective management of the current assets and current liabilities. This will enable to increase the profitability of the concern and the firm could be able to meet its current obligation will in time.

Hypotheses of the study

The study has been pursued to test the following hypotheses with reference to Cement Industry in India:

1. That proper management of working capital improves both 'Liquidity and Profitability' position of a business firm.
2. That external sources of finance particularly bank borrowing are being liberally utilized in financing the working capital requirement of industry in India.

3. That the scope for improvement in the management of working capital is greater in inventory as well as receivables management than in cash management.

4. That the private sector of the industry is definitely in a better position than the public sector, as far as management of working capital is concerned.

We often start with as assertion or a hypothesis and use our research data to prove or to disprove it. Every hypothesis put to test with know statistical procedure and unless such tests are carried out a research is not complete.

Objectives of the study

The present study has been undertaken to achieve the following objectives with regard to management of working capital in Cement Industry of India:

1. To analyze and evaluate working capital management of selected units.

2. To evaluate the inventory, receivable and cash management performance

3. To assess the relative significance of various sources of financing of working capital.

4. To compare the selected units of the private sector regarding management of working capital.

5. To suggest on the basis of conclusions, innovation in the management of working capital in Cement Industry in India.

6. To find out the fluctuations arising in working capital in various cement companies due to its nature of demand and supply, production, government policies thereto.

7. To analyse the growth in the sector of production and installation policies and capacities during five year plans.

8. To analyze the impact of cement industry on the national economy.

9. To analyze new technique in cement industry with a view to cutting costs and increasing efficiency in production and distribution so as to raise the level of production and consumption.

10. To know the profitability of cement industry and its impact on working capital.

Methods of Study

In the present study, top five cement companies have been selected out of more than 50 cement companies in India. These companies are:

(i) ACC
(ii) Gujarat Ambuja
(iii) Shree Cement
(iv) Indian Cement
(v) Mangalam Cement

As the case study of five companies, the company will be selected on the basis of capital employed. Obviously, it will be a comparative study through empirical methods of the study.

Simultaneously, interview of top official in these companies would be arranged to make the empirical aspect more meaningful. It is expected that direct interviews may provide insight into the practical and behavioural aspect of the management of working capital, as the management is basically a human problem. That is why interviews have been planned in the course of study.

Besides these empirical methods of study, a histro-descriptive method would also be used in order to make the study academically significant and practically important exercise.

The data relating to management of working capital of cement industry and its selected units has been collected from the published annual reports of the companies for the year 2003-04 to 2007-2008 which were directly obtained from the registered offices of respective companies. In addition to this primary data about practices, policies and procedures followed in the management working capital in the selected units have been collected through personal discussions with the top executives of the units. This data was supplemented by information collected from various books, journals, newspapers and articles relating to industry. With the help of data related to the study, various selected statements and ratios have been calculated, fund flow and cash flow statements have been prepared and interpreted through different statistical techniques analysis of variance, coefficient of correlation and

regression etc. With the help of conclusions drawn, suggestions have been presented to improve the efficiency of management of working capital in the industry.

In the course of analysis in the study, use of various accounting and statistical techniques have been made. Accounting technique includes ratio analysis and funds flow statement.

Ratio Analysis– The purpose of the ratio analysis has been three-size analysis, composition analysis and efficiency analysis. Various ratios computed in order to analyse the size, composition and circulation of working capital and its various components (Inventory, receivable and current liabilities) have been explained at the relevant places in different chapters.

(i) **Arithmetic mean–** It gives a single value to describe the whole data. Adding the value of all observations and dividing it by the numbers of observations have obtained simple arithmetic mean of each series of different ratio.

(ii) **Chi-square test–** If the calculated value of Chi-square exceeds the tabulated value at .05, it indicates that the difference between Chi-square and ≟ is significant at 5 percent level, if exceed. 01 values, significant at 1 percentage level. If less than .05, is not significant.

(iii) **Trend Indices–** In order to measure the change in the relative proportion of various components of the

working capital to the total such indices have been computed.

(iv) Linear Regression Analysis: To make projection of dependent variables (such as working capital, inventory, receivables and cash) for a given value of independent variables (sales) possible, the linear regression equations have been used. Further, in this type of analysis the value of Chi-square have been computed in order to ascertain the closeness of the relationship between dependent and independent variables.

References:

1. Adam Smith, *The Wealth of Nations,* (New York, Modern Library Inc., 1937), pp.262-263.
2. H.G. Guthman, *Analysis of Financial Statements* (New York, 1953), p.63
3. R.D. Kennedy and McMullen, *Financial Statements – Form Analysis and Interpretations*, (1968), pp. 265-266.
4. Parasanna Chandra, *Financial Management Theory and Practice* (New Delhi, McGraw Hill Publishing Company Ltd., 1984), p.260.
5. V.L. Gole, *Fitzerald's Ananysis and Interpretation of Financial Statement.*
6. *Ibid.,* p.51
7. N.P. Agarwal, *op.cit.,* pp.171-172.
8. *Ibid.*
9. Bentone E. Cup., *Principles of Financial Management,* (New York, John Wiley & Sons, 1983), p.418.
10. O'Donnel and Milton S. Goldberge, *Accountants Financial Administration,* (New Delhi, Prentice Hall of India Private Ltd., 1964), p.55.
11. *Ibid.,* p. 56.
12. K.V. Sith, *op.cit.,* p.55.

13. *Ibid.,* p. 419.
14. *Ibid.*
15. E.F. Dolandson, *Corporate Finance,* (New York, Ronald Press Company, 1956), p. 479.
16. K.V. Kulkarni, *Financial Management,* (New Delhi, Himalayan Publishing Hosue, 1983), p. 399.
17. The term 'technically solvent' may be defined as the ability of a business to meet its current liabilities duly as and when they become due.
18. Guthmann. H.G. and Dougall, H.E., *Corporate Financial Policy,* (Prentice Hall, New Delhi), Fourth Edition, p. 61.
19. John L.O. Donnell and Milton S. Galdberg, *Elements of Financial Administration, op.cit.,* p.55.
20. D.L. Thomas Keens, *Business Accounts and How to Real them in Studies in Accounting,* (New York: W.T. Baxter, Sweet and Maxwell Ltd. 1950), p.88.
21. C. Richard Osborn, *Corporation Finance,* (New York: Harper & Brothers, 1969(, pp. 353 and 371.
22. M.H.B. Abd El-Motaal, *Working Capital : Its role in the short-run Liquidity Policy of Industrial Concerns',* Accounting Research, Vol.IX, 1958, p.266

Chapter-II

Review of Literature

- Studies on Working Capital Management
- Studies on Working Capital Management in India
- Studies on Determinants of Inventory Investment

The purpose of this chapter is to present a review of literature relating to the working capital management. Although working capital is an important ingredient in the smooth working of business entities, it has not attracted much attention of scholars. Whatever studies have conducted, those have exercised profound influence on the understanding of working capital management good number of these studies which pioneered work in this area have been conducted abroad, following which, Indian scholars have also conducted research studies exploring various aspects of working capital. Special studies have been undertaken, mostly economists, to study the dynamics of inventory investment which often represented largest component of total working capital. As such the previous studies may be grouped into three broad classes— (1) studies conducted abroad, (2) studies conducted in India, and (3) studies relating to determine of inventory investment.

Studies on Working Capital Management

Studies adopting a new approach towards working capital management are reviewed here.

Sagan in his paper (1955),[1] perhaps the first theoretical paper on the theory of working capital management, emphasized the need for management of working capital accounts and warned that it could vitally affect the health of the company. He realized the need to build up a theory of working capital management. He discussed mainly the role and functions of money manager inefficient working capital

management. Sagan pointed out the money manager's operations were primarily in the area of cash flows generated in the course of business transactions. However, money manager must be familiar with what is being done with the control of inventories, receivables and payables because all these accounts affect cash position. Thus, Sagan concentrated mainly on cash component of working capital. Sagan indicated that the task of money manager was to provide funds as and when needed and to invest temporarily surplus funds as profitably as possible in view of his particular requirements of safety and liquidity of funds by examining the risk and return of various investment opportunities. He suggested that money manager should take his decisions on the basis of cash budget and total current assets position rather than on the basis of traditional working capital ratios. This is important because efficient money manager can avoid borrowing from outside even when his net working capital position is low. The study pointed out that there was a need to improve the collection of funds but it remained silent about the method of doing it. Moreover, this study is descriptive without any empirical support.

Realising the dearth of pertinent literature on working capital management, **Walker** in his study (1964)[2] made a pioneering effort to develop a theory of working capital management by empirically testing, though partially, three propositions based on risk-return trade-off of working capital

management. Walker studied the effect of the change in the level of working capital on the rate of return in nine industries for the year 1961 and found the relationship between the level of working capital and the rate of return to be negative. On the basis of this observation, Walker formulated three following propositions:

Proposition I— If the amount of working capital is to fixed capital, the amount of risk the firm assumes is also varied and the opportunities for gain or loss are increased.

Walker further stated that if a firm wished to reduce its risk to the minimum, it should employ only equity capital for financing of working capital; however by doing so, the firm reduced its opportunities for higher gains on equity capital as it would not be taking advantage of leverage. In fact, the problem is not whether to use debt capital but how much debt capital to use, which would depend on management attitude towards risk and return. On the basis of this, he developed his second proposition.

Proposition II— The type of capital (debt or equity) used to finance working capital directly affects the amount of risk that a firm assumes as well as the opportunities for gain or loss. Walker again suggested that not only the debt-equity ratio, but also the maturity period of debt would affect the risk-return trade-off. The longer the period of debt, the lower be the risk. For, management would have enough opportunity to acquire funds from operations to meet the debt obligations. But at the

same time, long-term debt is costlier. On the basis of this, he developed his third proposition:

Proposition III— The greater the disparity between the maturities of a firm's debt instruments and its flow of internally generated funds, the greater the risk and *vice-versa*.

Thus, Walker tried to build-up a theory of working capital management by developing three prepositions. However, Walker tested empirically the first proposition only. Walker's Study would have been more useful — had he attempted to test all the three propositions. **Weston and Brigham** (1972)[3] further extended the second proposition suggested by Walker by dividing debt into long-term debt and short-term debt. They suggested that short-term debt should be used in place of long-term debt whenever their use would lower the average cost of capital to the firm. They suggested that a business would hold short-term marketable securities only if there were excess funds after meeting short-term debt obligations. They further suggested that current assets holding should be expanded to the point where marginal returns on increase in these assets would just equal the cost of capital required to finance such increases.

Vanhorne in his study (1969)[4], recognizing working capital management as an area largely lacking in theoretical perspective, attempted to develop a framework in terms of probabilistic cash budget for evaluating decisions concerning

the level of liquid assets and the maturity composition of debt involving risk-return trade-off. He proposed calculation of different forecasted liquid asset requirements along with their subjective probabilities under different possible assumptions of sales, receivables, payables and other related receipts and disbursements. He suggested preparing a schedule showing, under each alternative of debt maturity, probability distributions of liquid asset balances for future periods, opportunity cost, maximum probability of running out of cash and number of future periods in which there was a chance of cash stock-out. Once the risk and opportunity cost for different alternatives were estimated, the form could determine the best alternative by balancing the risk of running out of cash against the cost of providing a solution to avoid such a possibility depending on management's risk tolerance limits. Thus, Vanhorne study presented a risk-return trade-off of working capital management in entirely new perspective by considering some of the variables probabilistically. However, the usefulness of the framework suggested by Vanhorne is limited because of the difficulties in obtaining information about the probability distributions of liquid-asset balances, the opportunity cost and the probability of running out of cash for different alternative of debt maturities.

Welter, in his study (1970)[5], stated that working capital originated because of the global delay between the moment expenditure for purchase of raw material was made and the moment when payment were received for the sale of finished

product. Delay centres are located throughout the production and marketing functions. The study requires specifying the delay centres and working capital tied up in each delay centre with the help of information regarding average delay and added value. He recognized that by more rapid and precise information through computers and improved professional ability of management, saving through reduction of working capital could be possible by reducing the length of global delay by rescuing and/or favourable redistribution of this global delay among the different delay centres. However, better information and improved staff involve cost. Therefore, savings through reduction of working capital should be tried till these saving are greater or equal to the cost of these savings. Thus, this study is concerned only with return aspect of working capital management ignoring risk. Enterprises, following this approach, can adversely affect its short-term liquidity position in an attempt to achieve saving through reduction of working capital. Thus, firms should be conscious of the effect of law current assets on its ability to pay-off current liabilities. Moreover, this approach concentrated only on total amount of current assets ignoring the interactions between current assets and current liabilities. **Lambrix and Singhvi** (1979)[6] adopting the working capital cycle approach to the working capital management, also suggested that investment in working capital could be optimized and cash flows could be improved by reducing the time frame of the physical flow from receipt of raw material to shipment of

finished goods, *i.e.* inventory management, and by improving the terms on which firm sells goods as well as receipt of cash. However, the further suggested that working capital investment could be optimized also (1) by improving the terms on which firms bought goods i.e. creditors and payment of cash, and (2) by eliminating the administrative delays *i.e.* the deficiencies of paper-work flow which tended to extend the time-frame of the movement of goods and cash.

Warren and **Shelton** (1971)[7] applied financial simulation[8] to simulate future financial statements of a firm, based on a set of simultaneous equations. Financial simulation approach makes it possible to incorporate both the uncertainty of the future and the many interrelationships between current assets, current liabilities and other balance sheet accounts. The strength of simulation as a tool of analysis is that it permits the financial manager to incorporate in his planning both the most likely value of an activity and the margin of error associated with this estimate. Warren and Shelton presented a model in which twenty simultaneous equations were used to forecast future balance sheet of the firm including forecasted current assets and forecasted current liabilities. Current assets and current liabilities were forecasted in aggregate by directly relating to firm sales. However, individual working capital accounts can also be forecasted in a larger simulation system. Moreover, future financial statements can be simulated over a range of different assumptions to portray inherent uncertainty of the future.

Cohn and **Pringle** in their study (1973)[9] illustrated the extension of Capital Asset Pricing Model (CAPM)[10] for working capital management decisions. They tried to interrelate long-term investment and financing decisions and working capital management decisions through CAPM. They emphasized that an active working capital management policy based on CAPM could be employed to keep the firm's shares in a given risk class. By risk, he meant unsystematic risk, the only risk deemed relevant by CAPM. Owing to the lumpy nature for long-term financial decisions, the firm is continually subject to shifts in the risk of its equity. The fluid nature of working capital, on the other hand, can be exploited so as to offset or moderate such swings. For example they suggested that a policy using CAPM could be adopted for the management of marketable securities portfolio such that the appropriate risk level at any point in time was that which maintains the risk of the company's common stock at a constant level. Similarly, **Copeland and Khoury** (1980)[11] applied CAPM to develop a theory of credit expansion. They argued that credit should be extended only if the expected rate of return on credit is greater than or equal to market determined required rate of return. They used CAPM to determine the required rate of return for the firm with its new risk, arising from uncertainty regarding collection due to the extension of credit. Thus, these studies show how CAPM can be used for decisions involved in working capital management.

One more approach, used mainly in empirical studies, towards working capital management has been to apply regression analysis to determine the factors influencing investment in working capital. Different studies in the past have considered different explanatory variables to explain the investment in inventory. A brief review[12] of these studies is important as regression equation of investment in working capital, in the present study, would be formulated on the basis of works on investment in inventory.

In inventory investment literature, there is basically one school of thought according to which firms aim at an optimum or desired stock of inventories in relation to a given level of output/sales. This is known as acceleration principle. Pioneering work in this field has been done by Metzler (1941)[13]. However, his work was mainly on simple acceleration principle which postulated that firms liked to maintain inventories in proportions to output/sales and they succeeded in achieving the desired level of inventories in a unit time-period. That is to say, any discrepancy between the actual level and desired level of inventories is adjusted within the same time-period. Needless to say, that such an instantaneous adjustment is not a realistic assumption to make. Modifications, therefore, have been introduced in the literature to provide for partial adjustment. **Goodwin** (1948)[14] assumed that firms attempted only a partial adjustment of the discrepancy between the desired stocks as determined by the level of output and the existing stock. Similarly, **Darling and**

Lovell (1965)[15] modified Metzler's formulation based on simple acceleration principle and obtained, the relationship based on flexible accelerator principle. There are several reasons physical, financial and technical those motivate partial adjustment. Among the physical factors, mention may be made of procurement lags between orders and deliveries. The length of such lags is connected with the source of supply, foreign or domestic availability. Import licensing procedures on account of foreign exchange scarcity could cause further delays in adjustment. Among the financial factors, cost advantages associated with bulk buying and higher procurement costs for speedy delivery are also mentioned. Uncertainties in the market for raw materials and in the demand for final product also play a role in influencing the speed of adjustment. Technically, firms like to make sure that changes in demand are of a permanent character before making full adjustment. The acceleration principle has great relevance in inventory analysis than in the analysis of fixed investment, as there are limits to liquidate fixed capital in the face of declining demand.

Other variables influencing inventories have been introduced in the literature in the context of accelerator model. Rate of interest is used as a proxy for the opportunity cost of carrying stocks or as a measure of the cost of funds needed to hold inventories. It has been found significant in the studies of Hilton (1976)[16] and Irwin (1981)[17]. Time-trend is expected to be important because inventories generally accumulate with the expansion of economic activities of the company. Anticipated

price changes, measured by changes in wholesale price index of inventories, are taken as an explanatory variable to capture speculative element in inventory. This suggests a positive relationship between price changes and inventory. An increase in sales is expected to increase the demand for stocks to meet orders regularly. An increase in capacity utilization is also expected to increase the demand for stock by increasing the demand for raw materials and increasing the inventories of finished goods. Thus, the variable, capacity utilization, is postulated to have a positive coefficient in the equation.

Abramovitz (1950)[18] and **Modigliani** (1957)[19] highlighted the impact of capacity utilization on inventory investment. Existing stock of inventories is expected to take account of adjustment process to the desired levels. Thus the variable, existing stock of inventories, is postulated to be negatively related with the desired stock. The ratio of inventory to sales may affect inventory investment positively because a high ratio of stocks to sales in the past suggests the maintenance of high levels of inventories in the past and thus also calling for high investment in inventories in the current period. The studies of **Metzler** (1941)[20] and **Hilton** (1976)[21] have found this variable, inventory-sales ratio, to be statistically significant. Fixed investment is generally expected to affect inventory investment inversely because of competing demand for the limited funds. However, in case of an expanding firm, the two components may be complementary. Besides, availability of funds from retained earnings and external sources, may affect investment

decision by providing funds for financing inventory investment. Therefore, retained earnings and flow of debt are postulated to have positive coefficients.

The studies described so far, are the important studies conducted abroad. A number of studies on working capital management have been conducted in India also. The following discussion describes Indian studies.

Studies on Working Capital Management in India

This part briefly reviews the studies conducted in India in respect of working capital management in Indian industries.

The first, small but fine piece of work is the study[22] conducted by National Council of Applied Economic Research (NCAER) in 1966 with reference to working capital management in three industries namely cement, fertilizer and sugar. This was the first study on nature and norms of working capital management in countries with 'scarcity of investible resources'. This study was mainly devoted to the ratio analysis of composition, utilization and financing of working capital for the period 1959 to 1963. This study classified these three industries into private and public sector for comparing their performance as regards the working capital management. The study revealed that inventory constituted a major portion of working capital *i.e.* 74.06 per cent in the sugar industry followed by cement industry (63.1%) and fertilizer industry (59.58%). The study observed that the control of inventory had not received proper attention. The inventory control was mainly confirmed to materials management leading to the

neglect of stores and spares. So far as the utilization of working capital was concerned, cement and fertilizer industry had a more efficient utilization of working capital. The sugar industry had inefficient utilization of working capital largely due to the accumulation of stock with the factories. As regards financing of working capital, the study showed that internal sources had contributed very little towards the financing of working capital. It was 11.87 per cent in the cement industry, 15.03 per cent in sugar and 31.25 per cent in fertilizer industry, 17.78 per cent being the average. However, this study failed to put into sharp focus the various problems involved in the management of specific working capital accounts.

Appavadhanulu (1971)[23] recognizing the lack of attention being given to investment in working capital, analysed working capital management by examining the impact of method of production on investment in working capital. He emphasized that different production techniques require different amount of working capital by affecting goods-in-process because different techniques have differences in the length of production period, the rate of output flow per unit of time and time pattern of value addition. Different techniques would also affect the stock of raw materials and finished goods, by affecting lead-time, optimum lot size and marketing lag of output disposals. He, therefore, hypothesised that choice of production technique could reduce the working capital needs. He estimated the ratio of work-in-progress and working capital to gross output and net output in textile weaving done

during 1960, on the basis of detailed discussions with the producers and not on the basis of balance sheets which might include speculative figures. His study could not show significant relationship between choice of technique and working capital. However, he pointed out that the idea could be tested in some other industries like machine tools, ship building etc. by taking more appropriate ratios representing production technique correctly.

Chakraborty (1973)[24] approached working capital as a segment of capital employed rather than a mere cover for creditors. He emphasized that working capital is the fund to pay all the operating expenses of running a business. He pointed out that return on capital employed, an aggregate measure of overall efficiency in running a business, would be adversely affected by excessive working capital. Similarly, too little working capital might reduce the earning capacity of the fixed capital employed over the succeeding periods. For knowing the appropriateness of working capital amount, he applied Operating Cycle (OC) Concept. He calculated required cash working capital by applying OC concept and compared it with cash from balance sheet data to find out the adequacy of working capital in Union Carbide Ltd. and Madura Mills Co. Ltd. for the years 1970 and 1971. He extended the analysis to four companies over the period 1965-69 in 1974 study.[25] The study revealed that cash working capital requirement were less than average working capital as per balance sheet for Hindustan Lever Ltd. and Guest, Keen and Williams Ltd.

indicating the need for effective management of current assets. Cash working capital requirements of Dunlop and Madura Mills were more than average balance sheet working capital for all years efficient employment of resources. For Union Carbide Ltd., cash working capital requirements were more in beginning years and then started reducing in the later years as compared to conventional working capital indicating the attempts to better manage the working capital. Chakraborty emphasized the usefulness of OC concept in the determination of future cash requirements on the basis of estimated sales and costs by internal staff of the firm. OC concept can also be successfully employed by banks to assess the working capital needs of the borrowers.

Misra (1975)[26] studied the problems of working capital with special reference to six selected public sector undertakings in India over the period 1960-61 to 1967-68. Analysis of financial ratios and responses to a questionnaire revealed somewhat the same results as those of NCAER study with respect to composition and utilization of working capital. In all the selected enterprises, inventory constituted the more important element of working capital. The study further revealed the overstocking of inventory in regard to its each component, very low receivables turnover and more cash than warranted by operational requirements and thus total mismanagement of working capital in public sector undertakings.

Agarwal (1983)[27] also studied working capital management on the basis of sample of 34 large manufacturing and trading public limited companies in ten industries in private sector for the period 1966-67 to 1976-77. Applying the same techniques of ratio analysis, responses to questionnaire and interview, the study concluded the although the working capital per rupee of sales showed a declining trend over the years but still there appeared a sufficient scope for reduction in investment in almost all the segments of working capital. An upward trend in cash to current assets ratio and a downward trend in cash turnover showed the accumulation of idle cash in these industries. Almost all the industries had overstocking of raw materials shown by increase in the share of raw material to total inventory while share of semi-finished and finished goods came down. It also revealed that long-term funds as a percentage of total working capital registered an upward trend, which was mainly due to restricted flow of bank credit to the industries.

Kamta Prasad Singh, Anil Kumar Sinha and **Subas Chandra Singh** (1986)[28] examined various aspects of working capital management in fertilizer industry in India during the period 1978-79 to 1982-93. Sample included public sector unit, Fertilizer Corporation of India Ltd. (FCI) and its daughter units namely Hindustan Fertilizers Corporation Ltd., the National Fertilizer Ltd., Rashtriya Chemicals and Fertilizers Ltd. and Fertilizer (Projects and Development) India Ltd. and comparing their working capital management results with

Gujarat State Fertilizer Company Limited in joint sector. On the basis of ratio-analysis and responses to a questionnaire, study revealed that inefficient management of working capital was to a great extent responsible for the losses incurred by the FCI and its daughter units, as turnover of its current assets had been low. FCI and its daughter units had high overstocking of inventory in respect of each of its components particularly stores and spares. Similarly, quantum of receivables had been excessive and their turnover very low. However, cash and liquid resources held by FCI and its daughter units had been much lower in relation to operation requirements. So far as financing of working capital was concerned, long-term funds had been financing a low proportion of current assets due to rapid increase of current liabilities. The profitability providing an internal base for financing of working capital, had been very low in these undertakings.

Verma (1989)[29] evaluated working capital management in iron and steel industry by taking a sample of selected units in both private and public sectors over the period 1978-79 to 1985-86. Sample included Tata Iron and Steel Company Ltd. (TISCO) in private sector and Steel Authority of India Ltd. (SAIL) and Indian Iron and Steel Company, a wholly owned subsidiary of SAIL, in public sector. By using the techniques of ratio analysis, growth rates and simple linear regression analysis, the study revealed that private sector had certainly an edge over public sector in respect of working capital management. Simple regression results revealed that working

capital and sales were functionally related concepts. The study further showed that all the firms in the industry had made excessive use of bank borrowings to meet their working capital requirement *vis-à-vis* the norms suggested by Tandon Committee.

Vijaykumar and **Venkatachalam** (1995)[30] studied the impact of working capital on profitability in sugar industry in Tamil Nadu by selecting a sample of 13 companies; 6 companies in co-operative sector and 7 companies in private sector over the period 1982-83 to 1991-92. They applied simple correlation and multiple regression analysis on working capital and profitability ratios. They concluded through correlation and regression analysis that liquid ratio inventory turnover ratio, receivables turnover ratio and cash turnover ratio influenced the profitability of sugar industry in Tamil Nadu. They also estimated the demand functions of working capital and its components *i.e.* cash, receivables, inventory, gross working capital and net working capital, by applying regression analysis. They showed the impact of sales and interest rate on working capital and its components. When only sales was taken as independent variable, coefficient of sales was more than unity in all the equations of working capital and its components showing more than unity sales elasticity and diseconomies of scale. When sales and interest rate were taken as independent variable, sales elasticity was again more than unity in demand functions of working capital and its components except cash. So far as capital costs were concerned,

these had negative signs in all the equations but significant only in inventory, gross working capital and net working capital showing negative impact of interest rates on investment in working capital and its components. Thus study showed that demand for working capital and its components was a function of both sales and carrying costs.

Studies on Determinants of Inventory Investment

Inventory, in most industries, accounts for largest proportion of gross working capital. A number of studies, therefore, have been conducted to find the determinants of investment in inventories. The following discussion provides a brief review of studies, dealing with factors influencing investments in inventory in India.

Econometric studies to analyse the factors that influence inventory accumulation in India, are based on time series and pooling of cross section of time series date pertaining to manufacturers' inventories. **Krishnamurty's** study (1964)[31] was aggregative and dealt with inventories in the private sector of the Indian Economy as a whole for the period 1948-61. this study used sales to represent demand for the product and suggested the importance of accelerator. Short-term rate of interest had also been found to be significant.

Sastry's study (1966)[32] was a cross section analysis of total inventories of companies across several heterogeneous industries for the period 1955-60 using balance sheet data of public limited companies in the private sector. The study brought out the importance of accelerator represented by

change in sales. It also showed negative influence of fixed inventory investment.

Krishnamurty and Sastry's study in 1970[33] was perhaps the most comprehensive study on manufacturers inventories. They used CMI data and the consolidated balance sheet data of public limited companies published by RBI, to analyse each of the major components *i.e.* raw material, goods-in-process and finished goods for 21 industries over the period 1946-62. It was a time series study but some inter-industry cross section analysis had also been done. Accelerator represented by change in sales, bank finance and short-term interest rate were found to be important determinants. Utilisation of productive capacity and price anticipations had been found to be of some relevance. Another study conducted by them in 1975 analysed inventory investment in the context of flexible accelerator with financial variables. Both RBI and Stock Exchange, Official Directory, Mumbai data for seven important industries had been taken for the period of 1956-69. Their study of pooled cross section was in current prices whereas time series analysis based on RBI data was a constant prices. OLS results showed the important influence of accelerator, internal and external funds flow and fixed investment on inventory investment.

The study by **Vinod Prakash** (1970)[34] was a time series analysis with mostly undeflated data taken from CMI and Annual Survey of Industries (ASI) for the period 1946-63. It examined the influence of structural changes in manufacturing activity on the relative size and composition of inventory in the

large scale-manufacturing sector in India. Three different models for industry groups and for six important individual industries had been tried. Output/sales, capacity utilization, short-term rate of interest, money supply, foreign exchange availability, price index, size and time trend were taken as explanatory variable. The simple accelerator model with output gave better results for industrial groups, whereas the ratio model seemed to perform better in the analysis of individual industry. The flexible accelerator models were found to be inferior. The impact of price index was found to be generally insignificant, while the impact of foreign exchange and money supply was absent. The rate of interest showed a perverse impact. Time trend appeared to be important than the size of establishment. The role of availability of funds was completely ignored in this study.

The study by **George** (1972)[35] was cross section analysis of balance sheet data of 52 public limited companies for the period 1967-70. Accelerator, internal and external finance variables were considered in the equations for raw materials including goods-in-process and total inventories. However, equations for finished goods inventories considered only output variable. Accelerator and external finance variables were found to be important.

The analysis by **Seamy** and **Rao** (1975)[36] of the flow of funds of public limited companies had an equation for aggregate inventory investment. RBI data for the period 1954-

70 had been used. The explanatory variables considered were accelerator, flow of bank borrowings, an index of man-days lost, capacity by the call rate. Accelerator, bank finance and fixed investment were found to be significant.

The study by **R.N. Agarwal** (1982)[37] estimated total inventory investment equation for individual firms in automobile manufacturing industry, which was divided into two sectors— car-sector and non car-sector. His study was based on the data for 1959-60 through 1978-79. Official Directory of Mumbai Stock Exchange had been the basic source of data. Analysis of two sector revealed that sales and stock-sales ratio were important explanatory variables. Cost of capital and trend were important in only car sector while fixed investment and flows of external funds were significant in non-car sector. Existing stock of inventories was statistically significant in both the sector but contrary to expectations, it possessed negative coefficient. Several other variables as dividends, capacity utilization and liquidity ratio were found to be of no importance in explaining inventory investment behaviour.

N.C. Gupta study (1987)[38] examined the determinants of total inventory investment in aluminum and non-ferrous semi firms in private sector. The data had been taken from Stock Exchange, Official Directory, Mumbai for 9 years 1966-67 to 1974-75. variables considered were current sales change, one-lagged sales change, inventory stock at the beginning, gross fixed investment during the year, flow of net debt (external

finance) and profits net of dividends and taxes but gross of depreciation provision (retained earnings or internal finance). The equation also provided for firm dummies and year dummies. Analysis was based on pooling of time series of cross section data. Demand factor and external finance turned out to be significant determinants in aluminum. Both retained earnings and external finance were important determinants in case of non-ferrous semis. Competition for investment funds between fixed and inventory investment was suggested both in aluminum and non-ferrous semis.

Adesh Sharma (1994)[39] applied accelerator model with financial variables to determine the factors influencing investment in inventories in pesticides industry in India. Data had been taken form the Stock Exchange Official Directory, Mumbai for the period 1978-1992 in respect of 18 firms in this industry. The coefficients of the accelerator and financial variables were found to be significant and positive. The coefficient of inventory of inventory stock was significant and negative.

The above brief review of studies in Indian context shows that no attempts has been made to analyse working capital management in Hotel industry in India. Secondly, there have been many studies exploring the determinants of inventory investment, no attempt has been made to study the factors influencing investment in total working capital. On the basis of previous studies, the present study aims at filling both these gaps.

References:

1. John Sagan, "Towards a Theory of Working Capital Management", *The Journal of Finance,* May 1955, pp. 121-129.

2. Ernest W. Walker, "Towards A Theory of Working Capital", *The Engineering Economist,* Winter 1967, pp. 21-35.

3. J. F. Weston and E.F. Brigham, *Managerial Finance,* Holt, Rinehart and Winston, 4th edition, 1972.

4. James C. Vanhorne, "A Risk-Return Analysis of a firm's Working Capital Position", *The Engineering Economist*, Winter 1969, pp. 50-58.

5. Paul Welter, "How to Calculate Savings Possible Through Reduction of Working Capital", *Financial Economist,* October 1970, pp. 50-58.

6. R. J. Lambrix and S.S. Singhvi, "Managing the Working Capital Cycle", *Financial Executive,* June 1979, pp.32-41.

7. J. M. Warren and J. P. Shelton, "A Simultaneous Equation Approach to Financial Planning", *Journal of Finance,* Volume 26, December 1976, pp. 1123-1142.

8. Simulation involves developing a model of some real phenomenon and then performing experiments in the model evolved. In stimulation, a given system is copied and the variables and constants associated such it are manipulated in that artificial environment to examine the behaviour of the system. The benefit of simulation is that the results of taking a particular course of action can be estimated prior to its implementation in the real world.

9. R.A. Cohen and J.J. Pringle, "Steps Towards as Integration of Corporate Financial Theory", 1973 in K.V. Smith, *Readings on The Management of Working Capital,* West Publishing Company, U.S.A., 1980.

10. CAPM states that the required rate of return on a security (investment) is equal to the riskless rate plus premium for unsystematic risk of the security. Unsystematic risk, which is specific to the company of the security, can be eliminated by diversification in the portfolio. But systematic risk, which is because of general market fluctuations, cannot be eliminated by diversification.

11. Thomas E. Copeland and Nabil T. Khoury, "Analysis of Credit Extension in a World with Uncertainty", in K.V. Smith, *op.cit.*

12. A detailed survey of literature in respect of inventory investment is not undertaken here as it is available in R. Eisner & R. Strotz, "Determinants of Business Investment", in *Impacts of Monetary Policy, Commission on Money and Credit,* Prentice-Hall, 1963, M.C. Lovell, "Determinants of Inventory Investment", in *Models of Income Determination,* NBER, Princeton University Press, 1964. Here, emphasis is on factors influencing inventory investment, which have been considered in the literature.

13. Lloyd Metzler, "The Nature and Stability of Inventory Cycles", *Review of Economics and Statistics,* Vol.III, August 1941, pp. 113-129.

14. Richard M. Goodwin, "Secular and Cyclical Aspects of the Multiplier and Accelerator", in *Income, Employment and Public Polic:, Essays in Honour of Alvin H. Hanson,* Norton and Company, New York, 1948.

15. P.G. Darling and M.C. Lovell, "Factors Influencing Investments in Inventories", in the *Brookings Quarterly Econometric Model of the U.S.,* J.S. Dusenberry *et al.,* eds.,, Chicago, 1965.

16. Hilton, "Inventory Investment" in *Applied Macro Economics,* ed. By David Heathfied, 1976.

17. F. Owen Irvine, Jr. "Retail Inventory Investment and the Cost at Capital", *The American Review,* September" 1981, pp. 633-648.

18. Moses Abramovitz, *Inventories and Business Cycles – With Special References to Manufacturers' Inventories,* NBER, New York, 1950.

19. Franco Modigliani, "Business Reasons for Holding Inventories and Their Macro Economic Implications", *Problems of Capital Formation, Studies in Income and Wealth,* Vol. 19, NBER, 1957, pp. 495-511.

20. Lloyd Metzler, *op.cit.*

21. Hilton, *op.cit.*

22. NCAER, *Structureof Working Capital,* New Delhi, 1966.

23. V. Appavadhanulu, "Working Capital and Choice of Techniques", *Indian Economic Journal,* July-Sept. 1971, Vol. XIX, pp. 34-41.

24. S.K. Chakraborty, "Use of Operating Cycle Concept for Better Management of Working Capital", *The Economic and Political Weekly,* August, 1973, Vol.8, pp. M69-M76.

25. S.K. Chakraborty, "Cash Working Capital Vs. Balance Sheet Working Capital", *The Economic and Political Weekly,* March 1974, pp. MII-M22.

26. Ram Kumar Misra, *Problems of Working Capital* (With Special Reference to Selected Public Understandings in India), Somaiya Publications Private Limited, Mumbai, 1975.

27. N.K. Agrawal, *Management of Working Capital,* Sterling Publication Pvt. Ltd., New Delhi, 1983

28. Kamta Prasad Singh, Anil Kumar Sinha and Subas Chandra Singh, *Management of Working Capital in India,* Janaki Prakashan, New Delhi, 1986.

29. Harbans Lal Verma, *Management of Working Capital,* Deep and Deep Publication, New Delhi, 1989.

30. Vijaykumar and A. Venkatachalam, "Working Capital Capital and Profitability – An Empirical Analysis", *The Management Accountant,* October 1995 p-748-750, *"Working Capital Managaement in Sugar Mills of Tamil Nadu – A Cash Study", Management and Labour Studies,* Vol. 20, No.4, October 1995, pp. 246-354.

31. K. Krishnamurty, "Private Investment Behaviour in India: A Macro Time Series Study", *Arthaniti,* January 1964.

32. V.K. Sastry, Dividends', *Investment and External Financing Behaviour of the Corporate Sector in India,* Unpublished doctoral dissertation. University of Pennysylvania, 1966.

33. S. Krishnamurthy & D.U. Sastry, *Inventories in Indian Manufacturing,* Institute of Economic Growth . . ., Books Ltd., Mumbai, 1970; and *Investment and Financing in Corporate Sector in India,* Tata McHill Publishing Company, New Delhi, 1975.

34. Vinod Prakash, Manufacturers' "*Inventoires in a Developing Economy*", Unpublished Ph.D. Tehsis, MIT, Cambridge, 1970; and *Industrialisation and Manufacturers' Inventories in India,* IBRD, May 1973 (mimeo).

35. P.V. George, "Inventory Behaviour and Efficacy of Credit Control", *Anvesak,* No.2, Vol.II, 1972, pp. 168-175.

36. Dalip S. Swamy and V,.G. Rao, "The Flow of Funds in Indian Manufacturing Sector", *Sankhya Series C,* Vol. 37, 1975.

37. R.N. Agarwal, Analysis of Profits, "*Investment and Financing Behaviour of Indian Automobile Manufacturing Industry*", Ph.D. Thesis, Delhi University, 1982.

38. N.C. Gupta, Productivity, *Investment and Import Substitution in Indian Industries (A Case Study of Non-Ferrous Metals),* Anmol Publications, New Delhi, 1987.

39. Adesh Sharma, "Investment and Financing in Pesticides Industry in India", Indian Journal of Finance and Research, Vol. No.2, July 1994, pp. 67-83.

Chapter-III

History and Growth of Cement Industry in India

- History of Cement
- Where It Is Heading
- Cement Map of India – Large Plants
- How Cement Is Made ?
- How Concrete Is Made ?
- Types of Cement
- Uses of Cement
- Cement Industry in India
- Industry Overview : Construction Machinery
- Problems of Cement Industry
- Process of Cement Manufacturing
- Cement Companies Under Study:

    1. Associated Cement Company
    2. India Cement
    3. Gujarat Ambuja Cement
    4. Mangalam Cement
    5. Shree Cement

History of Cement

It must be interesting to know how cement is made today *vis-à-vis* the historical background. Ever since civilizations stepped in the earth, people sought a material that would bind stones into a solid, formed mass. The Assyrians and Babylonians used clay for this purpose, and the Egyptians advanced to the discovery of lime and gypsum mortar as a binding agent for building such structures as the Pyramids. The Greeks made further improvements and finally the Romans developed cement that produced structures of remarkable durability. The secret of Roman success in making cement was traced to the mixing of slaked lime with pozzolana, a volcanic ash from Mount Vesuvius. This process produced cement capable of hardening under water. During the Middle Ages this art was lost and it was not until the scientific spirit of inquiry revived that we rediscovered the secret of hydraulic cement—cement that will harden under water. Most of the building foundations in the Roman Forum were constructed of a form of concrete, placed in some locations to a depth of 12 feet. The great Roman baths built about 27 B.C., the Coliseum, and the huge Basilica of Constantine are examples of early Roman architecture in which cement mortar was used. Portland cement today, as in Aspdin's day, is a predetermined and carefully proportioned chemical combination of calcium, silicon, iron, and aluminum. Natural cement gave way to Portland cement, which is a predictable, known product of consistently high quality. Aspdin established a plant in Wakefield to manufacture Portland cement, some of which was

used in 1828 in the construction of the Thames River Tunnel. But it was almost 20 years later when J.D. White and Sons set up a prosperous factory in Kent that the Portland cement industry saw its greatest period of early expansion, not only in England, but also in Belgium and Germany. Portland cement was used to build the London sewer system in 1859-1867. Thomas A. Edison was a pioneer in the further development of the rotary kiln. In 1902, in his Edison Portland Cement Works in New village, N.J., he introduced the first long kilns used in the industry—150 feet long in contrast to the customary 60 to 80 feet. Today, some kilns are more than 500 feet long. Parallel improvements in crushing and grinding equipment also influenced the rapid increase in production. Since grinding process consumes most of the energy various grinding systems like ball mill/vertical roller mill/Roller presses has been the result of technological developments. Blending takes place in silos with air blown in from the bottom to aerate the contents. Various new designs were also developed to increase the efficiency of mixing.

Where it is heading ?

The boom-and-bust syndrome normally characterizes a typical cyclical industry. A huge potential market and rapid growth in the early stages lead to a surge in interest and a flurry of research. The projected growth rates point to a lucrative market. The buoyant markets and huge profits raked in by players tempt more players into the market. Capacities increase in excess of demand and a glut in capacity is created.

Competition increases, prices fall and margins come under pressure. Capacity addition comes to a halt; weaker players shut shot or sell off to larger ones. Demand catches up and the cycle is repeated all over again. Perhaps, of all the cyclical industries, the Indian cement industry exhibits this boom-and-bust cycle most visibly. Consider the following:

Temptation

A huge potential market, easy availability of raw material and cheap labour leads to a flurry of activity and a surge in interest. The easiest way to estimate the potential that exists is the per capita consumption of cement, which is abnormally low in India at 85 kgs as against a world average of 256 kgs and the Asian average of 200 kgs. Although the growth of the industry depends more on the level of consumer spending rather than on the per capita consumption, nevertheless, it serves as an easy benchmark to estimate the potential that exists.

Fuel to Fire

The projected growth rates in demand (based on the potential per capital consumption growth or other demand drivers like the expected GDP growth rate) fuels stock market rallies. Consider the boom in cement stocks in 1994. Every cement company was attracting valuations it never dreamt about. Scarcity induced by lower capacities and to a large extent on non-availability of power, drove cement prices to the hilt. The kind of money minted by most cement companies as well as investors in that period drove strategists to plan

enormous increase in capacity. This explains why capacity creation starting 1994, was so enormous.

The Rush

The amounts of profits that are being raked tempt more players into the industry. Contagious enthusiasm sweeps the industry and suddenly there is a glut of new players. Capacities start increasing at a rate greater than the demand growth rates. A scenario of excess supply to demand becomes imminent. Average annual capacity addition during the three-year period 1994-95 to 1996-97 was 8.33 mt., while that for the five years till 1994-95 was just 3.3 mt. Against demand growth rate of 8 per cent capacity addition rose at over 10 per cent during 1995-96 and 1996-97, and over 9 per cent in 1997-98.

The Anguish

With competition increasing and growth in supply exceeding demand growth, prices begin to fall. This is also the time when players realize that Greenfield capacity addition would be to their own detriment. Consolidation within the industry starts. Most of the players weakened during the excess supply induced recession sell off to larger and stronger players. Hostile takeovers are also witnessed during this period as the only way to expand is by take-over. The slew of takeovers in the last two years culminating in Gujarat Ambuja taking a stake in ACC, the largest cement company in India bears ample testimony to this fact. Till now, over 12 mt. has changed hands, excluding Indian Rayons transfer of 3 mt to group company Grasim.

Cement Map of India-Large Plants

Company	Location	Annual Installed (Capacity (Million tonnes)
CCI Ltd.	Grinding Unit Tughalakabad, Delhi	0.5
CCI Ltd.	Charki-Dadri, Haryana	0.17
ACC Ltd.	Gagal, HP	2.31
CCI Ltd.	Rajban, HP	0.20
Gujarat Ambuja	Dariaghat, HP	1.16
J&K Cements	Khrew, J&K	0.20
Gujarat Ambuja	Cements Ropar Punjab	1.34
ACC Ltd	Lakheri, Rajasthan	0.60
Shriram Cement Works	Kota, Rajasthan	0.20
Mangalam Cement Works	Morak, Rajasthan	0.40
Neer Shree	Morak Rajasthan	0.60
Birla Cement Works	Chittorgarh, Rajasthan	0.60
Chittor Cement Works	Chittorgarh, Rajasthan	0.80
J.K. Cement Works	Nimbahera, Rajasthan	1.54
J.K. Cement Works (G)	Mangrol, Rajasthan	0.21
J.K. Udaipur Udyog Ltd.	Udaipur, Rajasthan	0.90
Shree & Raj Cement Ltd.	Beawar, Rajasthan	2.00
Lakshmi Cement	Sirohi Road, Rajasthan	2.23
Aditya Cement	Sambhupura, Rajasthan	1.40
DLF Cement	Pali, Rajasthan	1.40
Binani Cement	Sirohi, Rajasthan	1.65
UP State Cement (G)	Chunar, UP	1.68
UP State Cement	Churk, UP	0.48
UP State Cement	Dalla, UP	0.43
ACC Ltd (G)	Tikaria UP	0.60
Diamond (G)	Jhansi, UP	0.50
Birla Cement (G)	Raebareli, UP	0.36
Kalyanpur Cements	Banjari, Bihar	1.00
Sone Valaley Portland	Japla, Bihar	0.25
Lemos Cement	Khalari, Bihar	0.11
ACC Ltd.	Sindri, Bihar	0.60
ACC Ltd.	Chaibasa, Bihar	0.61
Lafarge	Singhbumi, Bihar	1.43
OCL India Ltd.	Rajgangapur, Orissa	1.00
IDCOL Cement Ltd.	Bargarh, Orissa	0.96
Larsen & Toubro Ltd. (G)	Jharsuguda, Orissa	0.70
Birla Jute & Industries Ltd (G)	Durgapur, West Bengal	0.60
Damodhar Cement	Purulia, West Bengal	0.53

(G)		
CCI Ltd.	Bokajan, Assam	0.20
Mawmluh Cherra Cement	Cherrapunji, Meghalaya	0.20
ACC Ltd.	Madukkarai, Tamil Nadu	0.84
India Cements Ltd.	Sankaridurg, Tamil Nadu	0.60
Chettinad Cement	Karur, Tamil Nadu	0.60
India Cements Ltd.	Talaiyuthu, Tamil Nadu	1.10
Tamilnadu Cements	Alangulam, Tamil Nadu	0.40
Madras Cements Ltd.	R.S. Raja Nagar Tamil Nadu	0.75
Dalmia Cements (B) Ltd.	Dalmiapuram Tamil Nadu	1.03
Tamil Nadu Cements	Ariyalur Tamil Nadu	0.50
Madras Cements	Alathiyur Tamil Nadu	0.90
India Cements	Dalavoi Tamil Nadu	0.90
ACC Ltd.	Macherial Andhra Pradesh	0.33
Orient Cement	Rechni Road Andhra Pradesh	1.18
Kesoram Cement	Ramagundam Andhra Pradesh	0.90
Andhra Cement (G)	Vijaywada Andhra Pradesh	0.24
Kistna Cement	Kistna Andhra Pradesh	0.22
Zuari Cement	Tadipatri Andhra Pradesh	1.70
India Cements Ltd.	Yerraguntla Andhra Pradesh	0.40
India Cements Ltd.	Chilamkur Andhra Pradesh	1.30
Madras Cements	Jaggayyapet Andhra Pradesh	1.10
Raasi Cements	Wadapally Andhra Pradesh	1.80
Priyadarsini Cements	Ramapuram Andhra Pradesh	0.60
Sri Vishnu Cements	Sitapuram Andhra Pradesh	1.0
CCI Ltd.	Tandur Andhra Paresh	1.0
Andhra Cement (G)	Vishakhapatnam Andhra Pradesh	0.50
CCI Ltd.	Tandur Andhra Pradesh	0.4
Andhra Cement	Nadikude Andhra Pradesh	0.5
KCP Ltd.	Macherla Andhra Pradesh	0.40
Panyam Cements	Bugganipalle Andhra Pradesh	0.53
Larsen & Toubro	AP Tadipatri Andhra Pradesh	2.00
India Cements	Visaka Tandur	0.90
HMP Cements Ltd.	Shahabad Karnataka	0.47
ACC Ltd.	Wadi Karnataka	2.05
Vasavadatta Cements	Sedam Karnataka	1.2
Rajshree Cements	Malkhed Karnataka	2.0
CCI Ltd.	Kurkunta Karnataka	0.2

How cement is made ?

Two main methods of cement manufacturing were prominent, the dry process and the wet process. Dry process now has almost replaced the wet process since wet process

consumes high thermal energy for drying the moisture. When rock is the principal raw material, the first step after quarrying in both processes is the primary crushing. Mountains of rock are fed through crushers capable of handling pieces as large as an oil drum. The first crushing reduces the rock to a maximum size of about 6 inches. The rock then goes to secondary crushers or hammer mills for reduction to about 3 inches or smaller. It is then ground in ball mill to fine powder with other ingredients like clay/iron ore/bauxite to create a combination of values for silica/alumina/lime etc. in the mixture. If the process is wet, the grinding goes on in with water so that slurry is resulted after grinding. This slurry is further mixed in mixers and pumped to the kiln. For a dry process kiln, the ground powder is sent to blending silos for uniform mixing of components added during the grinding stage. This blended material is fed to the preheater/calciner. The preheater is a group of cyclones placed over one another wherein material comes down and hot gases goes up heating the material and calcining it in the process. Calcination means liberating carbondioxide and converting calcium carbonate to calcium oxide. Calciner is nothing but a duct added to give more reaction time to material for calcination. This partially calcined material then comes to the kiln, which is refractory lined rotating tube having burner fitted in the other end. This burner fires coal/oil/natural gas to create a temperature of 1600^{o}C. at the discharge end. As the material in the kiln rolls down towards the discharge end, various reactions take place

amongst the components resulting in a mass known as clinker. This clinker is then cooled in coolers. The coolers are either planetary type or grate type. Grate coolers of modern times are much efficient resulting in better heat recuperation and allows reusing this heat in the kiln. The cooled clinker then either goes to storage silo or clinker yard. From the clinker yard it is taken for grinding. In case Ordinary Portland cement is made only gypsum (4-6%) is added before grinding. In case of Portland pozzolona cement additives like flyash/brick etc. are added. Grinding again is same like for raw material grinding with ball mill or with latest technologies like vertical mill/Roller press etc. The cement powder then taken to packing plant or discharged from silo to a bulk loader directly.

How concrete is made ?

The combination of cement, water, sand, and coarse aggregates (particles of gravel or rushed stone) as normally occurs in the process of concrete mixing is perhaps best described in terms of a simple three-part system:

1. Portland cement + water = cement paste
2. Cement paste + sand = mortar
3. Coarse aggregates + mortar = concrete

The cement paste component functions in the first instance to coat and "lubricate" the individual grains of sand, thereby imparting "workability" to the mortar phase. In turn, the mortar serves to lubricate the coarse aggregate particles and so give workability to the fresh concrete. The quantities of

cement paste and mortar necessary to achieve adequate levels of workability will depend on the amounts of sand and coarse aggregate present in the concrete, on the associated "grading" of constituent particle sizes, and on the actual level of workability required for the job. If there is insufficient mortar or cement paste the mix will tend to be "harsh" and unworkable. Conversely, too much mortar or cement paste will promote the likelihood of "segregation" effects whereby the coarser aggregate fractions tend to separate out from the remainder of the mix. Contrary to popular belief, concrete does not set and harden through a physical drying-out process. Setting and hardening is due instead to a series of chemical reactions between the Portland cement and water present in the mix; as a result of this so-called hydration process the original cement paste phase is transformed into a sort of "mineral glue" which acts to bind the sand and coarse aggregate fractions together. Most natural aggregates are a good deal stronger than the sort of cement pastes found in typical concretes; *i.e.* the "mineral glue" tends to function as the weakest link. Accordingly, the strength of a hardened concrete is normally controlled by the strength of its cement paste phase. In turn, for any given quantity of cement, the associated paste strength is governed first and foremost by the water content of the original mix; thus, the lower is the total amount of mix water employed, the greater is the ultimate strength potential of motar (and *vice versa*). Conversely, if the total mix water is held constant, the higher (or lower) is the level of

cement usage, the higher (or lower) becomes the potential strength capacity of the cement paste phase. The actual quantity of cement paste has no real influence here; rather, it is the amount of cement as compared to the amount of water, which is the main factor. Concrete aggregates should be relatively clean. (The squeezing of "dirty" sand will generally produce a noticeable stain on the palm). Dirty or dusty aggregates tend to require far more mixing water; unless correspondingly higher levels of cement usage match this additional "water demand," strength losses are likely. The presence of dusts, silts, or clays can also inhibit the degree of bond between individual coarse aggregate particles and the surrounding mortar, again to the ultimate detriment of strength; in certain circumstances the adverse effects of using dirty aggregates any even extend to interference with the normal processes of cement hydration. It is often supposed that aggregates serve to "enhance" the strength of concrete. While this rarely applies in practice, nether is it the case that the aggregate fractions merely function in the role of cheap fillers. If or when a concrete dries out, the associated cement paste phase will shrink to some extent; the greater is the original water content of the cement paste, the higher is its shrinkage potential. Normal aggregates, on the other hand, show little or no shrinkage on drying. Accordingly, the greater are the amounts of sand and coarse aggregate materials present in a concrete mix, the lesser will be the net influence of paste shrinkage. For a typical concrete in which the combined

aggregate fractions generally occupy somewhere between 70-80 per cent of the total volume, the shrinkage potential is probably of the order of 10-20 per cent of the corresponding value for the paste component acting alone.

Types of Cement

Ordinary Portland Cement (OPC):

The Ordinary Portland Cement is popularly known as grey cement, which is produced by grinding clinker with 5 per cent gypsum. It is used in all general concrete construction, mass and reinforced concrete. It accounts for about 70.60 per cent of the total production.

Portland Pozzolona Cement (PPC):

It is cheaply manufactured because it uses fly ash/burnt clay/coal waste as the main ingredient. PPC has a lower heat of hydration, which is of advantage in preventing cracks where large volumes are being cast. PPC accounts for 18.3 per cent of the production.

Portland Blast Furnace Slag Cement (PBFSC):

It is made by grinding granulated blast furnace slag, steel industry by product (upto 65%), gypsum (5%) and clinker (balance). PBFSC has a heat of hydration even lower than PPC and is generally used in construction of dams and similar massive construction. It contributes nearly 10 per cent to the total.

White Cement:

Basically it is OPC: Clinker using fuel oil (instead of coal) and with iron oxide content below 0.4 per cent to ensure

whiteness. Special cooling technique is used. It is used to enhance aesthetic value, in tiles and for flooring. White cement is much more expensive than grey cement.

Specialized Cement:

Oil Well Cement: is made from clinker with special additives to prevent any porosity.

Rapid Hardening Portland Cement:

It is similar to OPC, except that it is ground much finer, so that on casting the compressible strength increases rapidly. Water proof Cement:

OPC with small portion of calcium stearate or non-saponifibale oil to impart waterproofing properties

Uses of Cement

1. **Ordinary Portland Cement (OPC)—** Presently Bureau of Indian Standard has classified OPC in three grades based on the strength of cement. These grades are:

(1) Grade – 33-IS-269-1989

(2) Grade – 43-IS-6112-1989

(3) Grade – 53-IS-12269-1987

These types of cement are suited for all modern types of constructions including all kinds of masonry and concrete works such as pre-cast and pre-stressed concrete. They are also suitable for all kinds of repair works in masonry and concreting. The higher the grade of cement used, the greater would be the economy, durability and technical advantages. Moreover construction time is also reduced.

2. **Blended Cement—** Mixing Portland clinker, gypsum and other insert materials in suitable proportions and grinding the mixture to get a thorough and intimate mix obtain it.

Portland Pozzolana Cement (PPC) – Clinker + Gypsum + Pozzolana (Flyash, burnt clay etc)

Portland blast furnace slag – Cement Clinker + Gypsum + granulated slag

Masonry Cement – Cement Clinker + Gypsum + Pozzolana (Limestone Powder admixtures etc.

PPC— Suitable for most of the applications as stated in OPC ideally suited for domestic consumption like plastering, brickwork, mass concerting works like dams, large foundation. This cement enhances the impermeability and cohesiveness of concrete.

As a result durability is enhanced. It also generates low heat of hydration.

It is cheaply manufactured because it uses flyash/burntclay/coal waste as the main ingredient. PPC has a lower heat of advantage in preventing cracks where large volumes are being cast. PPC account for 18.3 per cent of the production.

3. **Slag Cement—** Common application is similar to those of OPC. However besides that it has more sulphate resistance properties than OPC and is suitable for coastal construction. It is made by grinding granulated blast furnace slag, stell industry by product (up to 65%), gypsum (5%) and clinker (balance). PBFSC has a heat of hydration even lower than PPC

and is generally used in construction of dams and similar massive construction. It contributes nearly 10 per cent to the total.

4. **Masonry Cement—** Exclusively meant for masonry works and plaster only.

5. **Low heat portland cement—** Grinding and chemical composition are similar to those of OPC. All applications requiring very early strength, very high early removal of from works, very high handling of pre-cast element, high grade precast and prestressed concrete product, slip form, cooling tower and pill tower.

6. **Sulphate Resistant Cement—**The chemical composition is designed in such a manner that C3A content in cement restricted to 5 per cent and other chemical constituents are similar to OPC. Used in structures in contact with soil or water having enough sulphate concentration.

7. O**il Well Cement—**This is a special kind of cement for use in the drilling of wells to fill the space between the steel lining tubes and the well wall. It sets slowly in order to give the slurry made with it sufficient time to reach the large depths of the oil wells. However once set it develops strength rapidly and remains stable at high temperature.

8. **White cement—** It is primarily used for decorative purposes and in manufacture of titles. The raw materials are so chosen that the maximum iron-oxide content is strictly limited to 1 per cent. Variety of colours can be obtained by the addition of pigments.

9. **Super sulphate cement—** Intergrading makes super sulphate cement, a mixture of 80-85 per cent selected granulated slag with 10-15 per cent calcium sulphate and about 5 per cent of Portland clinker. It may be applied where high sulphate, acid and organic oil attacks on structure is expected.

10. **High alumina cement—** The chemical composition is designed in such a manner that the total alumina content is at least 32 per cent. This cement is ideally suited for high temperature castable refractory.

11. **Grey Portland cement—** Chemical composition is similar to OPC expect the following limitations, which ensures very strength, increased cohesiveness and increased durability factor towards chemical attack. All applications where high-strength concrete is required ideally suited for railway prestressed concrete sleepers, bridges and slip form construction.

Description Limits as per IRST -40 OPC as per IS-Spec

LSF 0.8-1.02 0.66-1.02

C3S 45% Min –

C3A 10% Max –

Fineness 3700 Min-

Cement Industry in India

The Indian cement industry continues to suffer from excessive production capacity a time when demand growth continues to be sluggish. The industry remains highly fragmented and profit have been impaired by a series of

debilitating price wars as well as from steadily rising costs. The recent arrival of Lafarge may herald some much needed industry consolidation. Meanwhile cement capacity levels continue to be swollen by a sizeable new building programme.

Population:	**935.7**
Density:	314
Area:	279190
Capital City:	New Delhi
GNP Per Capita:	US$310
Urbanization:	26 per cent
Per Capita Cement Consumption:	79kg
Official Language:	Hindi, English
Currency:	Rupee

Year	**Production**	**Consumption**	**Exports**	**Imports**
1999	48.9	48.9	0.1	0
2000	53,61	53.61	0.4	0
2001	53.73	49.86	1.18	0
2002	54.09	52.91	2.83	0
2003	58.35	56.67	3.58	0
2004	69.32	60.64	4.8	0
2005	69.55	67.17	2.38	0
2006	76.22	73.52	2.7	0
2007	80	75.66	4.24	0
2008	84	80.6	3.4	0

Industry Overview: Construction Machinery

The demand for new construction equipment in India increased from USD 1.4 billion in 2003 to USD 1.7 billion in 2004. Demand is expected to increase to USD 2.1 billion by the end of 2005. During the following three years, the Indian

construction equipment industry is projected to grow 20 per cent each year. Similarly, U.S. imports that now stand at USD 81 million are expected to grow 27 per cent in each of the coming three years.

Since the onset of "economic liberalization" that occurred during Indian fiscal years (FY) 1996-97, the Government of India has adopted industrial policy changes that have permitted deregulation. Consequently, Indian companies have restructured and modernized. Except for a few strategic industries, the private sector can establish joint ventures with foreign firms. Now, the Government of India allows majority foreign equity ownership for such ventures. Joint ventures with higher-level participation can also be considered if there are substantial benefits to the Indian economy. In particular, the GOI also encourages infrastructure ventures involving the private sector. These initiatives have opened huge market and investment opportunities for the private sector. Many global players are developing industrial and fastructure projects either individually or jointly with leading Indian firms.

Industry Overview: Cement Producers

India was the fourth largest producer of cement in the world with 115 large plants with installed capacity of 96 Mt/yr belonging to 57 companies, 300 mini cement plants each with

less than 2,00,000 t/yr overall installed capacity in 2002 was about 105 Mt/yr (*World Cement*, 2002).

Redland PLC, based in the United Kingdom, was negotiating with the Birla Group to set up a joint venture to produce ready-mix concrete for the Delhi area, which has been undergoing considerable growth. If realized, then both companies would have a 50 per cent equity share (*Industrial Minerals,* 2002).

Problems of Cement industry

The main impediments to the growth of cement industry in India may be broadly listed as follows:

1. **Shortage of capital–** the cement industry is capital-intensive in nature. On account of its record on declining profitability, it is unable to raise the required finance from the capital market.

2. Power shortage– Power is an important infrastructure, which the cement industry needs. The cement industry is being adversely affected with the State Electricity Boards (SEBs), raising costs year after year accompanied by diminishing quality of power supplied, in terms of frequent voltage fluctuations, power cuts and interruptions.

By installing captive power plants the Indian cement industry is today supplementing grid power supply as a result, capacity has crossed 700MW.

3. Locational problems – Cement industries are mainly situated in Western and Southern regions producing about 71

per cent of the total output, while the Northern and Eastern regions account for 29 per cent of total output. The Southern and western regions consume only 57 percent of their total output, while the Northern and Eastern regions consume 43 percent of their total production. There is excess production in the Southern and Western regions while there is excess demand form Northern and Eastern regions. These factors lead do heavy transport cost.

4. **Shortage of coal –** Coal shortage affects production of cement industry resulting in idle capacity and under utilization of capacity. Coal requirement by the industry today, stands at 13mt, which is just 6 per cent of the total cost produced in India. As a result, industry sources say that, cement manufactures are left at the mercy of traders in coal, who charge exorbitant prices. By 2005 AD, the need for coal will go up to 25mt per annum.

The availability and movement of coal has been a perennial problem of the cement industry. Ninety per cent of the coal deposits occur in the four states of Bihar, Orissa, West Bengal and Madhya Pradesh. Barring Madhya Pradesh, none of the other states have any limestone deposits and hence coal has to be hauled over very long distances.

Keeping in view the likely production of 737mt of cement in 2001, coal requirement will have to be doubled to level of 21mt and about 15mt will have to be moved by rail against 8 mt by rail in 1996.

Requirement of coal during 1995s

year	Estimated Cement Production(Mt.)	Estimated Coal Requirement
2000	54	14.0
2001	57	15.0
2002	62	16.5
2003	67	17.5
2004	72	19.0
2005	76	20.5
2006	80	22.1
2007	87	23.7
2008	N.A.	24.1

5. **Non-availability of railway wagons–** Non-availability of railway wagons leads to considerable delay in bringing in the raw materials and in despatching the cement to various potential markets. Sending cement by open railway wagons leads to pilferage and damage by rain. 55 per cent of cement is despatched by rail and 45 per cent by road.

6. **Defective method of transport–** Methods of cement bagging and its transportation in India are primitive which marketing inefficient and uneconomical. Hardly any quantity of cement at present is handled in bulk.

7. **Negligible share in world trade–** India's share in world trade is negligible. Currently, India exports only about 3.5 lakh tones in a year.

8. **Technological obsolescence–** The industry is in need of change in the production process. There is a need for conversion from wet process to dry process.

Apart from a modernization programme involving Rs. 300 crore, latest technologies for, computerized control systems, X-ray analyzers, pollution control devices, captive power plants, upgrading quarry operations, etc, have all been adopted by the industry.

Quality – In order o meet the challenge of globalization, the Indian cement industry will have to adopt the ISO 9000/IS 14000 series of standards and the Total Quality Management (TQM) system.

So far, only about 10 per cent of cement plants have gone in for this international certification.

Cement manufactured in India is subjected to quality assurance checks within the plant, and further scrutinized and certified by the autonomous Bureau of Indian Standards (BIS). India is one of the few counties to have set up a limit of 0.5 per cent by weight, for chloride ions in cement for use in long span reinforced concrete and priestesses concrete structures.

With eco-labelling and ISO-labelling, becoming major issues in several countries, the Indian cement industry will have to conform to stiff norms for international and environmental acceptance.

Cost factor– The single major item of expenditure is the cost of fuel (*viz.* furnace oil/LSHS), which constitutes at least 60 per cent of the variable cost. The industry has to find some

means to reduce consumption of fuel oil of it is to survive in the long term.

Modern packing material will have to be introduced, which are strong enough, but at the same time cheaper to counter the increasing price of jute and paper.

Quality improvement and usage applications are major thrusts of the R & D effort, to benefit usage in India and abroad. Identified areas for future research and development include coal beneficiaries, quality modulation, improved burners etc.

Mini Cement Plants

Mini cement plants play a vital role in socio-economic development. In India, sizeable deposits of limestone, which is the main raw material required for the production of cement, are spread over the country. In those places where there are limited quantities of time stone available, and it is not possible to set up large plants, the Government has decided to start mini plants.

Process of Cement Manufacturing

Wet Process

It is the oldest process and it was originally used for easily crumbly materials because it can help to control accurate mix of raw material. In this process, the raw material is broken up and incorporated in wash mills. This usually consists circular hall, covers inside by bricks or concrete and containing a framework of iron in the walls to prevent the passing of raw materials otherwise it will reduce the proportion of chalk and

clay which are fed in the required proportion in the wash mill together with sufficient water to form materials which are reduced to a fine state of decision and pass as a slurry through the screens in walls of the pit. The flints, which are included in the chalk, remain at the bottom to the wash of mill and are removed periodically. In the modern methods, the raw material are usually reduced in size by treatment in another wash mill with finer screens in centrifugal screening mills, or by passing it through a tube mill. If the raw material contains harder limestone and shells the wash mill is not enough to affect the reduction.

In this case the raw material are crushed and passed into large tube mills after adding the water to the mill, in an adequate quantity to form the slurry, if the hard limestone and clay are the raw materials, the clay is passed through the tube mill already dispersed in the water. At the same time it is ensured that the finished slurry does not contain more than a few percent of materials remaining on a 170 mesh and the water content in it varies from 35-40 per cent with different raw material. The slurry is pumped to slurry tanks or pool and mixed by compressed air to keep the mixture homogeneous. To keep the limestone in good proportion in the mix it is controlled by analysis and the supply to the wash mill of tube mills is adjusted periodically as required. The final step to adjustment of composition is often obtained by mixing the slurry from two basins one of which is kept slightly high and on slightly low in time.

The wet process is known as rotary of kilns in which the cement is burnt. It is a long cylinder mixing on its axis which separates the materials supplied at the upper and travels slowly to the lower end. The fuel is blown inside by an air blast and fired in it. In the upper part of the kilns chains are fixed to assist in the transfer of the heat from kilns gases to the raw materials. The slurry is dried in the upper part of the kilns and water driven out as steam and then as it descends the kiln, the dry slurry undergoes a series of reactions forming in the most strongly heated zone hard granular masses mostly form 1/8 inch to ¾ inch diameter known as clinker mill where small quantity of gypsum is added during cement passes to silos from which it is drawn for packing.

Dry Process

In this process the raw materials are crushed and dried by rotary driers, proportional and ground in tube mills consisting of rotating steel cylinders contain balls of different sizes. The mill is continuous in operation, and supplying raw material at one end discharging the ground material at the order. The dried powder is transported to storage in silos from where it is supplied to the kiln. In this process it must be decided whether to use rotary kiln or not. The use of any other device will practically give the same results as drive form the use of rotary kiln, the choice in this case will depend upon the cost factor, the space, specific requirement and lastly the fuel. Shaft kilns required to slop fuel and can, therefore only be employed in places where coke or anthracite are readily

available. Rotary kilns can fire with pulverized fat coal gas or oil.

Semi Dry Process

Next process of drying is called semidry process, the shaft kilns are suitable filled with various types of discharge gates. It must discharge the clinker from the kiln continuously at a uniform rate. The clinker, which formed in the kiln, must be broken up while being discharged. The raw material and fuel are mixed in a correct proportion and this mixture is then agglomerated into nodules in conjunction with the addition of a suitable quantity of water, the quantity of water is in the ranger of 8 to 14 per cent depending upon the nature of meal. Some types of machines for agglomerating the raw material may be mentioned as disenoduliser, drumnoduliser, edge runner with perforated runner tracks, rings in which run heavy rollers which pass the material through the holes. In certain cases it is sufficient nearly to moisten the raw meal in simple paddle worn conveyor. For high capacity shaft kilns, the raw meal and fuel are nodulised in a special revolving drum or in an inclined revolving disc or pan. The finally divided material or agglomerate by the nodulising into small balls or nodules, and has in present years come to a general use as a most suitable method of preparing the raw materials for shaft kiln. To pass the material through the sintering zone as rapidly as possible, it is necessary to supply and distribute air adequately. The shaft kilns are constructed with clear internal diameter of 2-3 meter and the height of shaft in 8 to 10 meter for output

ranging from 13 to 200 tones of clinker per 24 hours a day. The consumption of fuel is about 800 to 1200k. cal per kg. of clinker.

Cement Companies Under Study

1. Associated Cement Company

Object and activities–Manaufacture of cement refractoriness cement and other heavy machinery including structural and mild fabrications.

Operations– The production of all types of cement for the year 1994-95 was 74.39 this level of lakh tones. The production of cement had achieved during this year despite the deinvestment of four cement plants. This level of production was achieved by increasing capacity utilization to a record level of 97 per cent through productivity improvements.

Production during the year 1995-96 was reduced to 73.39 lakh tones compared to 74.39 lakh tones of the pervious year. The loss of production was because of inadequate power supply. The sale of refractory products was also decreased to 31.742 tones compared to 51.776 tones of previous year. On account of strike at the Katni plant foe about 4 months. The export of cement during the year was 55 lakh tones and the sale of cement in the domestic market was 74.09 lakh tones. During 1997-98 the production of cement decreased to 74.87 lakh tones as compared to 77.59 lakh tones for the previous year. During the year 1998-99 the cement production was 77.21 lakh tones as against 74.81 lakh tones for the previous year. During 1999-2000 the production of cement increased to and all of time high of 8.47mt. The sale of cement was also at a record level of

8.52mt. The total sale of cement was higher by 14 per cent compared to previous year. During the same year the export of cement was at a higher level of .23mt. compared with .19 tones during the previous year. The record of turnover of refractory business was due to the highest ever sale of refractory products of over 56,000 tones form the plant of Katni, compared to 48,000 tones in the previous year.

Modernization and Expansion– The company has undertaken mines motorization major energy saving schemes during the year 1995-96 which would resulted in significant reduction in energy consumption, generation of additional captive power and better pollution control by installation of electronic precipitators of the various works.

During the year 1995-96 the modular of coal washary was setup at Kymore works, which is the first of its kind in any cement plant in the country. This had been successfully commissioned. During the year 1997-98 the expansion of existing capacity of Gagal cement plant in Himachal Pradesh was completed at cost of Rs. 35 crore one of the rotary kilns of Sindri works has been converted to slag drier this year.

The new plant in Gagal commenced regular production of about 1mt of cement per annum from September 1999 with the satisfactorily completion of this project. Now production of this plants has increased to over 2 million per annum. The production of the new plant was supplied to the customers in Himachal Pradesh, Punjab, Haryana and Delhi.

The ACC Ltd. has decided to undertake the major modernization programme of its old units at Lakheri and Kymore by the cost of approximately Rs. 123 crore. During 1999-2000 the phase of the projects for capacity balancing and expansion of Madukkari cement works as completed. Its capacity was to produce 8 lakh tones of cement per annum.

History–The company imported the technique precalcinations from Japan in order to same an capital investment and time in the establishment of the additional capacities and to increase the operational efficiency. The expansion, which achieved under the new technique, had undertaken at Wadi works and at Gagal works. During 1982 plant of the one mt. capacity was commissioned the company had converted same of its factories from wet process to dry process to conserve energy. The company had converted the plant of Madukkari from wet process to semi dry process in technical collaboration with M/s Ruby Cement Consultants Ltd., U.K., the machine and fabrication shops at Shabad were started in 1963, and several plants have been manufactured and installed in India as well as in Bhutan and Iran.

It has also secured contracts of management operations and maintenance of cement plants in Yanbu Cement Company Ltd. in Saudi Arabia and the cement plant at Kubasia, Iraq.

2. India Cement Company Ltd.

The India Cement Company Ltd. started in 1949, the company runs two factories, one at Sankardurg in Salem district of Tamil Nadu. It has been running a foundry at Nandambakkam near Chennai since 1965 and from that year it started producing pozzalana cement also. During the sample period the company expanded its capacity five times, including the setting up of second factory in 1964. This is one of the few units which produced above its rated capacity throughout the study period except in 1962-63 and 1964-65 when production was low due to major repair of the older kiln and techniques troubles in the new factory and in 1966-67 due to reduced demand by government and private sector as a result of recession. Another year of production below the rated capacity was 1969-70. During this year of production in the Sankardurg factory was only 85 per cent of the rated capacity due to some delay in the supply of machinery for the crushing unit and initial teething trouble in the working of the new kilns.

From December 1961 oil firing was resorted to for one of the kilns, which was extended to second factory also later on. This company may become in the category of efficient units of the industry that could utilize their capacity to the full and expand it. Even in the face of adverse circumstances like its distance from coal reserves and lower shortage etc.

The company runs two cement factories one at Sankaranagar in the Nellai Kattabomman district and the other at Sankardurg in the Salem district of Tamil Nadu state. It also runs a foundry at Nadambakkam near Chennai city.

In 1980-81 productions of Clinker and cement at both the factories declined due to shortage of power and inadequacy of coal. Production at Sankarnagar factories continued to be affected in the first quarter of the year due to the productivity of good quality limestone. Though the turnover increased, working resulted in huge losses. In 1981-82, step taken to increase the production yielded good results.

The combined capacity utilization of the two cement plants improved to 831 mt. from 731 mt. in 1980-81. In 1985-86 Clinker and cement production declined marginally due to inadequate supply of coal during the first quarter. Turnover increased by 10 per cent (Rs. 138.14 crore). In 1994-95 production of cement declined due to coal shortage in the first quarter of the year and inadequate demand for cement in the southern state. Production of Cement from large plants increased from 81.66 millions tones in 2003-2004 to 94.01 mt in 2004-2005 a growth of 15 per cent.

Additions to capacity by the industry during 2003-04 amounting to 8.5 millions tones had its full impact while a further 1.75 mt. of capacity was added during 2004-05. The capacity utilization of the industry also increased from 78 per cent to 87 per cent.

3. Gujarat Ambuja Cement

Object and activities: Manufacture of cement.

Incorporation and promotion– The company was incorporated on 20th October, 1981 as Ambuja Cements Pvt.

Ltd. It was jointly promoted by Gujarat Industrial Investment Corporation Ltd. N.S. Sekharia and his associates Vinod K. Neotia and Suresh Mulani for setting up a cement project in the joint sector. The company was converted in to a public limited company on 19th March 1983 and its name was changed to Gujarat Ambuja Cement Ltd. on 19th May, 1983.

Process and technology– The company adopted the latest dry process precalcination technology incorporating five stage preheater for the main processing system of the cement plant. For grinding the raw material the company undertook to install the latest air swept roller mills of polysious designs, which were for extremely energy efficient. A computerized process control system with field instruments supplied by Larsen and Turbo were also being installed to give consistently high quality cement with maximum productivity. In addition, electronic packing material machine were being obtained from Haver & Boecker, West Germany and reserve air bughouse equipment from Zurn Industries USA.

Foreign collaborations– The Company entered into an agreement with Krupp Polysius AG, West Germany (KP) for supply of plant equipment and service for the project. KP agreed to supply raw material and coal grinding vertical roller mills, homogenizing and kilns kid burning, cooling and coal firing equipment and pneumatic transport pumps. KP has a collaboration agreement with Backau Wolf India, Ltd. who is supplying the balance items of the main plant as per KP design. The scope of the agreement with KP provides for

complete engineering of plant, technical documentation and information and supervision of erection and commissioning of the project.

Project site and construction– The company undertook to set up a project for the manufacture of cement with a licensed capacity of 5,00,000 tones per annum. The plant location was initially contemplated at Mahuav Taluka in Bhavanagar district of Gujarat. On the basis of the preliminary report of limestone availability at the site, orders were placed for plant and equipment with a capacity of 6,25.000 tones per annum. Due to delay and difficulty in acquiring land, the location of the plant was shifted to Ambuja Nagar, Vadnagar village in Kodinagar Taluka of Amreli district a notified backward area in Gujarat. In view of the better quality of limestone at the new site the company had sought an increase in the licensed capacity to 7 lakh ton per annum. 193 acres of land was acquired and major civil work at the site was started. Owing to delay in completion of the 33 km. Long 132 k high lens ion power line, the project could not be commissioned as per the original schedule. The kiln was fired in June 1986 and commercial production commencement in October 1986.

Operations– Since the commencement of commercial production up to 30th June 1987, the company produced 3,37,017 tones of cement, 3,52,902 tones of cement worth Rs. 40.52 crore was sold in 87-88, the company produced 3,20,185 tones of cement which worked out to a capacity utilization of 117 per cent. 8,10,046 tones of cement valued at Rs. 90.14 crore

was sold. Power supply situation during the year was reasonably satisfactory.

Total production during the year 2002-03 clinker 9.19 lakhy tones and cement to 9.58 lakhy tones. Sales during the year 2002-03 were 5.06 mt, as against 4.09 mt in the previous year. During the year 2002-03 Asia had been in the midst of an unforeseen economic crisis. In spite of this, they had been able to further step their cement export that year from 4.77 lakh tones to 5.40 lakh tones. The total value of export was Rs. 83.95 crore as compared to Rs. 83.83 crore last year. During the year 2002-03 they had put up a 40 mw power plant in just 8 months at a low cost. With the commissioning of this power plant the total power generation capacity at Ambuja Nagar had gone up to 58 mw. They also put up a new 12 mw power plant at Himachal Pradesh during the year 2002-03. With the existing 12 mw the total capacity of the power plant at Himachal Pradesh had now been enhanced to 24 mw. During the year 2003-04, the company had make a profit of Rs. 150.47 crore.

During the year 2003-04 they had pushed cement production up by a hoping 1 mt over the previous year. The production of cement was 11.17 lakh tones and Clinker was 10.89 lakh tones during the year. Sale pushed up from 18.65 lakh tones in the previous year to 22.53 lakh tones during the year 2003-04. Cement exports during the year 2003-04 accounted for 5.04 lakh tones as against 5.40 lakh tones in the previous year. In value this amounted to Rs. 52.59 core as against the previous year Rs. 81.37 crore.

Future plans– After seeing the satisfactory results of the enhancement at their Himachal plant, their engineers have now drawn plans for doing the same at their Ambuja Nagar plants. The orders for plant and equipment have been placed. Their entire scheme is likely to be implemented by the end of year 2005 at an estimated expenditure of about Rs. 100 crore. After the implementation, their total clinker manufacturing capacity at Ambuja Nagar will increase by about 1 mt per annum.

Capital outlay– The project cost was estimated at Rs. 62.50 crore of which a sum of Rs. 9.15 crore was for land and building Rs.38.60 crore for plant, machinery and erection, and Rs. 75 lakh for working capital margins. This was being met by share capital of Rs. 14.65 crore terms loans from financial institutions and banks of Rs. 44.60 crore, Rs. 3 crore as loan from GIIC against sales tax department benefit and Rs. 25 lakh as central and state subsidy.

Subsequently, the cost of the project went up by Rs. 16.50 crore to Rs. 81 crore. This cost overrun was proposed to be met through additional term loans from financial institution of Rs. 13.15 crore issue of rights equity shares for Rs. 1.80 crore contribution towards equity share capital by Private Promoters and this association of Rs. 20 crore and the balance of Rs. 3.35 crore through excess subscription retained by the company out of the public issue.

4. Managalam Cement Limited

Objects and activities– The main objects of the company on its incorporation are to produce manufature, treat, process, refine, import, export, purchase, sell and generally to deal in and to act as brokers, agents, stockiest, distributors and suppliers of all kind of cement (whether ordinary, white, coloured Porland, pozzolana, alumina, blast furnace, silical or otherwise), cement products of any description such as pipes, poles, slabs, blocks, tiles, gardenwares and otherwise, connected with the aforesaid products and in connection there with no take on lease or acquire, erect, construct, establish works operate and maintain cement factories, quarries, mines, workshops and works.

Process– The company is showing a poor performance since its inception. The year 1995-96 was not an exception. The production of Portland cement was 4,07,866 tones only and the sale of goods by the company was Rs. 53.90 crore. During the year 1996-97 the cement production was declined to 3,88,258 mt. This production was less compared to last year. But the turnover of the company had increased to Rs. 61.67 crore in comparison to Rs. 59.9 crore of the previous year due to increase in price of cement. During the year 1997-98 the production of cement was 3,92,416 tones compared to 3,88,258 tones in the last year. This indicates that there was some improvement in the production. The turnover of company during the year was Rs. 59.01 crore as compared with Rs. 61.67 crs in the previous year. The turnover during the year 1998-99

was also reduced to Rs. 58.16 crore compared to Rs. 59.01 crore in the previous year.

Incorporation and promotion– Company was incorporated as a public limited company on 27th October 1976 and commences its business on 15th January 1977. The unit manufacture 4 lakh tones per annum cement started the commercial production in March 1981. Kesoram Industries Ltd., Century Textiles and Industries Ltd., Grasim Industries Ltd., Pilani Investment Corporation Ltd, Rajasthan State Industrial Development and investment Corporation Ltd mainly promoted the company. The projected cost for setting up the plant to manufacture 4 lakh tones per annum cement was Rs. 24 crore.

Raw material– The main raw materials, which are locally procured to manufacture cement, are limestone, laterite, blue dust and gypsum. The company is having lease of 8.95 Sq. km. of limestone bearing land adjacent to the plant site.

Power–Total sanctioned load from the RSEB to the company is 29 MVA. Company requires 25 MVA to run both the units. Company in having stand by arrangement of generation of power through 3 DG set of total 11.7 MV.

Operations– During 2000-01 the combined Clinker capacity utilization of both the plants (Managalam and Neer Cement) was 117 per cent and the cement 98 per cent this year as against 94 per cent and 98 per cent respectively the previous year. The turnover during the year was 235.98 crore as against 167.65 crore in the previous year. As a result the company

earned the highest ever profit of Rs. 57.77 crore and net Profit of Rs. 19.50 crore in the previous year.

The production of Clinker during the year 2001-02 was affected due to drastic power cuts imposed by RSEB since November, 2001. Due to severe power cuts kilns of Managalam Cement remain closed for the whole December 2001. Loss of clinker production on account of power cut during the above 4 months was 1,74,000 Mt. approximately. But for the power cut which drastically curtailed operations, production of Cliker would have been higher then the previous year. In spite of the marginal increase in sale from Rs. 235.98 crore in the previous year to Rs. 244.67 crore in the financial year, company had suffered a net loss.

During the year 2003-04 combined capacity utilization of both the plants was 110 per cent as against 104 per cent in the previous year. The measure (consumption of imported coal etc.) and the effective funds management enable to company to bring out its cash losses from Rs. 16.76 crore in the previous year to Rs. 4.31 crore in the current year.

Accounts auditing– "The books of accounts of the company shall be examined by one or more auditors at least once in a year. The first auditor or auditors of the company shall be appointed by the board within one month after the date of registration of the company and the auditors so appointed shall hold office until the conclusion of the first annual meeting of the company."

Memorandum and Articles of Association of Mangalam Cement Ltd. The auditors report shall be read before the company in general meeting and shall be open to inspection by the members of the company. Every balance sheet and profit and loss account of the company when audited and adopted by the company in general meeting shall be conclusive except to any error discovered therein.

5. Shree Cement Limited

Objects and activities– The main objects of the company on its incorporation are to produce, manufacture, treat, process, refine, import, export, purchase, sell and generally to deal in, and to act as brokers, agents, stockiest, distributors and suppliers of all kinds of cement (whether ordinary, white, coloured Portland, pozzolana, alumina, blast furnace, silica or otherwise), cement products of any description such as pipes, poles, slabs, blocks, tiles, garden wares and otherwise, connected with the aforesaid products and in connection therewith to take on lease or acquire, erect, construct, establish works operate and maintain cement factories, quarries, mines, workshops and other works.

History– The company was incorporated as a public limited company on 25th October, 1979 and obtained the certificate of commencement by members of the Bangur family and other Shree Digvijay Cement Co. Ltd., Graphite India Ltd. and Fort Gloster Industries Ltd. took active part in the promotion of the company which was licensed to manufacture 12 lakh tones of Portland cement per annum. Commercial

production was commenced from 1st May 1985. The installed capacity was increased to 7.7 lakh mt. per annum from 6.0 lakh Mt. per annum in 1993.

Project– The Company undertook to set up industrial unit foe manufacturing 6,00,000 tones of Portland cement.

Project site and land lease– The project was set up near village Andheri Deori, Tehsil Beawar in Ajmer District, Rajasthan state. The company required 700 acres of leasehold/freehold lands from the Rajasthan Government and private parties. The company was marching ahead with the implementation of new unit 1.24mt capacity per annum named RAJ Cement. The estimated cost of the project was Rs. 325 crore. Civil works on major structure have been completed and erection of machineries has commenced.

Process– To reduce fuel and power consumption the company adopted the latest dry process, four stages, preheater precalcination technology of clinkerisation and air swept roller mill grinding systems for raw material and coal grinding.

Present business– The company is in the business of manufacturing and market of ordinary Portland cement and Pozzolona Portland cement. The company is presently implementing 1.24mt per annum cement plant at its existing location at Beawar (Rajasthan). The company is also engaging in leasing and hire purchases activities.

Land and building– The company owns 220 hectares of land out of which 133 hectares is presently being used for the

existing plant and the balance 87 hectares had been remarked for the new plant. Cost of building estimated at Rs. 2,832 lakh.

Plant and machinery– The plant and machinery at company is existing plant include limestone crusher, vertical roller raw mill, two steam preheated with 5 stage low pressure drop cyclones and cross flow pyroclone, a rotary kilns, grate cooler, vertical roller coal mill, roller mills, ball mill, packing and electrostatic precipitators etc.

Manufacturing process method– The Company's exiting plant was setup on dry process technology using suspension preheated and incorporating precalcination technology.

Collaboration– The company entered into agreement with F.L. Smith & Company, A/S Copenhagen, a designer and manufacture of cement plants, its associated F.L. Smith and Co,. Espanala F.A. Madrid and with Larsen and Toubro Ltd., Mumbai, for the supply of plant, equipment and services for the proposed project under the agreements the foreign companies agreed to supply a major portion of the main plant and Larsen and Toubro the rest.

Project costs– The project was estimated to cost of Rs,. 5,350 lakh of which Rs. 44.93 lakh was for land and development, Rs. 3,612.18 lakh for plant and machinery, and Rs. 60 lakh as working capital margin. This was to be met by an equity issue of Rs. 1,540 lakh, Rs. 3,413 lakh of term loans and Rs. 397 lakh of deferred payments, credits from overseas suppliers/banks. The project cost escalated by Rs. 4,056 lakh because if higher prices of construction materials changes in

designs. Financial institutions and banks sanctioned term loans aggregating Rs. 361 lakh to meet a part of this cost overrun. The balance was being financed from the company's own resources and partly by unsecured loan/deposits of Rs. 36 lakh, from friends and associates.

Finance–The following rupee term loans were sanctioned**–** Rs. 1,500 lakh by IDBI, Rs. 500 lakh each by IFCI and ICICI and Rs. 50 lakh each by the Union Bank of India and Rs. 200 lakh each by LIC and the Punjab National Bank and Rs. 20 lakh each by General Insurance Co. Ltd. (UII).

The ICICI sanctioned foreign currency loans equivalent to Rs. 52 lakh. The IDBI, IFCI, ICICI, OIC, NIC, NIA, UI have the option to convert at par a portion not exceeding 20 per cent of their rupee loans into equity shares of the company between 1st January 1987 and 31st December 1988.

Accounting Auditing– Shree Cement Ltd. Being a public limited company is subjected to an annual audit, once at least in every year, the books and accounts of the company shall be examined by one more auditors. The company shall at each annual general meeting appoint an auditors or auditors to hold office from the conclusion of that meeting to the conclusion of the next annual general meeting.

Chapter-IV

Analysis of Cash and Liquidity Management

- Introduction
- Meaning of Cash Management
- Analysis of Cash Management
- Cash Planning
- Cash Forecasting and Cash Budgeting
- Cash Control Technique
- Control and Review
- Liquidity Analysis
- Measurement of Liquidity and Trends
  - Working of Liquidity and Trend
  - Net Working Capital to Current Liabilities
  - Working Capital Turnover

Introduction

One of the most important areas in the day-to-day management of the firms deals with the management of working capital, which is defined as all the short-term assets used in daily operations. This consists primarily of cash, marketable securities, accounts receivable and inventory. The balances in these accounts can be highly volatile as they respond very quickly to changes in the firm's operating environment.

A highly liquid firm has sufficient cash to pay its bills at all times. An illiquid firm is unable to pay its bills when due.

In a financial sense, the term cash refers to all money items and sources that are immediately available to help in paying firms' bills. On the balance sheet, cash assets include deposits in financial institutions and cash equivalent in money market funds or marketable securities. All highly liquid short-term securities are treated as cash. Most government and corporate securities are treated as cash because they may be liquidated through a telephone call.

Cash is the most important current assets for the operations of the business. It is the basic input needed to keep

the business running on a continuous basis. It is the money, which the firm can disburse immediately without any restriction. The term cash includes coins, currency, cheques held by the firm and balance in its bank accounts.

J.M. Keyens postulated three motives for holding cash *viz.* transactional motive, precautionary motive, and speculative motive. These can be said to form the basis for cash management in business enterprise. Cash is oil that lubricates the wheel of business. Inadequate cash slows down the production and on the other hand carrying cash is expensive since it is non-earning asset. A firm that holds cash beyond its minimum requirement is lowering its potential earning. Cash is the most important current asset. It is the cash, which keeps a business going. It is the hub around which all other financial matters centre. No one can deny the fact that cash is the blood inside the business enterprise. Healthy circulation of cash in the entire business operation is the basis of business solvency. Cash is the basic input needed to keep the business running on a continuous basis; it is the ultimate output expected to be realized by selling the services or product manufactured by the firm. Ultimately every transaction in a business results either in an inflow or an outflow of cash.

Therefore, effective management of cash is the key determinant of efficient working capital management. There should be sufficient cash with a firm all the time to meet the

needs of the business. Both excess and inadequate cash may degenerate a firm into a state of technical insolvency and even lead to its liquidation. It will eventually disrupt the firm's manufacturing operation. On the other hand excessive cash remains idle, without contributing anything towards the firm's profitability.

Moreover, holding of cash balance has an implicit cost in the form of its opportunity cost. The larger the idle cash, the greater will be its opportunity cost in the form of loss of interest which could have been earned either by investing in some interest bearing securities or by reducing the burden of interest charged by paying off the past loans. The carrying of cash and near cash reserves beyond the irreducible needs cuts assets turnover and rate of return. If the cash balance with a firm at any time is surplus or deficit, it is obvious that the finances are mismanaged. Today, when cash, like any other asset of the company, is a tool for profits, the emphasis is on right amount of cash at the right time, at the right place and at the right cost.

Meaning of Cash Management

Cash management is concerned with minimizing unproductive balances, investing temporarily cash advantageously and to making the best possible arrangement to meeting planned and unexpected demand on the firm's cash. It involves managing of cash flows in and out of the firm,

i.e. cash flows within the firm and cash balances held by the firm at a point of time.

Cash management must be thought of in terms of the overall liquidity needs of the firm, specifically its current assets and liabilities. In order to reduce the influence of uncertainties with regard to cash needs and to ensure adequate liquidity, firm has to gauge the need for protective liquidity.

It is necessary for business to maintain a certain amount of cash in hand or bank always, even if the other current assets are at a sustained figure. Cash is both beginning and the end of the working capital cycle – cash, inventories, receivables and cash.

Cash is the basic input needed to keep a business running on a continuous basis. It is also the ultimate output expected to be realized by selling the services or product manufactured by an enterprise.

Cash management assumes more importance than other current assets because cash is the most significant and the least productive asset that a firm holds. The aim of cash management should be to maintain adequate cash position to keep the firm's operations in profitable manner. There are two primary reasons for a firm to hold cash:

1. To meet the needs of day-to-day transactions.
2. To protect the firm against uncertainties characterizing its cash flow.

In brief we can say proper cash management is required for smooth running and maximum profitability of the business.

It is clear that cash is like blood stream in the human body, gives vitality and strength to a business enterprise. So it is necessary that the management of business enterprise should provide sufficient coverage to their currently maturing obligations in the form of enough cash and near cash assets, high and stable cash flows and sound profit margin. In brief while the first function of cash management increases the turnover of working capital cycle to bringing down the size of cash, the function reduces the problem of financing the working capital. Trade creditors, banks and external agencies provide finance.

Cash management involves managing the monies of the firm in order to attain maximum cash availability and maximum cash income on any idle funds. Cash management is concerned with minimizing unproductive cash balances, investing temporarily excess cash advantageously, and to making the best possible arrangements for meeting planned and unexpected demand on the firm's cash flows within the firm, and cash balances held by the firm at a point of time.

Cash management must be thought of in terms of the overall liquidity needs of the firm, specifically its current assets and liabilities. In order to reduce the influence of uncertainties with regard to cash needs and to ensure adequate liquidity, firms have to gauge the need for protective liquidity. The efforts involved for this purpose usually take the form of:

Assessment of the probabilities or odds that each of these will develop within a given period in future, such as 5 years. Assessment of the probabilities and developments creating cash drains will occur at the same time.

Assessment of the likely amount of cash drain that will result if each of the contingencies develops. An important policy decision regarding cash management is: what should be the optimal amount of cash balance to consider the form impact of the following factors:

1. The philosophy of the management regarding liquidity and risk of insolvency.
2. The expected cash inflows and outflows based on the cash budget forecasts encompassing long-ranging and short-range cash needs.
3. The size of sales in relation of fixed asset investment.
4. The degree of deviation between the expected and actual net cash flows.
5. The maturity structure of the firm's liabilities.
6. The firm's ability to borrow at short notice in the event of an emergency.
7. Efficient planning and control of cash.
8. The status of the firm's receivables and inventory.
9. The credit position of the firm.
10. The nature of business.

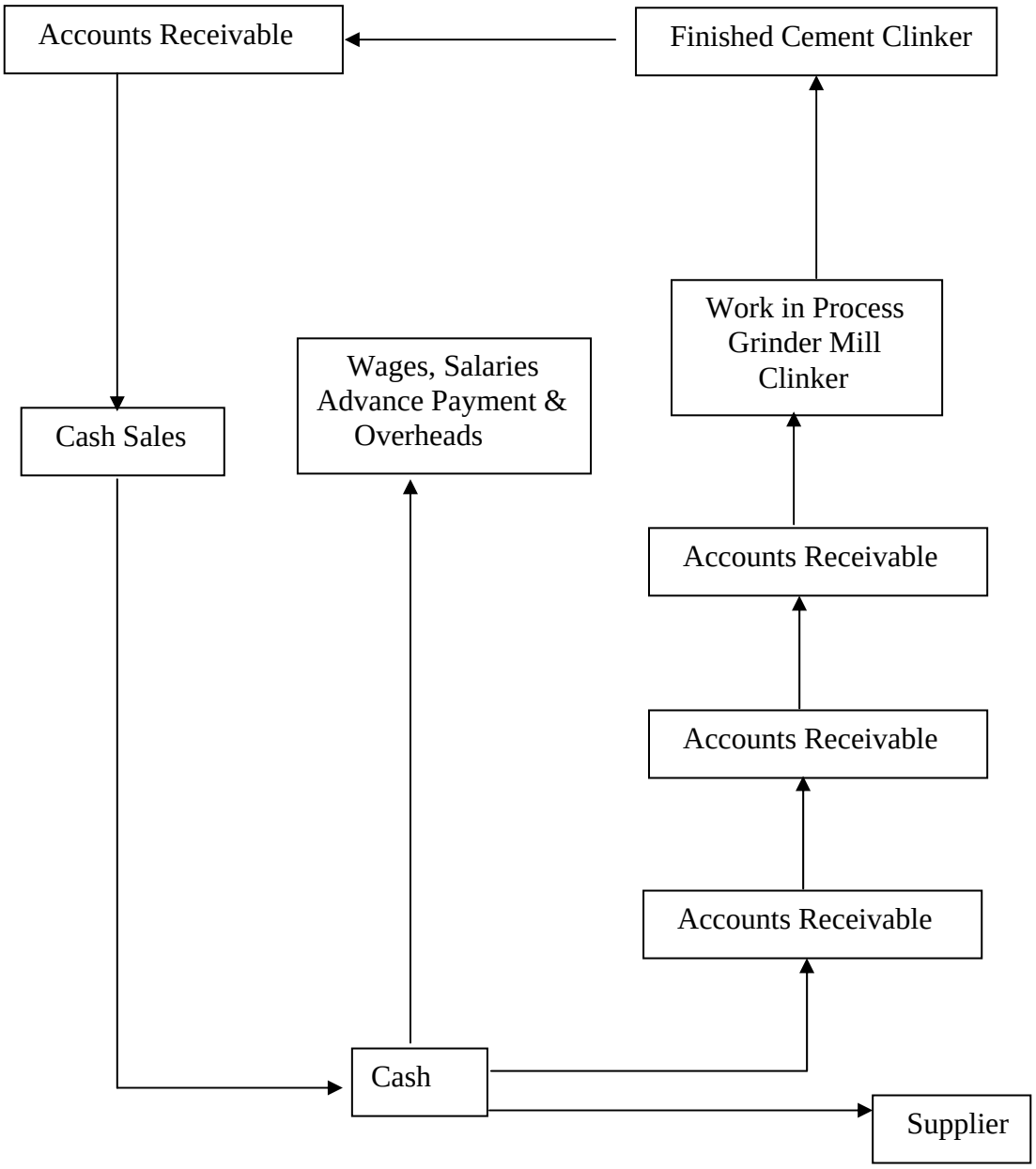
Analysis of Cash Management

Proper cash management is "life blood of a business" all the more so in product like cement where the value of sales of all major cement producers is in few hundred crore of rupees each. It has been analysed in this chapter what should be an ideal cash-sales ratio and what actually it is for cement industry in general and for various regions and Dalmia Cement in particular and what are the factors responsible for current state of affairs.

Cash is needed to meet day-to-day transactions for purchase of raw materials; payment of wages, salaries and royalty and factory overheads; payment for coal, electricity, furnaces oil and other inputs and goods in process; cash is also blocked in finished goods stock at factory and depots and distribution channels, advance payment of taxes and other future liabilities and sales on credit. On the one side purchase on credit, advance receipts for supplies and other short-term receipts are other side of the coin. All these factors affect not only overall current assets but also cash management. It is, therefore, necessary to properly understand and plan current assets cycle, which may be summarized as under for cement industry.

Current assets cycle, which may be summarized as under for cement industry.

Cycle of Current Assets & Cash



The cash is required basically to meet day-to-day running of business for purchase of materials, other inputs, energy payment of wages, salaries, overheads, and consumables. Funds are also required to meet cost of inventories (raw-materials, spares, consumables, goods in process, finished products and providing credit to buyers). Sometime funds are also needed to pay advance of excise duty, sales tax, property and water tax and income tax.

Many a times emergencies also arise which are not foreseen and reserve cash has to be kept to meet uncertainties with regard to cash receipts and payment whether for current assets and liabilities or to meet long-term funds.

The proper cash management is given great importance in financial management with a view to minimize its cost, ensure adequate cash for all requirements and avoid surplus cash with the organization. The aim of cash management is to minimize cost of interest on borrowings, earning maximum interest from surplus funds and avoid or atleast reduce uncertainties of surplus or short funds so that need of borrowings to meet emergencies is avoided. At the same time planning is needed for proper investment of surplus funds whether in securities, additional inventories or utilise them for prepaid payment of borrowings.

In order to ensure above objectives it is necessary to take a number of steps for cash planning such as cash deciding policy for credit purchase and sales. It also implies to fix optimum level of inventories and investment of surplus funds.

To what extent these planning tools have been adopted by cement industry in last one decade has been studied with the help of published data of selected cement companies and discussions with the industry.

Money, as is well assumed, has a time value. In inflationary economy (which is the case in India) current value of money is more than future value but if one takes the gain in the value of stocks the above statement is not always true. If the prices of inputs and outputs rises faster than rate of interest it will be more profitable to minimize cash balances. But as in India the rate of interest on working capital loans from banks is between 18-20 per cent and the rate of inflation is less, it is advisable to manage with the minimum possible cash but it is not always in the hands of management because of changing market and economic conditions and policies of the government. In our country cement industry has been victim of uncertainties. There is no fixed trend in the rate of growth in demand of cement. There have been periods of surpluses and shortages as described in earlier chapter soon after decontrol on production and prices number of new cement plants were established all over the country creating situation of surplus and increased competition forcing industry to give liberal credit to trade and creating situation of surplus and increased competition forcing industry to give liberal credit to trade and industry requiring more cash resources. Then there was a period of tight supplies and now again sales are less than

capacity forcing industry to reduce prices and provide more liberal credit to buyers.

In case of cement supplies to the PWD and other government departments and consumers (which accounts generally to more than one-third of sales). Credit has to be given and the terms by convention are decided by buyers and not by seller. Thus producers to a great extent are not able to manage cash as they wish and are governed by market forces.

The cement though is not a seasonal industry consumption goes down during rainy season because construction becomes difficult and some areas become unapproachable in July-September. In these areas sales are accelerated in April-July to keep stock for rainy season. But it is a fact that market is sluggish in monsoon season not only because of dampening in construction activity but also due to risk of spoilage of cement in transit during rainy season which reduces its movement. To what extent this factor has actually affected cash flow and cash management could not be studied in next part of analysis because only financial year-end data could become available. In the absence of monthly cash flow it has not been possible to study impact of this factor on cash sales ratio.

Cash Planning

Cash flows:

Inflows and outflows are inseparable parts of the business operations of all firms. The firm needs cash to invest in inventories, receivable and fixed assets and to make

payments for operating expenses in order to maintain growth in sales and earnings. It is possible that a firm may be making adequate profits, but may suffer from the shortage of cash as its growing needs may be consuming cash very fast. The "Cash poor" position of the firm can be corrected if its cash needs are planned in advance. At times, a firm can have excess cash with it if its cash inflows exceed cash outflows. Such excess cash may remain idle. Again, such excess cash flows can be anticipated and properly invested, if cash planning is esorted to.

Thus, cash planning can help anticipated future cash flows and needs of the firm and reduces the possibility of idle cash balances (which lowers firm's profitability) and cash deficits (which cause firm's failure).

Cash planning is a technique to plan for and control the use of cash. It protects the financial condition of the firm by developing a projected cash statement from a forecast of expected cash inflows and outflows for a given period. The forecasts may be based on the present operations or the anticipated future operations. Cash plans are very crucial in developing the overall operating plans of the firm.

Cash planning may be done on daily, weekly or monthly basis. The period and frequency of cash planning generally depends upon the size of the firm and philosophy of management. Large firms prepare daily and weekly forecasts. Small firms may not prepare formal cash forecasts because of the non-availability of information and non-sophistication of

operations. But, if, the small firms prepare cash projections, it is done on monthly basis. As the firm grows and business operations become complex, cash planning becomes inevitable for its continuing success.

Cash forecasting and budgeting:

Cash budget is the most significant device to plan for and control the cash receipts and payments. A cash budget is a summary statement of the firm's expected cash inflows and outs over a projected time period. It gives information on the timing and magnitude of expected cash flows and cash balances over the projected period. This information helps the financial manager to determine the future cash needs of the firm, plan for the financing of those needs and exercise control over the cash and liquidity of the firm.

Cash forecasting-- Cash forecasts are needed to prepare cash budgets. Cash forecasting can be done on short-term or long-term basis. Generally, forecasts conferring periods of one year or less considered short-term. Those extended beyond one year are considered long-term.

Short-term forecasts:

It is comparatively easy to make short-term forecasts. The important uses of carefully developed short-term cash forecasts are:

1. It helps to determine operating cash requirements.
2. It helps to anticipate short-term financing.
3. It helps to manage money market investments.

Short-term forecasting methods-- Two most commonly used methods of short-term cash forecasting are:

1. The receipt and disbursements method.
2. The adjusted net income method.

Receipts and disbursements method:

Cash flow in and out in most of companies on a continuous basis. The prime aim of receipts and disbursements forecasts is to summarize these flows during a predetermined period. In case of those companies where each item of income and expenses involve flow of cash, this method is favoured to keep a close control over cash.

Adjusted net income method:

This method of cash forecasting involves the tracing of working capital flows. It is sometimes called the sources and uses approach. Two objectives of the adjusted net income approach are- (i) to project the company's need for cash at some future date, and (ii) to show whether the company can generate this money internally, and if not, how much will have to either borrow or rise in the capital market.

Long-term cash forecasting:

Long-term cash forecasts are prepared to give an idea of the company's financial requirements of distant future. They are not as detailed as the short-term forecasts are. Once a company has impact, of say, new product developments or plant acquisitions on the firm's financial condition three, five or more years in the future.

Long-term forecasting methods- The short-term forecasting methods, the receipts and disbursements method and the adjusted net income method, can also be used in long-term cash forecasting. This method not only reflects more accurately the impact of any recent acquisitions but also foreshadows financing problems these new additions may pose for the company.

Cash Control Techniques:

The important techniques of controlling cash are:

(1) Cash budgeting
(2) Ratio analysis
(3) Fund flow statement
(4) Financial reports
(5) Linear programming
(6) Goal programming
(7) Simulation technique, and
(8) Portfolio management.

Some of these are discussed below:

1. Cash budgeting− Cash budget is a time phased schedule of cash receipts and disbursements, and show the estimated cash inflows and outflows over a certain period. It is a tool of planning cash need of a business concern and serves as a cash control device. The cash budget report aims at ascertaining deviation of actual operations from budgeted ones and making it possible to compare actual with estimated cash balances at the end of each plan period. If there is a marked difference between the actual and projected balances, the cash budget for

the succeeding period should be revised and included in the report.

2. Ratio analysis-- It involves the use of accounting ratios rather than obsolete figures as an index of financial performance of a business concern. However, the analysis and interpretation of ratios does not only evaluate and control the over all financial performance of a concern, but also the different facts of its financial activities.

3. Fund flow statement-- The analysis of financial statements through the preparation of the statements of changes in financial position of a business concern provides a very useful tool for financial planning and control. Such statements explain the charges in such or working capital and are accordingly called "Cash flow statement" or "funds flow statement".

These statements are prepared periodically to show the changes in a concern's cash position and charges in its net working capital position, they provide evaluating techniques to the management to know the sources and uses of a concern's fund over a period of time.

4. Financial reports-- Cash reports provide a comparison of actual develops with forecast figures. They are helpful in control and revision of cash forecasts on a continual basis. Among the several types of cash reports, the important ones are-- (i) the daily cash report, (ii) the daily treasury report, and (iii) the monthly cash report. The daily cash report, as the name implies, shows the cash picture on a daily basis. An

amplification of the daily cash report and the daily treasury report provides a comprehensive picture of changes in cash, marketable securities, debtors and creditors. The monthly cash report shows the picture of cash changes on a monthly basis.

Control and Review

There are five major approaches for effective control are:

1. Exploitation of techniques of cash mobilization to reduce operating requirement of cash.
2. Major efforts to increase the precision and reliability of cash forecasting.
3. Maximum efforts to define and quantify the liquidity reserve needs of the firm.
4. The development of explicit alternative sources of liquidity.
5. Aggressive search for more productive uses for surplus money assets.

Some of the important techniques of controlling cash are cash budgeting, ratio analysis, linear programming, goal programming, simulation and portfolio management. Ratio analysis is widely in application. Some of the important ratios used as measures of cash control are discussed below:

(1) **Cash turnover –** The ratio explains the speed with which cash is turned over. The higher the turnover, the less the cash balance required for any given level of sales; and other things remaining constant, it implies greater efficiency. The ratio can also be used to establish the cash balances to be held; once the sales forecasts for various periods have been made, the

required cash balance can be calculated, using historical cash turnover figures. However, the ratio shows only what is happening to the cash balance without indicating the imperfections and irregularities, caused in cash flows by the income through sales, which may be partly responsible.

(2) Cash as Percentage of Current Assets

The ratio of cash in current assets provides an index of current operations and, used correctly, helps determine the minimum level of cash. Monthly control of cash and his records give some indication of trends. An increasing level of cash in current assets could be caused by a reduction in the credit given by the company's suppliers or by too high cash balance. The first may be unavoidable; the second is not. The further analysis is required to determine the cause.

Current Ratio of Selected Cement Companies has been shown in Table 4.1.

Table 4.1

Current Ratio of Selected Cement Companies

for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	1.47	3.09	3.16	2.36	2.25	2.46
2004-05	1.92	2.45	3.79	2.48	3.64	2.86
2005-06	1.77	2.32	2.32	2.67	2.96	2.41
2006-07	1.56	1.56	2.21	3.17	3.66	2.43
2007-08	1.55	0.80	1.29	2.66	3.91	2.04
Company Average	1.65	2.05	2.55	2.67	3.28	2.44

Source: Based on data provided in Appendix

The current ratio of all the cement companies shows fluctuating trend throughout the study period except

Mangalam which shows decreasing trend. The minimum Current Ratio in ACC is 1.47 (2003-04), Mangalam is –0.80 (2007-08), Gujarat Ambuja is 1.29 (2007-08), Shree Cement is 2.36 (2003-04), and in the India Cement is 2.25 (2003-04). The maximum Current Ratio in ACC is 1.92 (2005-06), Mangalam is 3.09 (2003-03), Gujarat Ambuja is 3.79 (2004-05), and Shree Cement is 3.17 (2006-07) and in India cement is 3.91 (2007-08).

Liquid Ratio of Selected Cement Companies has been presented in Table 4.2

Table 4.2

Liquid Ratio of Selected Cement Companies

for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.39	1.39	0.60	0.58	0.47	0.69
2004-05	0.73	1.17	1.32	0.99	0.39	0.92
2005-06	0.67	1.02	0.57	1.09	0.40	0.75
2006-07	0.50	0.63	0.40	1.05	0.56	0.63
2007-08	0.48	0.26	0.17	1.43	0.51	0.57
Company Average	0.56	0.89	0.61	1.03	0.47	0.71

Source: Based on data provided in Appendix.

The liquid Ratio of all the cement companies shows fluctuating rend throughout the study period except Mangalam which shows decreasing trend. The minimum Liquid Ratio in ACC is 0.39 (2003-04), Mangalam is 0.26 (2007-08), Gujarat Ambuja is 0.17 (2007-08), Shree Cement is 0.58 (2003-04), and in India Cement is 0.39 (2004-05). The maximum Liquid Ratio in ACC is 0.73 (2004-05), Mangalam is 1.39 (2003-

04), Gujarat Ambuja is 1.32 (2004-05), and Shree Cement is 1.43 (2007-08) and in India Cement is 0.56 (2006-07).

Cash as Percentage to Total Assets of Selected Cement Companies has been shown in Table 4.3.

Table 4.3

Cash as Percentage to Total Assets of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	1.91	2.42	2.55	0.54	2.86	2.06
2004-05	2.26	3.42	5.64	1.69	1.09	2.82
2005-06	1.76	3.09	3.13	2.44	1.02	2.29
2006-07	1.05	2.25	1.37	1.45	0.77	1.38
2007-08	0.83	2.63	0.53	2.39	0.33	1.34
Company Average	1.56	2.76	2.65	1.70	1.21	1.98

Source: Based on data provided in Appendix

The Cash as percentage to Total Assets of all the cement companies shows fluctuating trend throughout the study period except India Cement which shows decreasing trend. The minimum Cash as percentage to Total Assets in ACC is 0.83 (2007-08), Mangalam is 2.25 (2006-07), Gujarat Ambuja is 0.53 (2007-08), Shree Cement is 0.54 (2003-04), and in India Cement is 0.33 (2007-08). The Maximum cash as percentage to Total Assets in ACC is 2.26 (2004-05), Mangalam is 3.42 (2004-05), Gujarat Ambuja is 5.64 (2004-05), and Shree Cement is 2.44 (2005-06) and in India cement is 2.86 (2003-04).

Cash to Net Working Capital of Selected Cement Companies has been given in Table 4.4.

Table 4.4

Cash to Net Working Capital of Selected Cement Companies for the years 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.15	0.16	0.21	0.04	0.17	0.15
2004-05	0.15	0.26	0.40	0.11	0.04	0.19
2005-06	0.14	0.24	0.31	0.14	0.04	0.17
2006-07	0.10	0.27	0.18	0.09	0.03	0.13
2007-08	0.09	-0.45	0.21	0.19	0.01	0.01
Company Average	0.13	0.09	0.26	0.11	0.06	0.13

Source: Based on data provided in Appendix

The Cash to Net Working Capital of all the cement companies shows fluctuating trend throughout the study period except ACC and India Cement which shows decreasing trend. The minimum Cash to Net Working Capital in ACC is 0.09 (2007-08), Magalam is -0.45 (2007-08), Gujarat Ambuja is 0.18 (2006-07), Shree Cement is 0.04 (2003-04), and in India Cement is 0.01 (2007-08). The Maximum Cash to Net Working Capital in ACC is 0.15 (2003-04 and 2004-05), Mangalam is 0.27 (2006-07), Gujarat Ambuja is 0.40 (2004-05), and Shree Cement is 0.19 (2007-08) and in India Cement is 0.17 (2003-04).

Cash to Current Assets of Selected Cement Companies has been presented in Table 4.5.

Table 4.5

Cash to Current Assets of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.05	0.11	0.14	0.02	0.10	0.08
2004-05	0.07	0.16	0.30	0.07	0.03	0.12
2005-06	0.06	0.13	0.17	0.09	0.03	0.10
2006-07	0.04	0.10	0.10	0.06	0.02	0.06
2007-08	0.03	0.11	0.05	0.12	0.01	0.06
Company Average	0.05	0.12	0.15	0.07	0.04	0.09

Source: Based on data provided in Appendix.

The cash to current assets of all the cement companies shows fluctuating tend throughout the study period except India Cement which shows decreasing trend. The minimum cash as percentage to current assets in ACC is O.04 (2007-08), Mangalam is 0.10 (2006-07), Gujarat Ambuja is 0.05 (2007-08), Shree Cement is 0.02 (2003-04), and in India Cement is 0.01 (2007-08). The maximum cash to current assets in ACC is 0.07 (2004-05), Mangalam is 0.16 (2004-05), Gujarat Ambuja is 0.30 (2004-05), and Shree Cement is 0.12 (2007-08) and in India Cement is 0.10 (2003-04).

Cash to Current Liabilities of Selected Cement Companies has been given in Table 4.6

Table 4.6

Cash to Current Liabilities of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.07	0.33	0.45	0.06	0.22	0.22
2004-05	0.14	0.38	1.12	0.16	0.11	0.38
2005-06	0.10	0.31	0.41	0.23	0.08	0.23
2006-07	0.06	0.15	0.21	0.19	0.07	0.13
2007-08	0.05	0.09	0.06	0.32	0.03	0.11
Company Average	0.08	0.25	0.45	0.19	0.10	0.22

Source: Based on data provided in Appendix.

The cash to current liabilities of all the cement companies shows fluctuating trend throughout the study period except India Cement which shows decreasing trend. The minimum cash to current liabilities in ACC is 0.05 (2007-08), Mangalam is 0.09 (2007-08), Gujarat Ambuja is 0.06 (2007-08), Shree Cement

is 0.05 (2003-04) and in India Cement is 0.03 (2007-08). The maximum cash to current liabilities in ACC is 0.14 (2004-05). Mangalam is 0.38 (2004-05), Gujarat Ambuja is 1.12 (2004-05), and Shree Cement is 0.32 (2007-08) and in India Cement is 0.22 (2003-04).

Liquidity Analysis

The concept of liquidity within a business is vital to the understanding of financial management as it is the basic criteria to test the short-term financial position of the enterprise. Liquidity may be defined as the ability to realize value in money the real liquid asset. It has two dimensions-- The time required converting the assets into money, and risks involved.

(1) The certainty of the reliable price. Liquidity refers to affirm continuous ability to meet its short-term maturing obligations. Since cash is used to meet a firm's obligations, emphasis is given on holding large investment in current assets which include cash and 'near cash' items like receivables, short term securities etc. thus, holding relatively large investment in current assets will result in no difficulty in paying the claims of the creditors and others.

According to Mauraw Bahadur, "Analysis of liquidity provides the measure of the ability of the enterprise to meet its obligation. It is not sufficient that the final accounts show a profit and the balance sheet a rosy picture of financial health of the enterprise. All this will look meaning less, unless the cash inflows and outflows are so regulated that at all times there is

enough cash available to meet obligations as and when they mature. The analysis of liquidity should therefore, be taken into consideration, the size of the components of current assets which can be readily converted into cash to meet maturing liability. The size, character and sequence of maturity of liabilities are also of significant importance and deserve due attention." The term liquid assets is used to describe money and assets that are readily convertible into money. Liquidity has two dimensions *viz.* time and risk.

The time dimension of liquidity concerns the speed with assets other than cash. The risk dimension raises the question of the degree of certainty about the conversion of inventories, receivable and others into cash with a little sacrifice in price as possible. Viewed from these, all assets will have a degree of liquidity and assets that comprise cash and near cash items in most liquid assets. The liquidity of any business results from its ability to generate cash. The financially sound company is able to build up a reserve of cash in excess of requirement for operation. This surplus of cash is then available for the financing of expansion and for payment of debts and dividends. The working capital of a business represent the amount of current assets which the enterprise has in excess of the claims of the current creditors and with which, therefore, it is free to work. From this statement it would appear that the greater the amount of working capital, or net current assets, the greater the degree of liquidity of the business, and so it is

alleged that the amount of working capital is a measure of liquidity.

The word liquidity was used by the financial accounting standard Board (FASB) "the amount of time that is expected to elapse until an asset is realized or otherwise converted into cash or until a liabilities has been paid".

Liquidity management therefore involves the amount of investment in the group of assets to meet short-term maturing obligations-creditors and others. From the point of financing, normally a major portion of the fund required for financing current assets is obtained from long-term sources, equity and for debt, while the rest is met from short-term sources. It goes without saying that if the maturing obligations are met continuously as and when become due, creditors and others will have a feeling of confidence in the financial strength of the firm and this will sustain the credit reputation of the firm and a going firm will accordingly face difficulty in holding a particular level of current assts. But failure to meet such obligations on a continuous basis will affect the reputation, and hence credit worthiness of a firm, which will, in turn, make it more difficult to continue to finance the level of current assets from the short-term source.

The word liquidity suggests a kind of measurement or qualification of the prospect of meeting maturing obligations.

In a sound business, the source of finance should be supplemented by own cash generation. The quantum of conversion of current assets into cash or in other words, near

liquid asset may have to be supplemented by outside borrowing to make sufficient liquid fund available to meet current obligations. The current obligations will also include the repayment of borrowing.

At last we can say that the term 'Liquidity' means conversion of assets into cash during the normal course of business and to have regular flow of cash to meet outside current liabilities (generally within a year) as and when due and payable and also to ensure money for day-to-day business operations. Hence, the flow of current assets should circulate within a year, so that timely payment is made to outsiders for interest, dividends etc. If the major part of current asset is blocked in inventories and credit sales (Sundry debtors), not any ready cash will not be available to pay current debt but also there is a risk of shortage in the total current asset available because of possible fall in the value of inventories, possible losses in account of bad debts. The quality of current asset is therefore very important for analyzing liquidity. However, a firm has a strong liquidity of it is able:

1. to meet the claims of short-term creditors.
2. to maintain sufficient working capital for efficient normal operations.
3. to meet current interest and dividend requirements.
4. to maintain a favourable credit rating. The efficient management of working capital requires constant attention to process of rapid conversion of receivable and inventory into cash.

Measurement of Liquidity and Trends

Working capital trend in financial analysis, the direction of change over a period of time is of crucial importance. Working capital is one of the important fields of financial management. It is, therefore, very essential for an analyst to make a study about the trend and direction of working capital. Further, a study should also be made about the trend of the components of the working capital movements to provide a deep and broad base while examining the working capital management of an industry. This analysis will provide a base to judge whether the practice and prevailing policy of the management with regard to working capital is good enough or an improvement is to be made in managing the working capital funds. Further, any one trend by itself is not very important and, therefore, an analyst should make comparison with related trends. To illustrate, an upward trend in working capital, coupled with a downward trend in sales would usually reflect an unfavourable situation, an upward trend of current assets, inventories, accounts receivable, cash in bank balances and other current assets, in connection with a downward trend of current liabilities would usually be viewed favourably. All such conclusions throw light on one or more aspects of the working capital position and have to be reconciled with those other aspects.

Working Capital Chain Indices of Selected Cement Companies has been shown in Table 4.7.

Table 4.7

Working Capital Chain Indices of Selected Cement Companies for the Years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	100.00	100.00	100.00	100.00	100.00	100.00
2004-05	128.54	79.13	135.58	11165.65	240.53	140.09
2005-06	114.72	77.43	92.03	135.46	284.97	140.92
2006-07	98.56	48.05	96.04	190.83	426.14	171.92
2007-08	97.43	-30.71	37.11	136.87	543.84	156.91
Company Average	107.85	54.78	92.15	135.96	319.10	141.97

Source: Based on data provided in Appendix-I.

The working capital chain indices of all the cement companies shows fluctuating trend throughout the study period except India Cement which shows increasing trend. The average of industry shows increasing trend throughout the study period. The minimum working capital chain indices in ACC are 97.42 (2007-08), Mangalam is -30.71 (2006-08), Gujarat Ambuja is 37.41 (2007-08), Shree Cement is 100.00 (2003-04) and in India Cement is 100.00 (2003-04). The maximum working capital chain indices in ACC are 128.54 (2004-05). Mangalam is 100.00 (2003-04), Gujarat Ambuja is 135.58 (2004-05), and Shree Cement is 190.83 (2006-07) and in India Cement is 543.84 (2007-08).

The linear least square trend values of working capital in the Cement industry are shown in the table 4.8

Table 4.8

Working Capital Trend of Selected Cement Companies for the years from 2003-04 to 2007-08

(Rs in lakh)

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	37841.00	4258.03	29267.43	7727.09	5025.25	16823.76
2004-05	36683.90	3158.57	25403.29	8801.59	10189.57	16847.38
2005-06	35526.80	2059.11	21539.16	9876.09	15353.89	16871.01
2006-07	34369.70	959.65	17675.02	1095.60	20518.21	16894.64
2007-08	33212.60	-139.81	13810.89	12025.10	25682.54	16818.26
Company Average	35526.80	2059.11	21539.16	9876.09	15353.89	16871.01

Source: Based on data provided in Appendix-I.

The trend is calculated on the basis of the statistical technique (Least Square Method), i.e, Y = a +bx,

In case of ACC eqn. comes to Yc = 35526.80+(-1157.10x).

In case of Managalam eqn. comes to Yc= 2059.11+(-444.33x).

In case of Gujarat Ambuja eqn. comes to Yc=21539.16+(-3864.14x).

In case of Shree Cement eqn. comes to Yc = 9876.09+(1074.50x)

In case of India Cement eqn. comes to Yc = 15353.89+(5164.32)

To test the significance between the actual values and the trend values of working capital of cement companies (under study) Chi-square test has been applied. The calculated values of chi-square in selected cement companies are shown in the table 4.9.

Table 4.9

Chi-square Test of Working Capital of Cement Industry in India for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement
2003-04	634.50	58.51	1186.95	27.77	9.08
2004-05	873.01	10.75	1555.79	12.25	188.00
2005-06	144.17	352.07	0.04	0.13	175.63
2006-07	105.44	746.80	1288.39	773.81	0.01
2007-08	37.67	-7362.42	1910.47	360.79	9.17
Sum of Chi-square	1794.80	-6194.29	5941.64	1174.76	381.88

Source: Based on data provided in Appendix-I.

In ACC, Mangalam, Gujarat Ambuja, Shree and India Cement the calculated value of Chi-square is 1794.80, -6194.29, 5941.64, 1174.76 and 381.88 respectively, while the table value of Chi-square at 5% level of significance is 1.145. As the calculated value of Chi-Square is more than the table value it shows that the difference between the actual value and the trend values of current assets in all the companies were significant except Managalam. Mangalam calculated value is less than table value so the difference between the actual value and the trends values is insignificant.

Net Working Capital to Current Liabilities (Net working Capital/Current Liabilities)-- it shows the financing mix that is used for financing the current assets. It also reveals the equity and long-term *vis-à-vis* current liability financed portion of current assets. From the liquidity angle it throws light on the equity and long-term financed asset cushion for a given amount of current liabilities.

Net Working Capital to Current Liabilities of Selected Cement Companies has been presented in Table 4.10

Table 4.10

Net Working Capital to Current Liabilities of Cement Industry in India for the years 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.47	2.09	2.16	1.36	1.25	1.46
2004-05	0.92	1.45	2.79	1.48	2.64	1.86
2005-06	0.77	1.32	1.32	1.67	1.96	1.41
2006-07	0.56	0.56	1.21	2.17	2.66	1.43
2007-08	0.55	-0.20	0.29	1.66	2.91	1.04
Company Average	0.65	1.05	1.55	1.67	2.28	1.44

Source: Based on data provided in Appendix.

The Net Working Capital to Current Liabilities of all the cement companies shows fluctuating trend throughout the study period except Mangalam which shows decreasing trend. The minimum Net Working Capital to current liabilities in ACC is 0.47 (2003-04), Mangalam is -0.20 (2007-08), Gujarat Ambuja is 0.29 (2007-08), Shree Cement is 1.36 (2003-04) and in India cement is 1.25 (2003-04). The maximum Net Working Capital to current liabilities in ACC is 0.92 (2004-05). Mangalam is 2.09 (2003-04), Gujarat Ambuja is 2.79 (2004-05), and Shree Cement is 2.17 (2006-07) and in India Cement is 2.91 (2007-08).

Working Capital Turnover (sales/net working capital):

A close relationship exists between sales and net working capital. With any increase in sales volume, there is aa corresponding increase in the working capital. Therefore, a

good amount of net working capital may be needed to support the increase in sales. The ratio helps to assess the degree of efficiency in the use of short-term funds for generating sales.

In order to test the efficiency with which working capital is utilized the working capital turnover is calculated. It is calculated by dividing the net working capital to sales indicating whether a business is being operated with a small or large amount of net working capital is relation to the cost of sales.

A high working capital turnover may be the result of favourable turnover of inventories and receivables or may reflect an inadequacy of working capital. On the other hand, a low turnover of working capital may be an outcome of the excess of working capital of slow turnover of inventories and receivables or a large cash balance or investment of working capital in the form of temporary investment.

However, a very high turnover of working capital might indicate that the working capital is insufficient for the given volume of business. A very low working capital turnover ratio should clearly be taken to mean that the capital is not sufficiently active. So we can say a high ratio indicates that management is aggressive in its use of working capital. However, an excessive high ratio indicates poor working capital management may be inadequate at present sales.

Working Capital Turnover of the Selected Cement Companies has been shown in Table 4.11.

Table 4.11

Working Capital Turnover of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	6.46	5.44	3.40	2.88	3.78	4.39
2004-05	4.85	6.00	3.12	3.46	1.73	3.83
2005-06	5.99	6.46	4.93	3.73	2.11	4.64
2006-07	7.34	12.43	4.98	2.95	1.46	5.83
2007-08	8.03	-14.43	14.62	4.82	1.20	2.85
Company Average	6.53	3.18	6.21	3.57	2.06	4.31

Source: Based on data provided in Appendix-I.

The working capital turnover of all the cement companies shows fluctuating trend throughout the study period. The minimum working capital turnover in ACC is 4.85 (2004-05), Mangalam is -14.43 (2003-04), Gujarat Ambuja is 3.12 (2004-05), Shree Cement is 2.88 (2003-04) and in India Cement is 1.20 (2007-08). The maximum working capital turnover in ACC is 8.03 (2007-08), Mangalam is 12.43 (2006-07), Gujarat Ambuja is 14.62 (2007-08), and Shree Cement is 4.82 (2007-08) and in India Cement is 3.78 (2003-04).

References:

Joseph F Bradly, *Administrative Financial Management*, Holt, Renehart and Wilson Inc. New York, 1969.

N.K Agarwal *Management of Working Capital,* Sterling Publishers Pvt Ltd. New Delhi, 1983.

A.F. Peed, "Corporate Cash Management" as reproduced in R.R. Bari's book *Selected Reading in Cash Management,* Triveit Publishing, Delhi, 1981.

R.K. Mishra, *Problems of Working capital with reference to selected Public Sector Undertaking in India.* (Mumbai Somanuya Publications Pvt Ltd., 1975).

B.B. Howard and M. Upton, *Introduction to Business Enterprise*. (New York, McGraw Hill, 1953).

James McN. Stancil; *Cash Management in Managerial Finance, Cases and Readings.* George N. Engle (New York: Business Publications. Inc., 1973).

Yair E Orgler, *Cash Management; Methods and Models* (Belmont, California: Wordsworth Publishing company Inc,. 1970).

G.W. Cooke and E.C. Bomali, *Business Financial Management,* Boston, 1967.

James C Van Horne, *Financial Management and Policy,* 6th edition, Prentice Hall of India Pvt Ltd. New Delhi, 1983).

ABR Choudhary, *Analysis and Interpretation of Financial statement through financial ratios* (New Delhi, Orient & Longman, 1970).

John N. Myer, *Financial Statement Analysis* Level, (Eanglewood Cliffs New Jersey, Prentice Hall, inc.).

Murao Bahadur, *Management Accounting,* (New Delhi: Meenakshi Prakashan, 1982).

J.C. Van Horn, *Financial Management and Policy*. (New Delhi: Prentice Hall of India Pvt. Ltd., 1979).

J.C. Waller. "Determination of Technical Insolvency." *Journal of Business*, January 1957.

B. Banerjee, *Financial Policy and Management Accounting,* (KalKata; the World Press Pvt. Ltd. 1987).

Harry Gross, *Financing Small and Medium Size Business,* (New Jersey, Prentice Hall, inc Englewood cliffs).

FASB proposed statement of financial accounting concepts, "Reporting income, cash flows and financial position of a business enterprise standard 1981."

Chapter-V

Accounts Receivable Management

- Introduction
- Goals of Receivable Management
- Credit Management
- Optimum Credit Policy
- Credit of Account Receivable

Introduction

Accounts receivable represent the amount due form customers (book debts) or debtors as a result of selling goods on credit. "The term debtors is defined as 'debt' owned to the firm by customers arising from sale of goods or services in the ordinary course of business." The three characteristics of receivables the element of risk, economic value and futurity explain the basis and the need for efficient management of receivables. The element of risk should be carefully analyzed. Cash sales are totally riskless but not the credit sales, as the same has yet to be received. To the buyer the economic value in goods and services process immediately at the time of sale, while the seller expect an equivalent value to be received later on. The cash payment for goods and services received by the buyer will be made by him in a future period. The customer from whom receivables or book debts have to be collected in future are called Trade debtor and represent the firm's claim on assets.

Receivables management, also termed as credit management, deals with the formulation of credit policy, in terms of liberal or restrictive, concerning credit standard and credit period, the discount offered for early payment and the

collection policy and procedures undertaken. It does so in such a way that taken together these policy variables determine an optimal level of investment in receivables where the return on that investment is maximum to the firm. The credit period extended by business firm usually ranges from 15 to 60 days. When goods are sold on credit, finished goods get converted into accounts receivable (trade debtors) in the books of the seller. In the books of the buyer, the obligation arising from credit purchase is represented as accounts payable (trade creditors). "Accounts receivable is the total of all credit extended by a firm to its customer."

A firm's investment in account receivable depends upon how much it sells on credit and how long it takes to collect receivable. Accounts receivable (or sundry debtors) constitute the 3rd most important assets category for business firm after plant and equipment and inventories and also constitute the 2nd most important current assets category for business firm after inventories.

Poor management of accounts receivables are: neglect of various overdue account, sharp rise in the bad debt expense, and the collection of debts expense and taking the discount by customers even though they pay after the discount date and even after the net date. Since accounts receivable represent a sizable investment on the part of most firms in the case of public enterprises in India it forms 16 to 20 per cent of current assets. Efficient management of these accounts can provide considerable saving to the firm.

Factors involving in Receivable management:

1. The terms of credit granted to customers deemed creditworthy.
2. The policies and practices of the firm in determining which customers are to be granted credit.
3. The paying practices of credit customers.
4. The vigoir of the sellers, collection policies and practice.
5. The volume of credit sales.

Goals of Receivable Management

The basic goal of credit management is to maximize the value of the firm by achieving a trade off between the liquidity (risk and profitability). The purpose of credit management is not to maximize sales, nor to minimize the risk of bad debt. If the objective were to maximize sales, then the firm would sell on credit to all. On the contrary, if minimization of bad debt risk were the aim, then the firm would not sell on credit to anyone. In fact, the firm should manage its credit in such a way that sales are expanded to an extent to which risk remains within an acceptable limit. Thus to achieve the goal of maximizing the value, the firm should manage its trade credit.

The efficient and effective credit management does help to expand sales and can prove to be an effective tool of marketing. It helps to retain old customers and win new customers. Well administrated credit means profitable credit accounts. The objectives of receivable management is to promote sales and profits until that point is reached where the

return on investment is further funding of receivables is less than the cost of funds raised to finance that additional credit.

Granting of credit and its management involve costs. To maximize the value of the firm, these costs must be controlled. These thus include the credit administration expanses, b/d losses and opportunity costs of the funds tied up in receivable. The aim of credit management should be to regulate and control these costs, not to eliminate them altogether. The cost can be reduced to zero, if no credit is granted. But the profit foregone on the expected volume of sales arising due to the extension of credit.

Debtors involve funds, which have an opportunity cost. Therefore, the investment in receivables or debtors should be optimized. Extending liberal credit pushes sales and thus results in higher profitability but the increasing investment in debtors results in increasing cost. Thus a trade off should be sought between cost and benefits to bring investment in debtors at an optimum level. Of course the level of debtors, to a great extent is influenced by external factors such as industry norms, level of business activity, seasonal factors and the degree of completion. But there are a lot of internal factors include credit terms, standards, limits and collection procedures. The internal factors should be well administered to optimize the investment in debtors.

Credit Management

In order that the credit sales are properly managed it is necessary to determine following factors:

1. Credit Policy
2. Credit Evaluation of Individual Buyers
3. Credit Sanction Decisions
4. Control and Monitoring of Receivables

Credit Policy

The first stage of credit sales is to decide policy in which most important variable is whether credit sales should be made or not and if yes to what extent *i.e.* what percentage of sales should be done on cash and what percentage on credit. The discussion with cement companies marketing and financé department clearly suggest that the credit policy is more dependent upon market forces and less on company specially in periods when there is excessive competition which has happened a number of times in the history of cement industry after decontrol and manufactures have been forced to provide credit if they wanted full utilization of capacity. If in the market there is practice of providing credit, those companies who do not fall in line have lower sales and so lower utilization of instilled capacity. The management has to weigh whether it should avoid risk of realization and problem of arranging funds for larger sales on credit or decide for reduced capacity utilization thereby resulting in higher cost per tonne of cement produced.

Actually the policy should be based on cost benefit analysis of these factors but often policy is decided without detailed calculations. In actual practice when one waits to push sales the marketing department pressurizes the management to provide liberal credit to buyers to realize sales targets.

Credit Rating

The second virtual point of credit policy is to whom to give credit and whom it should be denied. Whether it should be given to everyone or on selective basis? As per standards one can workout impact of credit sales on profits by following formulae:

$\Delta P = \Delta S (1-V) - K * \Delta I - B, \Delta S$

in the above formula

ΔP = Change in profit

ΔS = Change in sales

V = Ratio of variable cost to sales

K = Cost of capital *i.e.* interest cost of credit

ΔI = Increase in receivables investment

B = Bad debts ratio on additional sales

The change in profits (ΔP) is dependent upon ratio of variable cost and fixed cost and change in sales. The figure is worked out by deducting variable cost from sales *i.e.* sales minus variable cost is change in profits.

The above formula appears to be very simple but for policy purposes it requires that policy maker should be able to estimate precisely the impact of credit on sales value, the

variable cost and bad debts besides the cost of capital. In practice besides the cost of capital, it is very difficult to measure extent of increase in sales as a result of credit and it is only broad estimate of sales department. Similarly, it is very difficult if not impossible to workout likely bad debts. The variable cost can be worked out with great precision if proper costing system is maintained. Because of difficulties in quantifying various variables in the formulae often credit policy is decided without working details on prevailing market conditions and the need of the company to push sales at a point of time. It has been by various companies that no details are worked.

Credit Period

The credit period is the time length for which seller agrees to provide credit to the buyers. It varies according to the practice of trade and varies between 15 to 60 days. In some cases for an early payment pre-agreed discount is given to induce buyer make an early payment. For late payment in the agreement there is provision for interest payment by buyer. If credit is given for longer period it induces to push up sales but this is true only when one provides longer period credit than competitors. The customer-distributor, dealer, consumers is attracted to a firm who provides longer period credit. The impact of credit on profits and sales can be worked out from the following formula:

$\Delta P = \Delta S (1-V)*K*\Delta 1-b, \Delta S$

The various components are as under :

Δ P= Change in profit

Δ S= Change in sales

Δ 1= Change in investments receivables

V= Ratio of variable cost to sales

K= Cost of giving credit

b= bad debits ratio to increased credit

The discussion with the industry suggests that they rarely take decision on period of credit based on formula. It is market conditions and practices in the trade, which decides the period of credit and hardly any calculations of cost are done. In practice it is marketing department whose advice plays an important and deciding role. In the period when sales have to be pushed up more credit is provided and there is no uniform policy overtime. During rainy season (July-Sep.) when demand is generally slack more liberal credit is granted than rest of the year. Further, when stocks accumulate due to sluggish sales, producers accept the terms of their customers and traders about the period of credit but when market conditions are tight, the seller becomes more strict in providing credit.

Optimum Credit Policy

Credit policy refers to those decision variables that influence the amount of trade credit *i.e.* the investment in receivables. The firm's investment in receivable are affected by general economic conditions, industry norms, pace of technological change, competition etc. Though the firm has no control on these factors, yet they have a great impact on it and it can certainly influence the level of trade credit through its

credit policy within their constraints imposed externally. The purpose of any commercial enterprise is the earning of profit. Credit itself is utilized to increase sales, but sales must return a profit. Further, whenever some external factors change, the firm can accordingly adopt its credit policy. R.J. Chambers says, "The responsibility to administer credit and collection policies may be assigned to a financial executive or marketing executive or both of them jointly depending upon the original structure and the objectives of the firm."

Different types of credit policy are:

1. Loose or Expansive Credit Policy– Firms following this policy tend to sell on credit to customers very liberally. Credits are granted even to those whose credit worthiness is not proved, not known and are doubtful.

Advantages of Loose or Expansive Credit Policy:

(i) Increase in Sales (higher sales),

(ii) Increase in profit (higher profit),

Disadvantages of Loose or Expansive Credit Policy:

(i) Heavy bad/debts.

(ii) Problem of liquidity

(iii) Increase in cost of credit management.

2. Tight or Restrictive Credit Policy– Firms following this policy are very selective in extending credit. They sell on credit, only to those customers who had proved credit worthiness.

Advantages of Tight of Restrictive Credit Policy:

(i) Minimize cost.

(ii) Minimize chances of bad debts.

(iii) Higher sales in long run.

(iv) Higher profit in long run.

(v) Do not pose the serious problem of liquidity.

Disadvantages of Tight or Restrictive Credit Policy:

(i) Restrict Sales.

(ii) Restrict Profit Margin.

Benefits of Credit Extension:

(i) Increases the sales of the firm.

(ii) Makes the credit policy liberal.

(iii) Increase the profits of the firm

(iv) The market value of the firms share would rise.

Cost of Credit Extension:

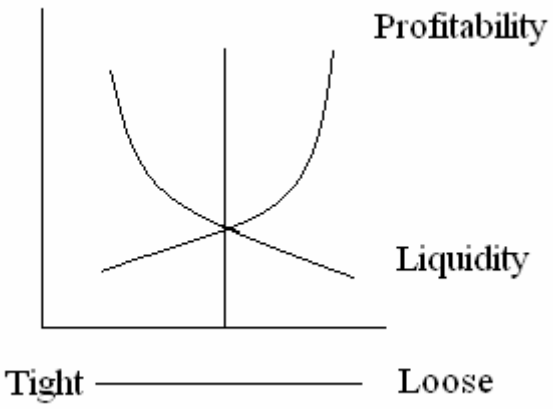
(i) Bad debt losses

(ii) Production and selling cost.

(iii) Administrative expenses.

(iv) Cash discounts and opportunity cost.

Cost Benefit Trade off Profitability



Aspects of Credit Policy:

(i) Credit terms

(a) Credit Period

(b) Cash Discounts

(ii) Credit Standard

(iii) Collection policy or collection efforts.

(i) Credit terms – The stipulations under which the firm sells on credit to its customers are called credit terms.

(a) Credit Period – The time duration for which credit is extended to the customers is referred to as credit period. It is the length of time for customers under which they are allowed to pay for their purchases. It is generally varies between 15-60 days. When a firm does not extend any credit the credit period would obviously be zero. It is generally stated in terms of a net date, for example, if firm allows 30 days of credit with no discount to induce early payments credit then its credit terms are stated at 'net 30'. Usually the credit period of the firm is governed by industry norms, but firms can extend credit for longer duration to stimulate sales. If the firm's bad debts build up, it may tighten up its credit policy as against the industry norms. According to Martin H. Seidhen, "Credit period is the duration of time for which trade credit is extended. During this period the overdue amount must be paid by the customer. The length of credit period directly affects the volume of investment in receivables and indirectly the net worth of the company. A long credit period may blast sales but it also

increase investment in receivables and lowers the quality of trade credit."

(b) Cash Discounts – It is the another aspect of credit terms. Many firms offer to grant cash discount to their customers in order to induce them to pay their bill early. The cash discount terms indicate the rate of discount and the period for which discount has been offered. If a customer does not avail this offer, he is expected to make the payment by the net date. In the words of Martin H. Seiden "Cash Discount prevents debtors from using trade credit as a source of Working Capital."

Liberalizing the cash discount policy may mean that the discount percentage is increased and or the discount period is lengthened. Such an action tends to enhance sales (because the discount is regarded as price reduction), reduce the average collection period (as customers pay promptly). Cash Discount is a premium on payment of debts before due date and not a compensation for the so - called prompt payment.

(iii) **Credit Standard -** The credit standard followed by the firm has an impact of sales and receivables. The sales and receivables level are likely to be high, if the credit standard of the firm are relatively low. In contrast, if the firm has relatively low credit standard, the sales and receivables level are expected to be relatively high. The firms credit standard are influenced by three "C" of credit. **(a) Character** – the willingness of the customers to pay, **(b) Capacity** – the ability of the

customers to pay, and **(c) Condition** – the prevailing economic conditions.

Normally a firm should lower its credit standards to the extent profitability of increased sales exceed the associated costs. The cost arising due to credit standard realization are administrative cost of supervising additional accounts and servicing increased volume of receivables, bad debt losses, production and selling cost and cost resulting from the slower average collection period.

The extent to which credit standard can be liberalized should depend upon the matching between the profits arising due to increased sales and cost to be incurred on the increased sales.

(iii) Collection policy- This policy is needed because all customers do not pay the firm's bill in time. There are certain customers who are slow payers and some are non-payers. Therefore the collection policy should aim at accelerating collections from slow payers and non-payers and reducing bad debt losses. According to R.K. Mishra, "A collection policy should always emphasize promptness, regularity and systematization in collection efforts. It will have a psychological effect upon the customers, in that, it will make them realize the attitude of the seller towards the obligations granted."

The collection programme of the firm aimed at timely collection of receivables, any consist of many things like monitoring the state of receivable, despatch of letter to

customers whose due date is approaching, telegraphic and telephone advice to customers around the due date, threat of legal action to overdue accounts, legal action against overdue accounts.

The firm has to be very cautious in taking the steps in order to collect from the slow paying customers. If the firm is strict in its collection policy with the permanent customers, who are temporarily slow payers due to their economic conditions, they will get offended and may shift to competitors and the firm may loose its permanent business. In following an optimal collection policy the firm should compare the cost and benefits. The optimal credit policy will maximize the profit and will consistent with the objective of maximizing the value of the firm.

Credit Evaluation

Before granting credit to a prospective customers the financial executive must judge, how creditworthy is the customer. In judging the creditworthiness of a customer, often financial executive keep in mind as basic criteria the four **(i) Capital** –refers to the financial resources of a company as indicated primarily by the financial statement of the firm. **(ii) Capacity** – refers to the ability of the customers to pay on time. **(iii) Character** – refers to the reputation of the customer for honest and fair dealings. **(iv) Collateral** – represents the security offered by the customer in the form of mortgages.

Credit evaluation involves a large number of activities ranging from credit investigation to contact with customers, appraisal review, follow up, inspection and recovery. These activities required decision-making skills which can partly be developed through experience but partly it has to be learned externally. This is particularly true in area of pre-credit appraisal and post-credit follow up.

It is an important element of credit management. It helps in establishing credit terms. In assessing credit risk, two types of error occur – (i) A good customer is misclassified as a poor credit risk. (ii) A bad customer is misclassified as a good credit risk.

Both the errors are costly. Type (i) leads to loss of profit on sales to good customer who are denied credit. Type (ii) leads in bad debt losses on credit sales made to risky customer. While misclassification errors cannot be eliminated wholly, a firm can mitigate their occurrence by doing proper credit evaluation.

Three broad approaches used for credit evaluation are:

A. Traditional Credit Analysis - This approach to credit analysis calls for assuming a prospective customer in terms of 5 of credit: (i) Character, (ii) Capacity, (iii) Capital, (iv) Collateral, and (v) Conditions.

To get the information on the 5 firm may rely on the following.

1. Financial statements
2. Bank references

3. Trade references
4. Credit agencies
5. Experience of the firm
6. Prices and yields on securities

B. Sequential Credit Analysis – This method is more efficient method than above method. In this analysis, investigation is carried further if the benefits of such analysis outweighs its cost.

C. Numerical Credit Scoring – This system involves the following steps.

1. Identifying factors relevant for credit evaluation.
2. Assign weights to these factors that reflect their relative importance.
3. Rate the customer on various factors, using a suitable rating scale (usually a 5 pt. Scale or a 7pt. Scale is used).
4. For each factor, multiply the factor rating with the factor weight to get the factor score.
5. Add all the factors score to get the overall customer rating index.
6. Based on the rating index, classify the rating index.

D. Discriminant Analysis - The credit index described above is somewhat *ad hoc* in nature and is based on weight which are subjective in nature. The nature of discriminate analysis may be employed to construct a better risk index.

Under this analysis the customers are divided into two categories:

1. who pay the dues (X)

2. who have defaulted (O)

The straight line seems to separate the x's from o's, not completely but does a fairly good job of segregating the two groups.

The equation of this straight line is

Z = 1 Current Ratio + 0.1 return on equity

A customer with a Z score less than 3 is deemed credit worthy and a customer with a Z score less than 3 is considered not credit worthy *i.e.* the higher the Z score the stronger the credit rating.

(V) Risk Classification Scheme - On the basis of information and analysis in the credit investigation process, customers may be classified into various risk categories.

Risk Categories	**Description**
1. Customers with no risk of default	
2. Customer with negligible risk of default	(< 2%)
3. Customer with less risk of default	(2% to 5%)
4. Customer with some risk of default	(5% to 10%)
5. Customer with significant risk of default	(> 10%)

Credit Granting Decision - After assessing the credit worthiness of a customer, next step is to take credit granting decision.

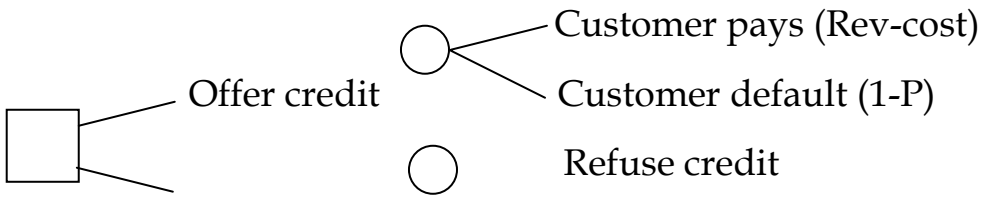
There are two possibilities:

(i) No repetition of order.

Profit = P (Rev-Cost) – (1-P) Cost

Where P is the probability that the customer pays his dues, (1-P) is the probability that the customer defaults, Rev is revenue for sale and cost is the cost of goods sold.

The expected profit for the refuse credit is O. Obviously, if the expected profit of the course of action offer credit is positive, it is desirable to extend credit otherwise not.



(ii) Repeat Order - In this case, this would only be accepted only if the customer does not default on the first order. Under this, once the customer pays for the first order, the probability that he would default on the second order is less than the probability of his defaulting on the first order. The expected profit of offering credit in this case.

Expected profit on initial order + Probability of payment and repeat order x expected profit on repeat order.

$[P_1 (Rev_1 – Cost_1)-(1-P_1) Cost^1] + P_1 x [P_2(Rev_2-Cost_2)-(1-P_2) Cost_2]$

The optimal credit policy, and hence the optimal level of accounts receivable, depends upon the firm's own unique operating conditions. Thus a firm with excess capacity and low variable production cost should extend credit more liberally and carry a higher level of accounts receivable than a firm operating a full capacity on a slim profit margin. When a sale is made, the following events occur:

(1) Inventories are reduced by the cost of goods sold.

(2) Accounts receivable are increased by the sales price, and

(3) The differences is recorded as a profit. If the sale is for cash.

Generally two methods have been commonly suggested for monitoring accounts receivable.

(1) Traditional Approach

  (a) Average collection period

  (b) Aging Schedule

(2) Collection Margin approach or Payment Pattern Approach

(a) Average Collection Period (AC): It is also called Day Sales Outstanding (DSOI) at a given time 't' may define as the ratio of receivable outstanding at that time to average daily sales figure.

$$ACP = \frac{\text{Accounts receivable at time "t"}}{\text{Average daily sales}}$$

According to this method accounts receivable are deemed to be in control if the ACP is equal to or less than a certain norm. If the value of ACP exceed the specified norm, collections are considered to be slow.

If the company had made cash sales as well as credit sales, we would have concentrated on credit sales only, and calculate average daily credit sales.

The widely used index of the efficiency of credit and collections is the collection period of number of days sales

outstanding in receivable. The receivable turnover is simply ACP/360 days.

Thus if receivable turnover is six times a year, the collection period is necessarily 60 days.

(b) Aging Schedule – An aging schedule breaks down a firm's receivable by age of account. The purpose of classifying receivables by age group is to gain a closer control over the quality of individual accounts. It requires going back to the receivables' ledger where the dates of each customer's purchases and payments are available.

To evaluate the receivable for control purpose, it may be considered desirable to compare this information with earlier age classification in that very firm and also to compare this information with the experience of other firms of same nature. Financial executives get such schedule prepared at periodic intervals for control purpose.

So we can say Aging Schedule classifies outstanding accounts receivable at a given point of time into different age brackers. The actual aging schedule of the firm is compared with some standard aging schedule to determine whether accounts receivable are in control. A problem is indicated if the actual aging schedule shows a greater proportion of receivable, compared with the standard aging schedule, in the higher age group.

An inter firm comparison of aging schedule of debtors is possible provided data relating to monthly sales and collection experience of competitive firm are available. This tool,

therefore, cannot be used by an external analyst who has got no approach to the details of receivable.

The above both approaches have some deficiencies. Both methods are influenced by pattern of sales and payment behaviour of customer. The aging schedule is distorted when the payment relating to sales in any month is unusual, even though payment relating to sales in other months are normal.

II. Payment Pattern Approach - This pattern is developed to measure any changes that might be occurring in customer's payment behaviour.

It is defined in terms of proportion or percentage. For analyzing the payment pattern of several months, it is necessary to prepare a conversion matrix which shows the credit sales in each month and the pattern of collection associated with it.

The payment pattern approach is not dependent on sales level. It focuses on the key issue, the payment behaviour. It enables one to analyze month by month pattern as against the combined sales and payment patterns.

From the collection pattern, one can judge whether the collection is improving, stable, or deteriorating. A secondary analysis is that it provides a historical record of collection percentage that can be useful in projecting monthly receipts for each budgeting period.

Control of Accounts Receivable

Some of the important techniques for controlling accounts receivable are ratio analysis, discriminate analysis,

decision tree approach, and electronic data processing. Information system with regard to receivables turnover, age of each account, progress of collection size of bad debt losses, and number of delinquent accounts is also used as one of the control measures.

Ratio analysis is widely used in the control of accounts receivable. Some of the important ratios used for this purpose are discussed below:

(1) Average collection Period (Receivables x 365/Annual Credit Sales):

The average collection period indicates the average time it takes to convert receivables into cash. Too low an average collection period may reflect an excessively restrictive credit policy and suggest the need for relaxing credit standards for an acceptable account. On the other hand too high an average collection period may indicate an excessively liberal credit policy leading to a large number of receivables being past due and some being not collectable.

(2) Receivables Turnover (Annual Credit Sales/Receivables):

This ratio also indicates the slowness of receivables. Both the average collection period ratio and receivables ratio must be analyzed in relation to the billing terms given on the sales. If the turnover rates are not satisfactory when compared with prior experience, average industry turnover and turnover ratios of comparable companies in the same industry, an analysis should be made to determine whether there is any

laxity in the credit policy or whether the problem is in collection policy.

(3) Receivables to Sales (Receivables/Annual Credit Sales x 100)

Receivables can be expected to fluctuate in direct relation to the volume of sales, provided that sales terms and collection practices do not change. The tendency towards more lenient credit extension as would be suggested by slackening of collections and increase in the number of slow paying accounts needs to be detected by carefully watching the relationship of receivables to sales. When credit sales figures for a period are not available, total sales figures may be used. The receivables figures in the calculation ordinarily represent year-end receivables. In the case of firms with seasonal sales, year-end receivables figures may be deceptive. Therefore, an average of the monthly closing balances figures may be more reliable.

(4) Receivables as percentage of Current Assets (Receivables/Total Current Assets Investment)

The ratio explains the amount of receivables per rupee of current asset investment and its size in current assets. Comparison of the ratio over a period offers an index of a firm's changing policies with regard to the level of receivables in the working capital.

Some other ratios are:

1. Size of receivable = receivable/total current assets
2. Size of debtors = debtors/total current assets

3. Size of loans and advances = loans and advances/total current assets

The size of receivables of selected companies has been given in table 5.1

Table 5.1

Size of Receivables of the Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.68	0.52	0.35	0.58	0.54	0.53
2004-05	0.61	0.43	0.35	0.55	0.72	0.53
2005-06	0.67	0.46	0.52	0.63	0.79	0.61
2006-07	0.64	0.43	0.54	0.61	0.84	0.61
2007-08	0.62	0.38	0.54	0.66	0.87	0.62
Company Average	0.64	0.44	0.46	0.61	0.75	0.58

Source: Based on data provided annual Reports of the cement companies.

The size of receivable of all the cement companies shows fluctuating trend throughout the study period except Gujarat Ambuja, and Shree. Both the companies show increasing trend. The minimum size of receivable in ACC is 0.61 (2004-05), Mangalam is 0.38 (2007-08), Gujarat Amubja is 0.35 (2003-04 and 2004-05), Shree Cement is 0.55 (2004-05) and in India Cement is 0.54 (2003-04). The maximum size of receivable in ACC is 0.66 (2003-04), Mangalam is 0.52 (2003-04), Gujarat Ambuja is 0.54 (2007-08), and Shree cement is 0.66 (2007-08) and in India cement is 0.87 (2007-08). The study of the composition of receivables is a very important tool to evaluate

the management of receivables. It assists to show the point where receivables are concentrated most.

The size of sundry debtors in cement manufacturing companies in India has been computed and presented in the table 5.2.

Table 5.2

Size of Sundry Debtors of the Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry
2003-04	0.21	0.34	0.05	0.22	0.11	0.19
2004-05	0.29	0.32	0.05	0.33	0.08	0.22
2005-06	0.32	0.34	0.07	0.32	0.11	0.23
2006-07	0.28	0.31	0.08	0.27	0.14	0.22
2007-08	0.27	0.21	0.09	0.26	0.12	0.19
Company Average	0.28	0.30	0.07	0.28	0.11	0.21

Source: Based on data based on Annual Report of Cement Company

It is evident from the table 5.2 that the size of sundry debtors in ACC, India Cement, Mangalam and Shree show fluctuating trend throughout the study period. Percentage to current assets was highest to 0.32 in ACC in 2005-06 and highest 0.33 in Shree in 2004-05. Gujarat Ambuja shows increasing trend throughout the study period. The percentage of sundry debtors to current assets where reduced shows that in those years the speed of increase in current assets was much more than that of the sundry debtors. The size of receivable of all the cement companies shows fluctuating trend throughout the study period except Gujarat Amubja. The minimum size of

receivable in ACC is 0.21 (2003-04), Mangalam is 0.21 (2007-08), Gujarat Ambuja is 0.05 (2003-04 and 2004-05), Shree cement is 0.22 (2003-04) and in India Cement is 0.08 (2004-05). The maximum size of receivable in ACC is 0.32 (2005-06), Mangalam is 0.34 (2003-04 and 2005-06), Gujarat Ambuja is 0.09 (2007-08), and Shree Cement is 0.33 (2004-05) and in India Cement is 0.14 (2006-07).

The average collection period of selected cement companies has been given in table 5.3

Table 5.3
Average Collection Period in Selected Cement Companies for the years from 2003-04 to 2007-08

(in days)

Year	ACC	Mangalam	Gujarat Ambuja	Shree	India Cement
1999-00	34	36	7	46	18
2000-01	43	36	7	47	20
2001-02	43	33	8	49	22
2002-03	41	27	10	48	37
2003-04	26	28	10	37	47
Company Average	39	32	8	45	29

Source: Based on data provided in Appendix

The minimum Average Collection Period in ACC is 34 (2003-04), Mangalam is 27 (2006-07), Gujarat Ambuja is 7 (2003-04 and 2004-05), Shree Cement is 37 (2007-08) and in India Cement is 18 (2003-04). The maximum Average Collection Period in ACC is 43 (2004-05 and 2005-06), Mangalam is 36 (2003-04 and 2004-05), Gujarat Ambuja is 10 (2006-07) and 2007-08), and Shree Cement is 49 (2005-06) and in India Cement is 47 (2007-08).

The Creditor turnover of selected cement companies has been given in the table 5.4.

Table 5.4

Creditor turnover of Selected Cement Companies or the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree	India Cement	Industry Average
2003-04	11.10	8.77	1.12	1.63	1.40	4.80
2004-05	12.60	6.98	0.71	1.15	1.38	4.56
2005-06	12.93	5.80	0.63	1.41	1.09	4.37
2006-07	12.19	5.48	0.95	1.93	0.97	4.30
2007-08	13.42	3.71	0.73	1.58	0.90	4.07
Company Average	12.45	6.15	0.83	1.54	1.15	4.42

Source: Based on data based on Annual Report of the cement companies

It is evident from the table 5.4 that Creditor turnover in ACC and Gujarat Ambuja and Shree fluctuating trend. Mangalam and India Cement show decreasing trend all over the study period. The minimum Creditor turnover in ACC is 1.10 (2003-04), Mangalam is 3.71 (2007-08), Gujarat Ambuja is 0.62 (2005-06), Shree Cement is 1.15 (2004-05) and in India Cement is 0.90 (2007-08). The maximum Creditor turnover in ACC is 13.42 (2007-08), Mangalam is 8.77 (2003-04), Gujarat Ambuja is 1.12 (2003-04), and Shree Cement is 1.93 (2006-07) and in India Cement is 1.40 (2003-04).

The debtors turnover in cement manufacturing companies in India has been computed and presented in the table 5.5.

Table 5.5

Size of Receivable of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree	India Cement	Industry Average
2003-04	10.65	10.21	50.26	7.90	20.45	19.89
2004-05	8.58	10.21	52.07	7.78	17.85	19.30
2005-06	8.45	11.19	44,17	7.47	16.66	17.59
2006-07	8.95	13.64	36.79	7.67	9.92	15.39
2007-08	10.20	13.06	37.41	9.94	7.73	15.67
Company Average	9.37	11.66	44.14	8.15	14.52	17.57

Source: Based on data based on Annual Report of the Cement Companies

It is evident from the table 5.5 that the debtors turnover in ACC is fluctuating maintains approximately a fixed level. Mangalam and Gujarat Ambuja show fluctuating trend throughout the study period. Debtors turnover was highest to 13.64 in Mangalam and 9.94 in Shree in 2006-07 and 2007-08 respectively. India Cement shows decreasing trend through-out the study period. The minimum debtors turnover in ACC is 8.45 (2005-06), Mangalam is 10.21 (2003-04 and 2004-05), Gujarat Ambuja is 36,79 (2002-03), Shree Cement is 7.47 (2005-06) and in India Cement is 7.73 (2007-08). The maximum debtors turnover in ACC is 10.65 (2003-04), Mangalam is 13.64 (2006-07), Gujarat Ambuja is 52.07 (2004-05), and Shree Cement is 9.94 (2007-08) and in India Cement is 20-45 (2003-04).

Select References:

O.M. *Introduction to Financial Management* (Homewood illnois: Richard D. Irwin, 1978).

Lawerence D. Schal and Charles W. Haley, *Financial Management,* 3rd Edition. New York, McGraw Hill, 1973).

S.E Bolten, *Managerial Finance,* (Boston: Houghton Mitten Co., 1976).

R.J. Chambers, *Financial Management,* (Sydney: GTE Law Book Company Ltd,. 1967).

Joseph L. Wood, 'Credit and Collections' in Daris Lillian, ed., *Business Finance Handbook,* (Englewood, Cliffs, New Jersey : Prentice Hall, 1962.

Martin H. Seiden, *The Quality of Trade Credit* (New York : National Bureau of Economic Research, 1964.

Theodore N. Backman, *Credit and Collection: Management and Theory* (New York : McGraw Hill Book Company, 1962).

Chapter-VI

Inventory Management and Control

- Meaning and Definition of Inventory
- Management of Inventories
- Objectives of Inventory Management
- Problems faced by Management
- Inventory Control
- Inventory Control Techniques

  ABC Analysis of Inventories

  Fixation of Norms of Inventory Holdings

  Pricing of Raw Materials

  Perpetual Inventory System

- Factory influences the Level of Each Component of Inventory
  Raw Material Inventory

  Work-in-Process Inventory

  Finished Goods Inventory

  Stores and Spares Inventory

- Measures of Effectiveness of Inventory Management
- Control and Review

Inventories occupy the most strategic position in the structure of working capital of most business enterprises. It constitutes the largest component of current asset in most business enterprises. In the sphere of working capital, the efficient control of inventory has passed the most serious problem to the cement mills because about two-third of the current assets of mills are blocked in inventories. The turnover of working capital is largely governed by the turnover of inventory. It is therefore quite natural that inventory which helps in maximize profit occupies the most significant place among current assets.

Meaning and Definition of Inventory

In dictionary meaning of inventory is a "detailed list of goods, furniture etc." Many understand the word inventory, as a stock of goods, but the generally accepted meaning of the word 'goods' in the accounting language, is the stock of finished goods only. In a manufacturing organization, however, in addition to the stock of finished goods, there will be stock of partly finished goods, raw materials and stores. The collective name of these entire items is 'inventory'.

The term 'inventory' refers to the stockpile of production a firm is offering for sale and the components that make up the production.

The inventory means aggregate of those items of tangible personal property which

(i) are held for sale in ordinary course of business.

(ii) are in process of production for such sales.

(iii) they are to be currently consumed in the production of goods or services to be available for sale.

Inventories are expandable physical articles held for resale for use in manufacturing a production or for consumption in carrying on business activity such as merchandise, goods purchased by the business which are ready for sale.

It is the inventory of the trader who dies not manufacture it.

Finished Goods:

Goods being manufactured for sale by the business which are ready for sale.

Materials:

Articles such as raw materials, semi-finished goods or finished parts, which the business plans to incorporate physically into the finished production.

Supplies:

"Article, which will be consumed by the business in its operation but will not physically as they are a part of the production.

The short inventory may be defined as the material, which are either saleable in the market or usable directly or indirectly in the manufacturing process. It also includes the

items which are ready for making finished goods in some other process or by comparing them either by the concern itself and/or by outside parties. In other words, the term inventory means the material having any one of the following characteristics. It may be

1. saleable in the market,
2. directly saleable in the manufacturing process of the business,
3. usable directly in the manufacturing process of the undertaking, and
4. ready to send to the outside parties for making usable and saleable productions out of it.

In the present study raw materials, stores and spare parts, finished goods and work-in-process have been included inventories. Firm also manufactures inventory to supplies.

Supplies included office and plant cleaning materials (soap, brooms etc. oil, fuel, light bulbs and the likes). These materials do not directly enter into the production process, but are necessary for production process. Inventory constitutes the most significant part of current assets of a large majority of companies in India. For example, on an average inventories are more than 57 per cent of current assets in public limited companies and about 60.5per cent in government companies in India. Therefore it is absolutely imperative to manage inventories efficiently and effectively in order to avoid unnecessary investment in them. An undertaking neglecting the management of inventories will be jeopardizing its long

run profitability and may fail ultimately. It is possible for a company to reduce its level of inventories to a considerable degree *e.g.* 10 to 20 per cent without any adverse effect on production and sales.

Management of Inventories

Inventories consist of raw materials, stores, spares, packing materials, coal, petroleum products, works-in-progress and finished products in stock either at the factory or deposits. It is most important component of current assets in the cement industry and was 42 per cent of total current assets for sample companies as on March 31, 2004. In other industries too it is very important component of total investment.

The maintenance of inventory means blocking of funds and so it involves the interest and opportunity cost to the firm. In many countries specially in Japan great emphasis is placed on inventory management. Efforts are made to minimize the stock of inputs and outputs by proper planning and forecasting of demand of various inputs and producing only that much quantity which can be sold in the market.

The inventory cost is not only interest on stocks but also cost of store building for storage, insurance and obsolesce and movement of inputs from place of storage to the factory where the materials have to be finally used to convert them into finished goods. In japan industries have adopted concept of JIT (Just in Time) and components, materials are received when required for which detailed instructions are given to suppliers. There are many engineering companies who receive

components directly at assembly point and that too only for 3-4 hours requirements at a time. Even in case of bulk materials like iron ore, which is imported from abroad, the minimum possible inventory is kept.

As against this by and large in India the inventory of coal, raw materials and packing materials is very high and many items become junk or obsolete causing heavy loss to the enterprise. Lack of inventory planning in India has been pointed out by various committees but due to uncertainties in supplies, problem of timely receipt of railway wagons, lack of planning and unreliable suppliers the investment in inventories is quit high. The fluctuation in demand affects inventory of finished product of which cement industry has been a victim many times.

The situation in cement industry has been analysed in this chapter after studying the principles of inventory control and relating it with cement industry.

In case of raw materials the first requirement is to study lead time between the date of order and receipt in the factory and same is applicable in case of coal.

In case of cement industry the basic raw material *i.e.* lime stone is not purchased from the market but form one's own queries which are within 10 to 15 Km distance from factory and only in few cases distance is more upto 50 Km. It is transported to cursing mills by trucks, rail or overhead ropeways to the factory. The only uncertainty is with regard to problem of quarrying in quarries, which may be affected due to labour

problem, problem in supplies of electricity or explosives. But in spite of these factors industry feels that 3-4 days of stock of raw material is enough. This, from any standard is on the high side when self-produced raw material is used. Actually for ideal situation there should be stock for a few hours, requirement and at the most for one day need. The industry is keeping larger stocks of limestone because of uncertainties in quarrying and transportation.

Objectives of Inventory Management

The primary objectives of inventory management are:

(i) To minimize the possibility of disruption in the production schedule of a firm for want of raw material, stock and spares.

(ii) To keep down capital investment in inventories.

So it is essential to have necessary inventories. Excessive inventory is an idle resource of a concern. The concern should always avoid this situation. The investment in inventories should be just sufficient in the optimum level. The major dangers of excessive inventories are:

(i) the unnecessary tie up of the firm's funds and loss of profit.

(ii) excessive carrying cost, and

(iii) the risk of liquidity.

The excessive level of inventories consumes the funds of business, which cannot be used for any other purpose and thus involves an opportunity cost. The carrying cost, such as the cost of shortage, handling insurance, recording and inspection,

are also increased in proportion to the volume of inventories. This cost will impair the concern profitability further.

On the other hand, a low level of inventories may result in frequent interruptions in the production schedule resulting in under-utilization of capacity and lower sales. The aim of inventory management thus should be to avoid excessive inventory and inadequate inventory and to maintain adequate inventory for smooth running of the business operations. Efforts should be made to place orders at the right time with the right source to purchase the right quantity at the right price and quality. The effective inventory management should

(i) maintain sufficient stock of raw material in the period of short supply and anticipate price changes.

(ii) ensure a continuous supply of material to production department facilitating uninterrupted production.

(iii) minimize the carrying cost and time.

(iv) maintain sufficient stock of finished goods for smooth sales operations.

(v) ensure that materials are available for use in production and production services as and when required.

(vi) ensure that finished goods are available for delivery to customers to fulfil orders, smooth sales operation and efficient customer service.

(vii) minimize investment in inventories and minimize the carrying cost and time.

(viii) protect the inventory against deterioration, obsolescence and unauthorized use.

(ix) maintain sufficient stock of raw material in period of short supply and anticipate price changes.

(x) control investment in inventories and keep it at an optimum level.

Problems faced by management:

(i) To maintain a large size inventories for efficient and smooth production and sales operation.

(ii) To maintain only a minimum possible inventory because of inventory holding cost and opportunity cost of funds invested in inventory.

(iii) Control investment in inventories and keep it at the optimum level.

Inventory management, therefore, should strike a balance between too much inventory and too little inventory. The efficient management and effective control of inventories help in achieving better operational results and reducing investment in working capital. It has a significant influence on the profitability of a concern.

Inventory Control

Inventory control is concerned with the acquisition, storage, handling and use of inventories so as to ensure the availability of inventory whenever needed, providing adequate provision for contingencies, deriving maximum economy and minimizing wastage and losses.

Hence Inventory control refers to a system, which ensures the supply of required quantity and quality of inventory at the required time and at the same time prevent unnecessary investment in inventories.

It is one of the most vital phase of material management. Reducing inventories without impairing operating efficiency frees working capital that can be effectively employed elsewhere. Inventory control can make or break a company. This explains the usual saying that "inventories" are the graveyard of a business.

Designing a sound inventory control system is in a large measure for balancing operations. It is the focal point of many seemingly conflicting interests and considerations both short range and long range.

The aim of a sound inventory control system is to secure the best balance between "too much and too little." Too much inventory carries financial rises and too little reacts adversely on continuity of productions and competitive dynamics. The real problem is not the reduction of the size of the inventory as a whole but to secure a scientifically determined balance between several items that make up the inventory.

The efficiency of inventory control affects the flexibility of the firm. Insufficient procedures may result in an unbalanced inventory. Some items out of stock, other overstocked, necessitating excessive investment. These inefficiencies ultimately will have adverse effects upon profits. Turning the situation round, difference in the efficiency of the inventory

control for a given level of flexibility affects the level of investment required in inventory. The less efficient is the inventory control, the greater is the investment required. Excessive investment in inventories increase cost and reduce profits, thus, the effects of inventory control of flexibility and on level of investment required in inventories represent two sides of the same coin.

Control of inventory is exercised by introducing various measures of inventory control, such as ABC analysis fixation of norms of inventory holdings and reorder point and a close watch on the movements of inventories.

Inventories Control Techniques

ABC Analysis of Inventories

The ABC inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of money value of the total inventory used in the production process, while a relatively large number of items may from a small part of the money value of stores. The money value is ascertained by multiplying the quantity of material of each item by its unit price.

According to this approach to inventory control high value items are more closely controlled than low value items. Each item of inventory is given A, B or C denomination depending upon the amount spent for that particular item. "A"

or the highest value items should be under the tight control and under responsibility of the most experienced personnel, while "C" or the lowest value may be under simple physical control.

It may also be clear with the help of the following examples:

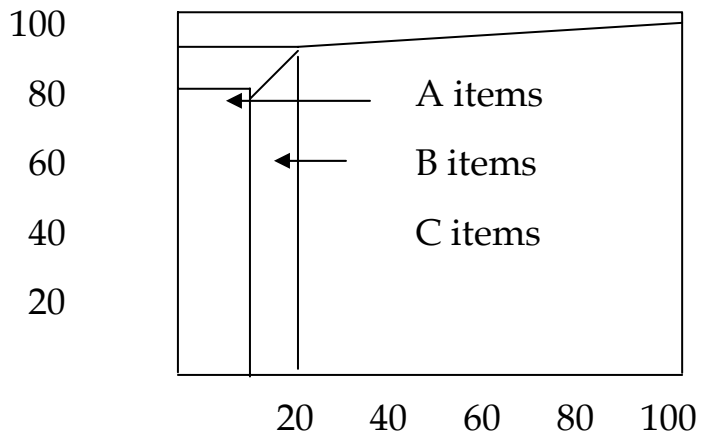
"A" Category – 5% to 10% of the items represent 70% to 75% of the money value.

"B" Category – 15% to 20% of the items represent 15% to 20% of the money.

"C" Category – The remaining number of the items represent 5% to 10% of the money value.

The relative position of these items show that items of category A should be under the maximum control, items of category B may not be given that much attention and item C may be under a loose control.

Particulars	**A item**	**B item**	**C item**
Control	Tight	Moderate	Loose
Requirement	Exact	Exact	Estimated
Check	Close	Some	Little
Expenditure	Regular	Some	No
Posting	Industrial	Individual	Group/none
Safety Stock	Low	Medium	Lare



After classification, the items are ranked by their value and then the cumulative percentage of total value against the percentage of item are noted. A detailed analysis of inventory may indicate above figure that only 10 per cent of item may account for 75 per cent of the value, another 10 per cent of item may account for 15 per cent of the value and remaining percentage items may account for 10 per cent of the value. The importance of this tool lies in the fact that it directs attention to the key items.

Advantages of ABC Analysis

1. It ensures a closer and a more strict control over such items, which are having a sizable investment in there.
2. It releases working capital, which would otherwise have been locked up for a more profitable channel of investment.
3. It reduces inventory-carrying cost.
4. It enables the relaxation of control for the 'C' items and thus makes it possible for a sufficient buffer stock to be created.

5. It enables the maintenance of high inventory turn over rate.

Fixation of Norms of Inventory Holdings

Either by the top management or by the materials department could set the norms for inventories. The top management usually sets monitory limits for investment in inventories. The materials department has to allocate this investment to the various items and ensure the smooth operation of the concern. It would be worthwhile if norms of inventories were set by the management by objectives, concept. This concept expects the top management to set the inventory norms (limit) after consultation with the materials department. A number of factors enter into consideration in the determination of stock levels for individual items for the purpose of control and economy. Some of them are:

1. Lead time for deliveries.
2. The rate of consumption.
3. Requirements of funds.
4. Keeping qualities, deterioration, evaporation etc.
5. Storage cost.
6. Availability of space.
7. Price fluctuations.
8. Insurance cost.
9. Obsolescence price.
10. Seasonal consideration of price and availability.
11. EOQ (Economic Order Quantity), and
12. Government and other statuary restriction

Any decision involving procurement storage and uses of item will have to be based on an overall appreciation of the influence of the critical ones among them. Material control necessitates the maintenance of inventory of every item of material as low as possible ensuring at the same time, its availability as and when required for production. These twin objectives are achieved only by a proper planning of inventory levels. It the level of inventory is not properly planned, the results may either be overstocking or understocking. If a large stock of any item is carried it will unnecessarily lock up a huge amount of working capital and consequently there is a loss of interest. Further, a higher quantity than what is legitimate would also result in deterioration. Besides there is also the risk of obsolescence if the end product for which the inventory is required goes out of fashion. Again, a large stock necessarily involves an increased cost of carrying such as insurance, rent handling charges. Under stocking which is other extreme, is equally undesirable as it results in stock outs and the consequent production holds ups. Stoppage of production in turn, cause idle facility cost. Further, failure to keep up delivery schedules results in the loss of customers and goodwill. These two extreme can be avoided by a proper fixation of two important inventory level *viz,* the maximum level and the minimum level. The fixation of inventory levels is also known as the demand and supply method of inventory control.

Carrying too much or too little of the inventories is detrimental to the company. If too little inventories are maintained, company will have to encounter frequent stock outs and incur heavy ordering costs. Very large inventories subjects the company to heavy inventory carrying cost in addition to unnecessary tie up of capital.

An efficient inventory management, therefore, requires the company to maintain inventories at an optimum level where inventory costs are minimum and at the same time there is no stock out which may result in loss of sale or stoppage of production. This necessitates the determination of the minimum and maximum level of inventories.

Minimum Level

The minimum level of inventories of their reorder point may be determined on the following bases:

1 Consumption during lead-time.

2 Consumption during lead-time plus safety stock.

3 Stock out costs.

4 Customers irritation and loss of goodwill and production hold costs.

To continue production during Lead Time it is essential to maintain some inventories. Lead Time has been defined as the interval between the placing of an order (with a supplier) and the time at which the goods are available to meet the consumer needs.

There are sometimes fluctuations in the lead-time and/ or in the consumption rate. If no provision is made for these

variations, stock out may take place-causing disruption in the production schedule of the company. The stock, which takes care to the fluctuation in demand, varies in lead-time and consumption rate is known as safety stock. Safety stock may be defined as the minimum additional inventory, which serves as a safety margin or buffer or cushion to meet an unanticipated increase in usage resulting from an unusually high demand and or an uncontrollable late receipt of incoming inventory. It can be determined on the basis of the consumption rate, plus other relevant factor such as transport bottleneck, strikes or shutdowns.

In the case of uncertainly, the probabilistic approach may be applied to determine the safety margin. To avoid stock out arising out of such eventualities, companies always carry some minimum level of inventories including safety stock. Safety stock may not be static for all the times. A change in the circumstances and in the nature of industry demand, necessitates are adjusted in its level. In this study an effort has been made to examine how the current companies determine their minimum level for re-order inventories, safety stock, whether a level of study is maintained throughout the year or not.

For each type of inventory a maximum level is set that demand presumably will not exceed as well as a minimum level representative a margin of safety required to prevent out of stock condition. The minimum level also governs the ordering point. An order to sufficient size is placed to bring

inventory to the maximum point when the minimum level is reached.

Maximum Level

The upper limit beyond which the quantity of any item is not normally allowed to rise is known as the "Maximum Level". It is the sum total of the minimum quantity, and ECQ. The fixation of the maximum level depends upon a number of factors, such as, the storage space available, the nature of the material *i.e.* chances of deterioration and obsolescence, capital outlay, the time necessary to obtain fresh supplies, the ECQ, the cost of storage and government restriction.

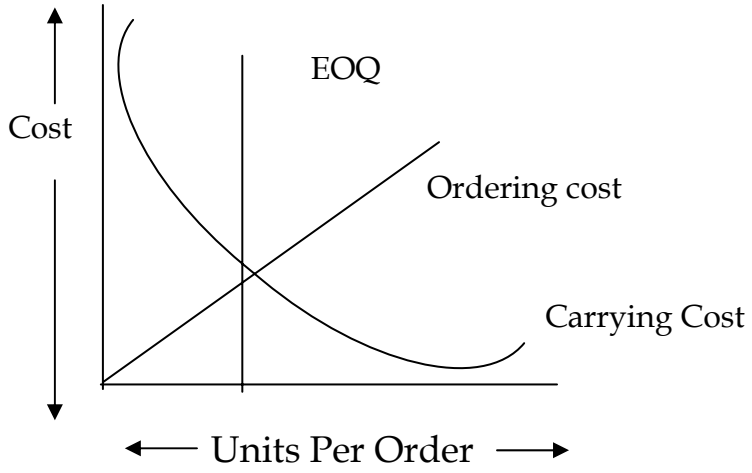
Re-Order Level

Also known as the 'ordering level' the reorder level is that level of stock at which a purchase requisition is initiated by the storekeeper for replenishing the stock. This level is set between the maximum and the minimum level in such a way that before the material ordered for are received into the stores, there is sufficient quantity on hand to cover both normal and abnormal circumstances. The fixation of ordering level depends upon two important factors *viz,* the maximum delivery period and the maximum rate of consumption.

Re-Order Quantity

The quantity, which is ordered when the stock of an item falls to the reorder level, is know as the reorder quantity or the EOQ or the economic lot size. Although it is not a stock level as such, the reorder quantity has a direct bearing upon the stock level in as much as it is necessary to consider the maximum

and minimum stock level in determining the quantity to be ordered. The re-order quantity should be such that, when it is added to the minimum quantity, the maximum level is not exceeded. the re-order quantity depends upon two important factors *viz,* order costs and inventory carrying costs. It is, however, necessary to remember that the ordering cost and inventory carrying cost are opposed to each other. Frequent purchases in small quantities, no doubt reduce carrying cost, but the ordering costs such as the cost inviting tenders of placing order and of receiving and inspection, goes up. If on the other hand purchases are made in large quantities, carrying costs, such as, the interest on capital, rent, insurance, handling charges and losses and wastage, will be more than the ordering costs. The EOQ is therefore determined by balancing these opposing costs.



Economy Order Quantity

The EOQ refers to the order size that will result in the lowest total of order and carrying costs for an item of

inventory. If a firm place unnecessary orders it will incur unneeded order costs. If a firm places too few order, it must maintain large stocks of goods and will have excessive carrying cost. By calculating an economic order quantity, the firm identifies the number of units to order that result in the lowest total of these two costs.

The constraints and assumption followed:

1. **Demand is known**-- Using past data and future plans a reasonably accurate prediction of demand can often be made. This is expressed in unit sold in a year.

2. **Sales occur at a constant rate--** This model may be used for goods that are sold in relatively constant amount throughout the year. A more complicated model is needed for firms whose sales fluctuate in response to there seasonal cyclical factors.

3. **Cost of running of goods are ignored--** Cost associated with storage, delays or lost sales are not considered. These costs are considered in the determination of safety level in the re-order point subsystem.

4. **Safety stock level is not considered--** The safety stock level is the minimum level of inventory that the firm wishes to hold as a protection against running out. Since the firm must always be above this level the EOQ need not be considered the safety stock level.

Total Ordering Cost (TOC)=(A/Q)*O

Average Inventory=Q/2

Total Carrying Cost (TCC)=(Q/2)*C

Total Inventory Cost=TOC+TCC

Total Cost=(AO/2)+(QC/2)

Where A=total annual demand

Q=Quantity order in units

O=Order cost per order

C=Carrying cost per unit

The basic formula is EOQ = $\frac{2(U)(OC)}{CC\%PP}$

Where 2=mathematical factor that occurs during the deriving of the formula, U-Units sold per year, a forecast provided by the marketing department. OC=Cost of placing each order for more inventory provided by cost accounting. CC% = Inventory carrying cost expressed as a percentage of the average value of the inventory, an estimate usually provided by cost accounting. PP = Purchase price per each unit of inventory supplied by the purchasing department.

Trial and error approach

Select a number of possible lot (Order) sizes to purchase, then determine the total cost for each lot size chosen, now select the ordering quantity that minimizes the total cost.

Quantity Discount and Order Quantity

The standard EOQ analysis is based on the assumption that the price per unit remains constant irrespective of the order size. When quantity discount are available which is often the case, price per unit is influenced by the ordered quantity. This violates the applicability of the EOQ formulas. However

the EOQ framework can still be used as a starting point for analyzing the problem.

To determine the optimal order size when quantity discount is available, the following procedures may be followed:

1. Determine the order quantity using the standard EOQ formula assuming no quantity discount.
2. If Q enable the firm to get quantity discount then it represents the optimal order size.
3. If Q is less then the minimum order size required for quantity discount (call it-G^2) compute to change in profit as a result of increasing the order quantity from O^1 to O^2 as follows.

   $=AD+[A/Q^1-A/Q^2]\ O-[Q^2((P-D)/2-(Q^1PC/2)$

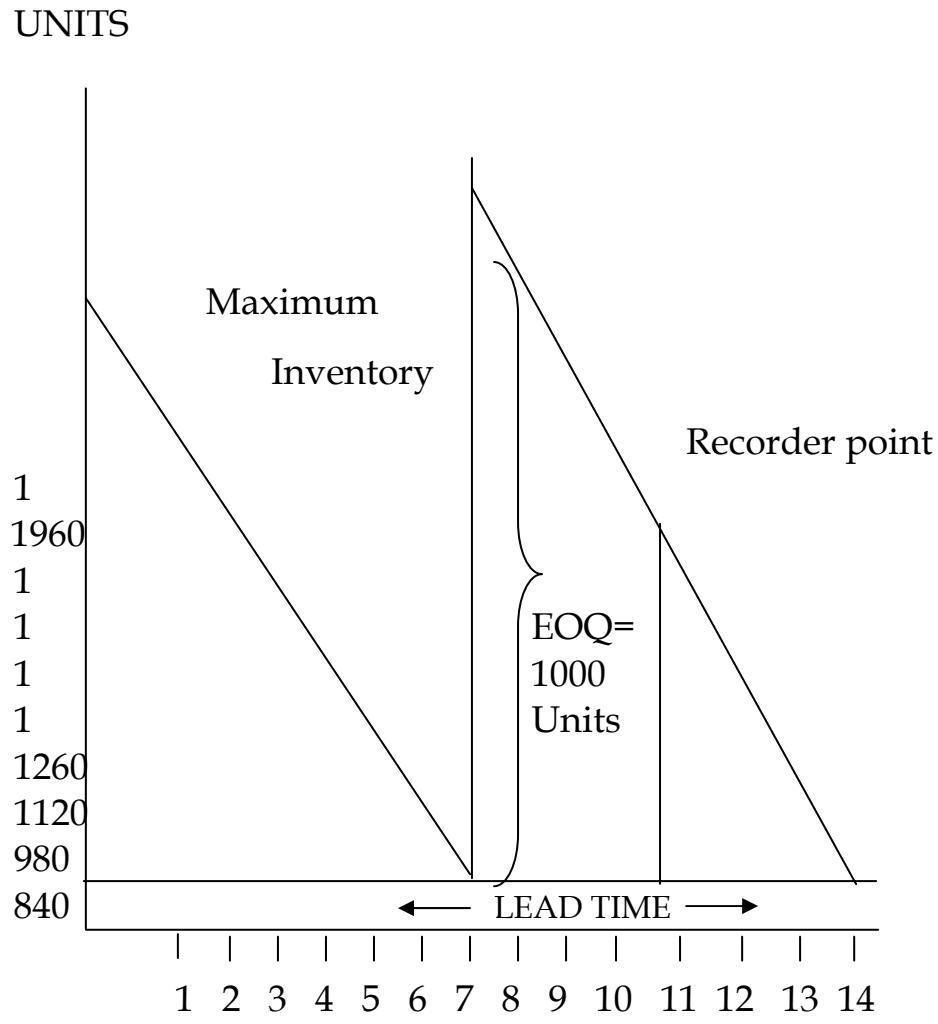
   = Change in profit, A = total demand, D = discount per unit when quantity discount in available, Q^1 = EOR assuming no discount, Q^2 = minimum order size required for quantity discount, O = order cost, P = Purchase price without discount, C = carrying cost
4. If change in profit is positive = Q^2

   If change in profit is positive = Q^1

Stock Level Sub-system

This system keeps track of the goods held by the firm, the insurance of goods, and the arrival of order. It is made up of the records accounting for the goods in stock. Thus the stock level subsystems maintain record of the current level of inventory for any period of time, the current level is calculated

by taking the beginning inventory, adding the inventory received and subtracting the cost of goods sold. When ever those subsystems reports that an item is at a below the recorder pt level, the firm will begin to place an order for the item.



Uncertainty and Safety Stock

In practice, the demand or usage of inventory is not generally known with certainty. Usually it fluctuates at a given period of time. In this case formula is (Maximum daily usage rate x Maximum lead time) – (Average daily usage rate x Average lead time).

Reorder Point

The reorder point is the level of inventory at which the firm places an order in the amount of EOQ. If the firm places the order when the inventory reaches the reorder point, the new goods will arrive before the firm runs out of goods to sell.

In designing reorder point subsystem, three items of information are needed as inputs to the subsystem.

1. **Usage rate--** This is the rate per day at which the item is consumed in production or sold to customers. It is expressed in units. It may be calculated by dividing annual sales by 365 days. If the sales are 50,000 units the usage rate is 50,000/365 = 137 Units per day.

2. Lead time-- This is the amount of time between placing an order and receiving goods. This information is usually provided by the purchasing department. The time to allow for an order to arrive may be estimated from a check of the company's record and the time taken in the past for different suppliers to fill orders.

3. **Safety stock--** The minimum level of inventory may be expressed in terms of several days' sales. The level can be calculated by multiplying the usage rate and time in the number of days that the firm wants to hold as a protection against shortages.

Re-order point = (Usage rate)(Lead time + Days of safety)

= (Lead Time x Consumption rate) + Safety stock.

The probabilistic approach is found to be cumbersome and unfeasible for a multi period problem. It is proposed an order point whereby an order is placed. When inventory reaches so many units (See Arthur Snynder, "Principle of inventory management," *Financial Executive,* 32 (April 64 (13-21);

Re-order point $S(L)+F\sqrt{SR(L)}$

L = Lead Time

R = Average number of units per order

F = Stock out acceptance factor.

The foregoing analysis is based on certain simplifying assumption. In the real worked some additional consideration ought to be taken into account:

(i) Anticipated scarcity of raw material

(ii) Expected price charge

(iii) Obsolescence risk

(iv) Government restriction on inventory

(v) Competitive market.

Pricing of Raw Materials

When issues are made out of various lots purchased at varying prices, the problem arises as to which of the receipt price should be adopted for valuing the materials requisitions.

1. First in first out

Materials received first will be issued first. The price of the earliest consignment is taken first and when that consignment is exhausted the price of the next consignment is adopted and so on. This method is suitable in times of falling

prices, because the material charge to production will be high while the replacement cost of materials will be low.

2. Last in first out

Materials received last will be issued first. The price of the last consignment is taken first and when that consignment is exhausted the price of the second last consignment is adopted and so on. In timing of rising prices this method will show a charge to production, which is closely related to current price levels provided that the last purchase is made recently.

3. **Weighted average cost method**

Under this method, material issued is priced at the weighted average cost of material in stock:

WAC = Value of material in stock/Quantity in stock.

4. Standard price method

Under this method a standard price is predetermined. The price of issues predetermined for a stated period taken into account all the factors affecting price such as anticipated market trends, transportation charges, and normal quantity of purchase. Standard prices are determined for each material and material requisition are priced at standards irrespective of the actual purchase price. Any difference between the standard and actual price results in materials price variance.

5. Current price

According to this method, material issued is priced at their replacement or realizable price at the time of issue. So the cost at which identical material could be purchased from the

market should be ascertained and used for valuing material issues.

Perpetual Inventory System

Another method of inventory control is the maintenance of inventory control on a continuous basis. After the material are received into the stores, the storekeeper will arrange for the storing of each item in the allotted rack, bin, shelf or other receptacles and attach a card to each bin for the purpose of making entries there-in, relating to the receipts, issues and balance. The bin card or the locker card, this becomes a perpetual inventory record for each item of stores. If the stores balance is recorded on continuous basis after every receipt and issue, the record is said to be one of perpetual inventory and the method of recording is called the perpetual inventory system. Thus the perpetual inventory is a method of recording store balance after every receipt and issue to facilitate regular checking and to obviate closing down for stock locking

As a perpetual inventory record, the bin card records the receipt, issues and the balance of every item of stores only in physical quantities, and not in value. This feature of the bin card is in accordance with the accepted principle that the storekeeper true to his designation, should be responsible for the safe keeping of the items of stores entrusted to him, and his accounting for stores should always be in physical quantities and not in value. The perpetual inventory system includes continues stock taking also.

Stocktaking or stock verification is done mainly with a view to finding out whether the book balances as revealed by the stock records agree with the physical or the ground balance. Although, therefore, stock verification is one of the tools of inventory control, and is done for exercising control over the stock of every item, is an integral part of material control for the purpose of preparing the B/S, the physical verification of stock must be done at the end of year.

Such verification at the end of the year is known as the periodical stock taking as against the continuous stocktaking, which is done throughout the year. The periodic stock taking method usually adopted by concerns which cannot maintain perpetual inventory records due to the nature of the items which are usually stored in open yards and not in bins and as a such, bin cards cannot be employed for them, or do not want to maintain such records and employ stock verification staff to do the work of stock checking throughout the year. Under this method of stocktaking, the verification of the whole of the stock and its valuation are accomplished only once at the close of the financial year and difference in stock is adjusted only once. As such, the stock in hand would tend to be accurate for the balance sheet purposes. It is also possible to find out slow moving items. Nevertheless, the periodic inventory has its own disadvantage. In the first place, it becomes necessary to close down the factory on the day of stock taking. Secondly, discrepancies in stock cannot be corrected by an executive action immediately as and when they occur. Thirdly, since all

the items are checked only once in a particular day, a surprise verification will not be possible. Lastly, reason for the discrepancies cannot be found out because of the long interval between two consecutive verifications.

These disadvantages of the periodical inventory system are overcome in the case of the perpetual inventory system. Under this method of continuous stock verification the purpose of verification is carried on throughout the year by a specially trained staff. This duty is to verify a few selected items in details so that each item is checked up a number of times during the year. The day and time of checking not being known to the staff, they are taken by a surprise. As such, not only secrecy of the items to be verified cannot maintained, a manipulation of every type can be prevented. Discrepancies are located, reasons are ascertained, the necessary adjustment are made in the accounting records, and correlative action is taken then and there to prevent their recurrence. The advantages of a continuous stocktaking where perpetual inventory records are maintained may thus be summarized as follows:

(i) The elaborate and costly work involved in periodic stock taking can be avoided.

(ii) The stock verification can be done without the necessity of closing down the factory.

(iii) The preparation of interim financial statement becomes possible.

(iv) Discrepancies are easily located, and corrected immediately.

(v) It ensure a reliable check on the stores.

(vi) It exercises a moral influence on the stores staff.

(vii) Fast and slow moving items can be distinguished and the fixation of proper stock levels prevents not only over-stocking, but under-stocking also.

(viii) A perpetual inventory record of the nature of the bin cards enables the storekeeper to keep an eye on the stock levels, and replenish the stock of every item whenever the limit falls to the reorder level.

(ix) It provides a reliable information to the management of the number of units, and the value of every item of stores.

(x) It ensures secrecy of the items that are verified.

Factors Influences the Level of each Component of Inventory

Raw Material Inventory:

1. The volume of safety stock against material shortages that interrupt production.
2. Considerations of economy in purchase.
3. The outlook for future movements in the price of materials.
4. Anticipated volume of usage and consumption.
5. The efficiency of procurement and inventory control function.
6. The operating costs of carrying the stocks.

7. The costs and availability of funds for investment in inventory.
8. Storage capacity.
9. Re-component cycle.
10. Indigenous or foreign.
11. The lead-time of supply.
12. Formalities for importing.

Work-in-process Inventory:

1. The length of the complete production process.
2. Management policies affecting length of process time.
3. Length of process in runs.
4. Action that speed up the production process, *e.g.* adding second or third production shifts.
5. Management's skills in production scheduling and control.
6. Volume of production.
7. Sales expectations.
8. Level of sales and new orders.
9. Price level of raw materials used, wages and other items that enter production cost and the value added in production.
10. Customer requirements.
11. Usual period of aging.

Finished Goods Inventory:

1. The policy of the management to gear the production to meet the firm order in hand.

2. The policy to produce for anticipated orders and stock keeping.
3. Goods required or the purpose of minimum and safety stocks.
4. Sales policies of the firm.
5. Need for maintaining stability in production.
6. Price fluctuations for the product.
7. Durability, spoilage and obsolescence.
8. Distribution system.
9. Ability to fill orders immediately.
10. Availability of raw material on seasonal basis while customer's demand spread throughout the year.
11. Storage capacity.

Stores and Spares Inventory:

1. Nature of the product to be manufactured and its lead-time of manufacture.
2. State of technology involved.
3. Consumption's patterns.
4. Lead time of supply.
5. Indigenous or foreign.
6. Minimum and safety stock and ordering quantities.
7. Capacity utilization.
8. Importing formalities.

Some of the important inventory policies relates to :

1. minimum, maximum and optimum stocks;
2. safety stocks, order quantities, order levels and anticipated stocks;

3. waste, scrap spoilage and defective;
4. policies relating to alternative use;
5. policies relating to order filling;

Measure of Effectiveness of Inventory Management

1. Size of Inventory = Total inventory/Total Current assets
2. Size of Raw material Inventory = Raw material inventory/Total inventory
3. Size of Work in Process Inventory = Work in process Inventory/Total Inventory
4. Size of Stores and Spares parts Inventory = Stores and Spares parts inventory/Total Inventory
5. Size of Finished Goods Inventory = Finished goods inventory/Total inventory
6. Overall inventory turn over ratio = Cost of goods sold/average total inventories at cost
7. Raw material inventory turnover ratio = Annual consumption of Raw material / Average Raw material inventory
8. Work-in-process inventory turnover ratio = Cost of manufacture/average work-in-process inventory at cost
9. Finished Goods inventory turnover ratio = Cost of goods sold / Average finished stock
10. Stores and spare parts inventory turnover ratio = Stores and Spares consumed/Average stock of stores and spares
11. Age of Finished Goods inventory = 365/Finished Goods inventory turnover ratio

12. Average age of raw material inventory = 365/Raw material inventory turnover ratio
13. Average age of Work-in-Process inventory = 365/Work-in-Process inventory turnover ratio
14. Age of Stores and spare parts inventory = 365/Stores and spare parts inventory turnover ratio
15. Inventory holding period = 365/Inventory turn over ratio

Control and Review

The efficiency of inventory control affects the flexibility of the firm. There are several tools of inventory control. Some of these are:

(1) The economic order quantity which enables determination of optimal size of order to place on the basis of demand or usage of the inventory.

(2) The technique of safety stocks to overcome problems of uncertainty.

(3) The order point formula, which tells us, the optimal point at which to reorder a particular item of inventory.

Together, these tools provide the means for determining an optimal average level of inventory for the firm.

Ratio analysis has a wider application as a measure of inventory control among most manufacturing firms. Some of the important ratios are explained below:

(1) Inventory to Sales (Total Inventory/Sales for the Period)

The ratio explains variations in the level of investment. An increase in inventory levels, substantially beyond that

which might be expected from an increase in sales, may reflect such phenomena as the result of a conscious policy shift to higher stock levels, of unintended accumulation of unsold stocks, and of inventory speculation, or simply stocking in anticipation of an almost certain surge of orders.

(2) Inventory Turnover (Cost of Goods Sold/Average Inventory)

The ratio tells us the rapidity with which the inventory is turned over into receivables through sales. Generally, the higher the inventory turnover, the more efficient the management of a firm is. However, a relatively high inventory turnover ratio may be the result of too low a level of inventory and frequent stock outs. Therefore, the ratio must be judged in relation to the past and expected future ratios of the firm and in relations of similar firms or the industry average or both.

(3) Sales to Inventory (Annual Net Sales/Inventory at the End of Fiscal Period)

The ratio indicates the volume of sales in relation to the amount of capital invested in inventories. When inventory for a firm is larger in relation to sales (the condition which causes it to have a lower net sales to inventory ratio than other firms) the firm's rate of return is less since it has more working capital tied up in inventories than has the firm with a higher ratio.

(4) Inventory to Current Assets (Total Inventory/Total Current Assets)

The ratio indicates the amount of investment in inventory per rupee of current assets investment. Generally an increasing

proportion of inventory is indicative of inefficient inventory management. The ratio may also indicate the state of liquidity position of concern. The lower the inventory to current assets lowers the liquidity as compared to other current assets, *viz.*, receivables, cash and marketable securities.

(5) Inventories Expressed in Terms of Number of Days Sales (Inventory/Sales x 365)

The ratio indicates the size of inventory in terms of number of days sales. For this purpose first the sales per day are calculated and inventory is divided by the amount of sales per day. The increasing inventory in terms of number of days sales may indicate either accumulation of inventory or decline in sales. Inventory for this purpose is assumed to include finished goods only. While the former situation signifies poor inventory management, the later indicates the poor performance of the marketing department.

(6) Sundry Creditors to Inventory (Sundry Creditors/Inventory)

The ratio reveals the extent to which inventories are procured through credit purchases. Inventories for this purpose are assumed to include raw materials and stores and spares only. If the ratio is less than unity, it reveals that the credit available is lower than the total inventory required. It also explains the extent of inventory procured through cash purchases. Indirectly it emphasizes the inventory financing policy of the firm. If the ratio is more than one, it explains that the entire inventory is purchased on credit.

(7) Inventory to Net Working Capital (Inventory/Net Working Capital)

The ratio explains the amount of inventory per rupee of equity/long-term financed portion of current assets. A higher ratio may mean greater amount of net working capital investment in inventory. In order to control each category of inventory, the following ratios can be calculated.

The size of inventory of selected cement companies has been presented in table 6.1.

Table 6.1

Size of Inventory of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.27	0.37	0.51	0.40	0.37	0.38
2004-05	0.31	0.41	0.35	0.38	0.26	0.34
2005-06	0.27	0.40	0.31	0.29	0.19	0.29
2006-07	0.32	0.47	0.36	0.33	0.14	0.33
2007-08	0.34	0.51	0.41	0.22	0.12	0.32
Company Average	0.31	0.43	0.39	0.32	0.22	0.33

Source: Based on data provided in Appendix

Five cement companies under study have kept at different levels of inventory during the study period from 2003-04 to 2007-08. Table 6.1 gives a clear picture of inventory kept by the five companies. The size of inventory of all the cement companies shows fluctuating trend throughout the study period except India Cement that shows decreasing trend. The minimum size of inventory in ACC is 0.27 (2003-04). Mangalam is 0.37 (2003-04), Gujarat Ambuja is 0.31 (2005-06),

Shree Cement is 0.22 (2007-08) and in India Cement is 0.12 (2007-08). The maximum size of inventory in ACC is 0.34 (2007-08), Mangalam is 0.51 (2007-08), Gujarat Ambuja is 0.51 (2003-04), and Shree Cement is 0.40 (2003-04) and in India Cement is 0.37 (2003-04).

The size of Raw Material Inventory of selected companies has been given in table 6.2.

Table 6.2

Size of Raw Material Inventory of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.14	0.11	0.04	0.15	0.07	0.10
2004-05	0.12	0.07	0.04	0.23	0.08	0.11
2005-06	0.15	0.08	0.04	0.30	0.08	0.13
2006-07	0.15	0.05	0.04	0.25	0.10	0.12
2007-08	0.13	0.03	0.05	0.13	0.11	0.09
Company Average	0.14	0.07	0.04	0.21	0.09	0.11

Source: Based on data provided in Appendix

Five cement companies under study have kept at different levels of raw material inventory during the study period from 2003-04 to 2007-08. Table 6.2 gives a clear picture of raw material inventory kept by the five companies. The size of raw material inventory of all the cement companies shows fluctuating trend throughout the study period except Gujarat Ambuja and India Cement which shows decreasing trend. The minimum size of raw material inventory in ACC is 0.12 ((2004-05), Mangalam is 0.03 (2007-08), Gujarat Ambuja is 0.04 (2003-04 to 2006-07), Shree Cement is 0.13 (2007-08) and in India Cement is 0.07 (2003-04). The maximum size of raw material

inventory in ACC is 0.15 (2005-06 and 2006-07). Mangalam is 0.11 (2003-04), Gujarat Ambuja is 0.05 (2007-08), and Shree Cement is 0.30 (2005-06) and in India Cement is 0.11 (2007-08).

The size of Stores and Spares Inventory of selected companies have been presented in Table 6.3

Table 6.3

Size of Stores and Spares Inventory of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.51	0.56	0.68	0.52	0.60	0.57
2004-05	0.48	0.60	0.64	0.36	0.49	0.52
2005-06	0.51	0.52	0.68	0.45	0.48	0.53
2006-07	0.40	0.56	0.66	0.45	0.39	0.49
2007-08	0.42	0.49	0.61	0.67	0.39	0.51
Company Average	0.46	0.54	0.65	0.49	0.47	0.53

Source: Based on data provided in Appendix

Five cement companies under study have kept at different levels of stores and spare parts inventory during the study period from 2003-04 to 2007-08. Table 6.3 gives a clear picture of stores and spare parts inventory kept by the five companies. The size of stores and spare parts inventory of all the cement companies shows fluctuating trend throughout the study period except India Cement which shows decreasing trend. The minimum size of stores and spare parts inventory in ACC is 0.40 (2006-07), Mangalam is 0.49 (2007-08), Gujarat Ambuja is 0.61 (2007-08), Shree Cement is 0.36 (2004-05) and in India Cement is 0.39 (2006-07 and 2007-08). The maximum size of stores and spare parts inventory in ACC is 0.5 (2003-04 and

2005-06), Mangalam is 0.60 (2004-05), Gujarat Ambuja is 0.68 (2003 04 and 2005-06) and Shree Cement is 0.67 (2007-08) and in India Cement is 0.60 (2003-04).

The Size of Works of Process Inventory of Selected Companies has been given in Table 6.4.

Table 6.4
Size of Work of Process Inventory of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.12	0.23	0.19	0.23	0.23	0.20
2004-05	0.17	0.26	0.22	0.15	0.31	0.22
2005-06	0.16	0.33	0.06	0.09	0.31	0.19
2006-07	0.22	0.21	0.18	0.20	0.26	0.21
2007-08	0.25	0.29	0.22	0.03	0.31	0.22
Company Average	0.18	0.26	0.17	0.14	0.28	0.21

Source: Based on data provided in Appendix

Five cement companies under study have kept at different levels of Work-in-Process inventory during the study period from 2003-04 to 2007-08. Table 6.4 gives a clear picture of Work in Process inventory kept by the five companies. The Work in Process inventory of all the cement companies shows fluctuating trend throughout the study period. The minimum Work-in-Process inventory in ACC is 0.12 (2003-04). Mangalam is 0.21 (2006-07), Gujarat Ambuja is 0.06 (2005-06), Shree Cement is 0.03 (2007-08) and in India Cement is 0.23 (2003-04). The maximum Work-in-Process inventory in ACC is 0.25 (2007-08), Mangalam is 0.33 (2005-06), Gujarat Ambuja is 0.22 (2004-05 and 2007-08), and Shree Cement is 0.23 (2003-04) and in India Cement is 0.31 (2004-05, 2005-06, and 2007-08).

Five cement companies under study have kept at different levels of finished goods inventory during the study period from 2003-04 to 2007-08 has been presented in Table 6.5.

Table 6.5

Size of Finished Goods Inventory of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.23	0.10	0.09	0.10	0.09	0.12
2004-05	0.23	0.07	0.09	0.26	0.12	0.15
2005-06	0.19	0.07	0.22	0.16	0.12	0.15
2006-07	0.24	0.18	0.12	0.11	0.24	0.18
2007-08	0.21	0.20	0.12	0.17	0.19	0.17
Company Average	0.22	0.12	0.13	0.16	0.15	0.16

Source: Based on data provided in Appendix

Table 6.5 gives a clear picture of finished goods inventory kept by the five companies. The size of finished goods inventory of all the cement companies shows fluctuating trend throughout the study period. The minimum size of finished goods inventory in ACC is 0.19 (2005-06), Mangalam is 0.07 (2004-05 and 2005-06), Gujarat Ambuja is 0.09 (2003-04 and 2004-05), Shree Cement is 0.10 (2003-04) and in India Cement is 0.09 (2003-04). The maximum size of finished goods inventory in ACC is 0.24 (2006-07), Mangalam is 0.20 (2007-08).

Five cement companies under study have kept at different levels of inventory holding period during the study period from 2003-04 to 2007-08 has been given in Table 6.6.

Table 6.6
Inventory holding period of Selected Cement Companies for the years from 2003-04 to 2007-08

(In days)

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	84	52	153	136	125	110
2004-05	87	49	135	135	157	113
2005-06	75	49	113	99	119	91
2006-07	71	43	102	97	113	85
2007-08	79	62	106	78	121	89
Company Average	79	51	122	109	127	98

Source: Based on data provided in Appendix

Table 6.6 gives a clear picture of inventory holding period kept by the five companies. The inventory-holding period of all the cement companies shows fluctuating trend throughout the study period expect Shree Cement that shows decreasing trend. The minimum inventory holding period in ACC is 71 (2006-07), Mangalam is 43 (2006-07), Gujarat Ambuja is 102 (2006-07), Shree Cement is 78 (2007-08) and in India Cement is 85 (2006-07). The maximum inventory-holding period in ACC is 87 (2004-05), Mangalam is 62 (2007-08), Gujarat Ambuja is 106 (2007-08), and Shree Cement is 97 (2003-04) and in India Cement is 113 (2004-05).

Inventory Turnover (Cost of Goods Sold/Average Inventory)

The ratio tells us the rapidity with which the inventory is turned over into receivables through sales. Generally, the higher the inventory turnover, the more efficient the management of a firm is. However, a relatively high inventory turnover ratio may be the result of too low a level of inventory

and frequent stock outs. Therefore, the ratio must be judged in relation to the past and expected future ratios of the firm and in relations of similar firms or the industry average or both.

Five cement companies under study have kept at different levels of inventory turnover during the study period from 2003-04 to 2007-08 has been given in Table 6.7.

Table 6.7
Inventory Turnover of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	4.34	7.03	2.39	2.69	2.92	3.87
2004-05	4.20	7.50	2.69	2.70	2.33	3.88
2005-06	4.86	7.46	3.22	3.70	3.08	4.46
2006-07	5.11	8.55	3.59	3.75	3.24	4.85
2007-08	4.63	5.93	3.44	4.67	3.01	4.34
Company Average	4.63	7.29	3.07	3.50	2.92	4.28

Source: Based on data provided in Appendix

Table 6.7 gives a clear picture of inventory kept by the five companies. The inventory turnover of all the cement companies shows fluctuating trend throughout the study period expect Shree Cement that shows increasing trend. The minimum inventory turnover in ACC is 4.20 (2004-05), Mangalam is 5.93 (2007-08), Gujarat Ambuja is 2.39 (2003-04), Shree Cement is 2.69 (2003-04) and in India Cement is 2.33 (2004-05). The maximum inventory turnover in ACC is 5.11(2006-07), Mangalam is 8.55 (2006-07), Gujarat Ambuja is 3.59 (2006-07), and Shree Cement is 4.67 (2007-08) and in India Cement is 4.67 (2006-07).

Sales to Inventory (Annual Net Sales/Inventory at the End of Fiscal Period)

The ratio indicates the volume of sales in relation to the amount of capital invested in inventories. When inventory for a firm is larger in relation to sales (the condition which causes it to have a lower net sales to inventory ratio than other firms) the firm's rate of return is less since it has more working capital tied up in inventories than has the firm with a higher ratio.

Five cement companies under study have kept at different levels of Sales to total inventory during the study period from 2003-04 to 2007-08 has been shown in Table 6.8.

Table 6.8

Sales to Total Inventory of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	7.63	9.85	4.57	4.19	5.65	6.39
2004-05	7.37	8.58	6.57	5.41	4.90	6.57
2005-06	9.55	9.14	9.14	8.12	7.53	8.70
2006-07	8.10	9.49	7.57	6.12	7.36	7.73
2007-08	8.24	6.91	7.86	13.80	7.35	8.83
Company Average	8.18	8.79	7.14	7.53	6.56	7.64

Source: Based on data provided in Appendix

Table 6.8 gives a clear picture of Sales to Total inventory kept by the five companies. The Sales to Total inventory of all the cement companies shows fluctuating trend throughout the study period. The minimum Sales to Total Inventory in ACC is 7.37 (2004-05). Mangalam is 6.91 (2007-08), Gujarat Ambuja is 4.57 (2003-04), Shree Cement is 4.19 (2003-04) and in India Cement is 4.90 (2004-05). The maximum Sales to Total

Inventory in ACC is 9.55 (2005-06), Mangalam is 9.85 (2003-04), Gujarat Ambuja is 9.14 (2005-06), and Shree Cement is 13.80 (2007-08) and in India Cement is 7.53 (2005-06).

Inventory to Net Working Capital (Inventory/Net Working Capital)

The ratio explains the amount of inventory per rupee of equity/long-term financed portion of current assets. A higher ratio may mean greater amount of net working capital investment in inventory.

The Inventory of net Working Capital of selected cement companies has been given in table 6.9.

Table 6.9
Inventory to net Working Capital of Selected Cement Companies for the years from 2003-04 to 2007-08

Year	ACC	Mangalam	Gujarat Ambuja	Shree Cement	India Cement	Industry Average
2003-04	0.85	0.55	0.74	0.69	0.66	0.70
2004-05	0.66	0.70	0.47	0.64	0.35	0.56
2005-06	0.63	0.71	0.54	0.46	0.28	0.52
2006-07	0.91	1.13	0.66	0.48	0.20	0.71
2007-08	0.97	-2.09	0.86	0.35	0.16	0.25
Company Average	0.80	0.24	0.86	0.52	0.33	0.55

Source: Based on data provided in Appendix

The inventory of net working capital of all the cement companies shows fluctuating trend throughout the study period except India Cement, which shows decreasing trend. The minimum value of inventory in net working capital in ACC is 0.63 (2005-06), Mangalam is -2.09 (2007-08), Gujarat Ambuja is 0.47 (2004-05), Shree Cement is 0.35 (2007-08) and in India Cement is 0.16 (2007-08). The maximum value of

inventory to net working capital in ACC is 0.97 (2007-08), Mangalam is 1.13 (2006-07), Gujarat Ambuja is 1.86 (2007-08), and Shree Cement is 0.69 (2003-04) and in India Cement is 0.66 (2003-04).

Select References:

S.E. Bolter, *Managerial Finance*, (Boston: Hovyhlon Mifflin Co., 1976).

American Institute of Certified Public Accounts: According *Research and Terminology Bullet* New York (1961).

Black Champion U. Miller, *Accounting in Business Decisiions-Theory Method and Use,* Englewood Cliffs New Jersey, Prentice Hall, Inc., (1961).

S. Venu, *Lokudyog* (1972).

Howard Leslie R., *Working Capital: Its Management and Control,* London MacDonald and Evan Ltd., 1971.

L.R. Howard, *Working Capital – Its Management and Control,* (London : Macdonald & Evan Ltd., 1971).

R.S. Chadda, *Inventory Management in India,* (Mumbai Allied Publishes, 1971).

Martin K. Star and David W. Miller, *Inventory Control,* (NJ, Jheary and Phensice, Englewood cliffs, Prentice Hall, 1962).

P.K. Ghosh and G.S. Gupta, *Fundaments of Management Accounting,* (New Delhi: National Publishing House, 1979).

R.S. Chadda provides the following useful guidelines for selective control (Chadda R.S.: Inventory Management in India).

P. Hopal Prishan L.M. Sundersan, *Material Management-An Integrated Approach*, (New Delhi): Prentice Hall and India 1984.

Buchar, Joseph and Koenisbgerg, Ernest, *Scientific, Inventory Management,* (New Delhi: Prentice Hall of India, 1966).

H.J. Wheldon, *Cost Accounting and Costing Methods,* (London : McDonald and Evans Ltd., 1948).

Chapter-VII

Conclusion, Suggestions and Recommendations

Conclusion, Suggestions and Recommendations

The foregoing study in the preceding six chapters leads to many conclusions about the cement industry working capital management but with one caution. As already pointed out in earlier the biggest limitation of the study had been that a large number of companies had to be left out because cement is not their main business though they are big producers of cement. Further, beyond data published in annual accounts no further data were made available by any company. Therefore, detailed probe could not be made on many aspects which has been pointed out at relevant places.

Subject to these limitations following conclusions can be drawn from the study:

The basic objective of working capital management is to minimise cost to the firm whether managing cash, receivables (Sunday debtors) or inventory or miscellaneous current assets, minimize risk to the company on receivables, ensure just level of inventory to operate full level of capacity with minimum inventory. It also implies that as far as possible miscellaneous current assets should be utilised for company's operations. In other words the working capital management should aim to optimise production and sales with minimum risk and cost. However, this had not been achieved by cement industry because scientific techniques have not been utilised and

decisions have been taken on *ad hoc* basics. It seems from the analysis of data of selected sample companies that in cement industry by and large there is no proper working capital management. Every decision has been left out to market forces without working out cost benefit analysis or applying various formulas suggested by experts. This is very much evident from wide variations in various ratios from company to company and in different years for the same company.

The cash management is very faulty as a result of which cash ratio to total current assets and to sales are very high for the cement industry. With the above general observations one can draw number of conclusion about the economic health of the industry and various aspects of working capital.

The industry at present is passing through buyers phase of the market. This state of cement industry is expected to continue in near future too because new capacity is being created faster than growth in demand. This has increased competition and working capital management has become more difficult. On the one side customers have to be accommodated to compete in the market but at the same time all possible economies must be achieved in management of cash, receivables and inventory to maintain and improve profitability.

Some of the industrial houses are in the process to sell their cement units to other dominant players, which should help to improve working capital management and profitability of the industry.

There are clusters of factories in certain belts but so far no attempt has been made to take advantage of this fact to reduce working capital needs. As pointed out later through cooperation it is possible to reduce stocks of coal, gypsum, and spare parts to not only save interest cost but bulk purchases should also help in lowering procurement cost.

As stated earlier there is concentration of capacity in the hands of few big industrial houses but there is no joint management of working capital. In cases where factories of one group are located at long distances from each other it is not possible to have joint management of inventory or receivable but in certain matters joint action is possible which is described below:

There can be joint purchases of stores and spares for all the companies of the group by the following mechanism. There should be centralised purchase department at a place where maximum numbers of inputs are available.

On receipt of orders from various units joint order can be placed with the advice to supply specific quantities to various units on specified dates.

Actually some group have adopted this system which should be adopted by other industrial groups too.

History and Growth of Cement Industry in India

Cement is vital material for all constructions like factories, houses, bridges, building of dams and paving of roads. 60 per cent of the total plan outlay goes towards

construction of which cement is the important and main input. The importance of cement accelerates with development of the country. Hence if there is development, it will be reflected in the increase of construction of factories, buildings and bridges so the demand of cement will be more and more. India has become one of the largest consumers of cement in the world.

The Indian scenario for the mineral sector is an encouraging one, considering that the Government has given lot of thrust on infrastructure namely power, roads, highways and railways network etc. This means more raw materials like coal, iron ore, limestone and dolomite, which are major ores/mineral required for the core sectors, namely power, steel and cement. At present the values of ores/mineral in India as per cent of total GDP is forecasted for around 0.5 to 1 though chances of increase in ore/mineral value are quite high.

Types of Cement

Ordinary Portland Cement (OPC):

The Ordinary Portland Cement is popularly known as grey coment, which is produced by grinding clinker with 5 per cent gypsum. It is used in all general concrete construction, mass and reinforced concrete. It accounts for about 70.60 per cent of the total production.

Portland Pozzolona Cement (PPC):

It is cheaply manufactured because it uses fly ash/burnt clay/coal waste as the main ingredient. PPC has a lower heat of hydration, which is of advantage in preventing cracks where

large volumes are being cast. PPC accounts for 18.3per cent of the production.

Portland Blast Furnace Slag Cement (PBFSC):

It is made by grinding granulated blast furnace slag, steel industry by product (up to 65%), gypsum (5%), and clinker (balance). PBFSC has a heat of hydration even lower than PPC and is generally used in construction of dams and similar massive construction. It contributes nearly 10 per cent to the total.

White Cement:

Basically it is OPC: Clinker using fuel oil (instead of coal) and with iron oxide content below 0.40 per cent to ensure whiteness. Special cooling technique is used. It is used to enhance aesthetic value, in tiles and for flooring. White cement is much more expensive than grey cement.

Specialised Cement:

Oil Well Cement is made from clinker with special additives to prevent any porosity.

Rapid Hardening Portland Cement:

It is similar to OPC, except that it is ground much finer, so that on casting the compressible strength increases rapidly. Water proof Cement: OPC with small portion of calcium separate or non-saponifibale oil to impart waterproofing properties

History of cement:

It must be interesting to know how cement is made today *vis-a'-vis* the historical background. Ever since civilizations stepped on the earth, people sought a material that would bind stones into a solid, formed mass. The Assyrians and Babylonians used clay for this purpose, and the Egyptians advanced to the discovery of lime and gypsum mortar as a binding agent for building such structures as the Pyramids. The Greeks made further improvements and finally the Romans developed cement that produced structures of remarkable durability. The secret of Roman success in making cement was traced to the mixing of slaked lime with pozzolana, a volcanic ash from Mount Vesuvius. This process produced cement capable of hardening under water. During the middle ages this art was lost and it was not until the scientific spirit of inquiry revived that we rediscovered the secret of hydraulic cement – cement that will harden under water. Most of the building foundations in the Roman Forum were constructed of a form of concrete, placed in some locations to a depth of 12 feet. The great Roman baths built about 27 B.C., the Coliseum, and the huge Basilica of Constantine are examples of early Roman architecture in which cement mortar was used. Portland cement today, as in Aspdin's day, is a predetermined and carefully proportioned chemical combination of calcium,

silicon, iron, and aluminum. Natural cement gave way to Portland cement, which is predictable, known product of consistently high quality. Aspdin established a plant in Wakefield to manufacture Portland cement, some of which was used in 1828 in the construction of the Thames River Tunnel. But it was almost 20 years later when J.D. White and Sons set up a prosperous factory in Kent that the Portland cement industry saw its greatest period of early expansion, not only in England, but also in Belgium and Germany. Portland cement was used to build the London sewer system in 1859-1867. Thomas A. Edison was used a pioneer in the further development of the rotary kiln. In 1902, in his Edison Portland Cement Works in New village, NJ, he introduced the firs long kilns used in the industry – 150 feet long in contrast to the customary 60 to 80 feet. Today, some kilns are more than 500 feet long. Parallel improvements in crushing and grinding equipment also influenced the rapid increase in production. Since grinding process consumers most of the energy various grinding systems like ball mill/vertical roller mill/roller presses has been the result of technological developments. Blending takes place in silos with air blown in from the bottom to aerate the contents. Various new designs were also developed to increase the efficiency of mixing.

Problems of Cement Industry

The main impediments to the growth of cement industry in India may be broadly listed as follows:

1. **Shortage of capital--** The cement industry is capital-intensive in nature. On account of its record on declining profitability, it is unable to raise the required finance from the capital market.

2. **Power shortage--**Power is an important infrastructure, which the cement industry needs. The cement industry is being adversely affected with the State Electricity Boards (SEBs), raising costs year after year accompanied by diminishing quality of power supplied, in terms of frequent voltage fluctuations, power cuts and interruptions.

3. **By installing captive power plants--** The Indian cement Industry is today supplementing grid power supply as a result, capacity has crossed 700MW.

4. **Location problems--** Cement industries are mainly situated in Western and Southern regions producing about 71 per cent of the total output, while the Northern and Eastern regions account for 29 per cent of the total output. The Southern and Western regions consume only 57 per cent of their total output, while the Northern and Eastern regions consume 43 per cent of their total production. There is excess production in the Southern and Western regions while there is excess demand from Northern and Eastern regions. These factors lead do heavy transport cost.

5. **Shortage of coal--** Coal shortage affects production of cement industry resulting in idle capacity and under utilisation of capacity. Coal requirement by the industry today, stands at 13 mt, which is just 6 per cent of the total coal

produced in India. As a result, industry sources say that cement manufacturers are left at the mercy of traders in coal, who charge exorbitant prices. By 2010 AD, the need for coal will go up to 25 mt per annum.

The availability and movement of coal has been a perennial problem of the cement industry. Ninety per cent of the coal deposits occur in the four states of Bihar, Orissa, West Bengal and Madhya Pradesh. Barring Madhya Pradesh, none of the other states have any limestone deposits and hence coal has to be hauled over very long distances.

Keeping in view the likely production of 737 mt. of cement in 2001-02, coal requirement will have to double to the level of 21 mt and about 15 mt will have to be moved by rail against eight mt by rail in 1996-98.

Non-availability of railway wagons-- Non-availability of railway wagons leads to considerable delay in bringing in the raw materials and in despatching the cement to various potential markets. Sending cement by open railway wagons leads to pilferage and damage by rain. 55 per cent of cement is dispatched by rail and 45 per cent by road.

6. Defective method of transport-- Methods of cement bagging and its transportation in India are primitive which make marketing inefficient and uneconomical. Hardly any quantity of cement at present is handled in bulk. Negligible share in World Trade: India's share in world trade is negligible. Currently, India export only about 3.5 lakh tones in a year.

7. Technological obsolescence-- The industry is in need of change in the production process. There is a need for conversion from wet process to dry process.

Cash Management

One of the most important areas in the day-to-day management of the firms deals with the management of working capital, which is defined as all the short-term assets used in daily operations. This consists primarily of cash, marketable securities, accounts receivable and inventory. The balances in these accounts can be highly volatile as they respond very quickly to changes in the firm's operating environment.

A highly liquid firm has sufficient cash to pay its bills at all times. An illiquid firm is unable to pay its bills when due.

In a financial sense, the term cash refers to all money items and sources that are immediately available to help in paying firms bills. On the balance sheet, cash assets include deposits in financial institutions and cash equivalent in money market funds or marketable securities. All highly liquid short-term securities are treated as cash. Most government and corporate securities are treated as cash because they may be liquidated through a telephone call.

Cash is the most important current asset for the operations of the business. It is the basic input needed to keep the business running on a continuous basis. It is the money, which the firm can disburse immediately without any

restriction. The term cash includes coin, currency, cheques held by the firm and balances in its bank accounts.

J.M. Keynes postulated three motives for holding cash, *viz.*, transactions motive, precautionary motive and speculative motive. These can be said to form the basis for cash management in business enterprises.

Cash management is concerned with minimizing unproductive cash balances, investing temporarily excess cash advantageously, and to making the best possible arrangements for meeting planned and unexpected demand on the firm's the firm; cash flows within the firm, and cash balances held by the firm at a point of time.

Cash management must be thought of in terms of the overall liquidity needs of the firm, specifically its current assets and liabilities. In order to reduce the influence of uncertainties with regard to cash needs and to ensure adequate liquidity, firms have to gauge the need for protective liquidity. The efforts involved for this purpose usually take the form of:

1. Assessment of the probabilities or odds that each of these will develop within a given period in future, such as 5 years.
2. Assessment of the probabilities and developments creating cash drains will occur at the same time.
3. Assessment of the likely amount of cash drain that will result if each of the contingencies develops.

An important policy decision regarding cash management is: what should be the optimal amount of cash balance to consider the joint impact of the following factors:

1. The philosophy of the management regarding liquidity and risk of insolvency.
2. The expected cash inflows and outflows based on the cash budget forecasts encompassing long-range and short-range cash needs.
3. The size of sales in relation to fix asset investment.
4. The degree of deviation between the expected and actual net cash flows
5. The maturity structure of the firm's liabilities
6. The firm's ability to borrow at short notice in the event of an emergency.
7. Efficient planning and control of cash.
8. The status of the firm's receivables and inventory.
9. The credit position of the firm.
10. The nature of business.

Cash management must to reduce the required level of cash but minimize the risk of being unable to discharge claims against the company as they arise. If the firm holds too small a cash balance its liquidity position becomes weak; although the overall profitability will be high, the risk of technical insolvency will increase. On the other hand, if the firm maintains too much of a cash balance, it will have a sound liquidity position and less risk. But its overall profitability will be reduced. Therefore, the firm should maintain an optimal

cash balance which is neither small nor large. It is that balance where the liquidity and profitability goals meet and there is a trade off between risk and return.

Another major cash decision is what exact mix of cash and marketable securities should be maintained? Marketable securities are the means through which cash balances are replenished in the process of their optimization and held to augment the cash balance or to mop up temporary surplus cash. The level of marketable securities is determined, the banks, the need for cash and its predictability, the interest rate on marketable securities, and the transaction and inconvenience costs associated with affecting a transfer between marketable securities and cash. The firm need not hold cash if the transaction and inconvenience costs are zero and the conversion of marketable securities into cash and cash into marketable securities is instantaneous. Since this is not practically possible, excess cash above some minimum level should, as a rule, be invested in marketable securities. The rule is subject to the qualification that the interest earned over the expected holding period must more than compensate for transactions and inconvenience costs. Under conditions of uncertainty, when the demand for cash is not known in advances upper and lower limits for cash are set. When cash reaches an upper limit, it is invested in securities and when cash reaches a lower limit marketable securities are converted into cash. The level of marketable securities should also include resources, which are saved to meet large expenses. Another

consideration that affects the level of marketable securities is the firm's banking relationships; if these are good it means that the securities balance can be reduced.

These are various collection and disbursement methods which exercise a joint impact on the overall efficiency of cash management. These methods speed up the mailing time of payments from customers to the firm; reduce the time during which payments received by the firm remain uncollected funds; and speed up the movement of funds to disbursement banks.

The methods which accelerate the collection process are concentration banking, lock-box system, special handling of remittances which involve personal picking up of these chouse or the use of air-mail or special delivery, initiating controls to accelerate the deposit and collection of those small cherub which account for a large proportion of total deposits, speeding up into-bank transfers of cash and transfers between various divisions of the company, closing of unnecessary bank accounts which create unnecessary pockets of idle funds. The firm should be given due consideration to such aspects as quick shifting of funds to the disbursing in a particular bank. Establishing well defined operating procedures for disbursement, eliminating or minimizing the less of cash discounts on accounts payable due to clerical inefficiencies and the timing of payment. Some of the methods of delaying disbursements are: the use of drafts instead of cheques carrying float maintaining a separate account for pay roll disbursements

in order to minimize cash balance in that account by predicting. Establishing a minimum level of cash balance in that account by predicting when the pay cheques are likely to be presented for collection. Establishing a minimum level of cash balances depends in part upon the compensating balance requirements of banks.

One of the main methods of planning and controlling investment in cash is to prepare detailed cash budgets. Cash budgets are the period by period forecasts of future cash flows of the business. They are the estimates of when additional finance will be required and when surplus funds are likely to arise. This gives notice to the management about the need for arranging short-term financing in the case of cash shortages and investigate short-term investment opportunities in the case of surplus cash. Cash budgets can be prepard over various time horizons. For purposes of working capital management, it is the short-term horizon, say one year, which is important, although regard should still be had for longer term cash flow statements. The period for which cash flows are computed depends upon the nature of the business. But generally they should be at least monthly. If the cash inflows and outflows fluctuate greatly, a weekly forecasting will be required. The usefulness of a cash budget is dependent on the accordance of the forecasts on which it rests. Two methods can contribute to the improvement of cash budgeting. The first is to analyse the deviations that occur, and the second is to apply risk analysis to the cash budgets.

Control and Review

There are five major approaches for effective control are:

1. Exploitation of techniques of cash mobilization to reduce operating requirement of cash.
2. Major efforts to increase the precision and reliability of cash forecasting.
3. Maximum efforts to define and quantify the quality reserve needs of the firm.
4. The development of explicit alternative sources of liquidity.
5. Aggressive search for more productive uses for surplus money assets.

Some of the important technique of controlling cash are cash budgeting, ratio analysis, linear programming, goal programming, simulation and portfolio management. Ratio analysis is widely in application. Some of the important ratios used as measures of cash control are discussed below:

(1) Cash turnover-The ratio explains the speed with which cash is turned over. The higher the turnover, the less the cash balance required for any given level of sales; and other things remaining constant, it implies greater efficiency. The ratio can also be used to establish the cash balances to be held; once the sales forecasts for various periods have been made, the required cash balance can be calculated, using historical cash turnover figures. However, the ratio shows only what is happening to the cash balance without indicating the

imperfections and irregularities, caused in cash flows by the income through sales, which may be partly responsible.

(2) Cash as percentage of current assets-The ratio of cash in current assets provides an index of current operations and, used correctly, helps determine the minimum level of cash. Monthly control of cash and his records give some indication of trends. An increasing level of cash in current assets could be caused by a reduction in the credit given by the company's suppliers or by too high cash balance. The first may be unavoidable; the second is not. The further analysis is required to determine the cause.

Liquidity Analysis

A series of financial statements may be analyzed and be determining and studying the trend of the data shown in the statement. This method of analysis is one of the directors upwards or downwards and involves the percentage relationship that each statement item bears to the same items in the base year. Trend percentage or relative to the base year emphasis changes in the financial operating data from year to year and makes possible a horizontal study of data.

Business is a dynamic process. It is very different to find complete information about the business by way of analyzing the financial statement of one year. Therefore, it is important for an analyst to determine the direction and tendency of business. To determine the direction of business, the past data relating to the problems are studied and the trend is

determined. The analysis of the trend helps to judge the future tendency of a business.

Working Capital Trend

A series of trend ratios shows whether an item has increased or decreased and the rate of increase or decrease, it does not indicate whether the movement is favourable or unfavourable. For the purpose of forming an opinion as to the satisfaction of the trend of a certain item it is necessary to compare it with the trend of some related items in the working capital statement.

In working capital analysis the direction of change over a period of time is of crucial importance. Working capital is one of the important fields of financial management. It is, therefore, very necessary for an analyst to make a study about the trend and direction of working capital. This analysis will provide a base to whether the practice and prevailing policy of the management with regard to working capital is good enough or an improvement is to be made in managing the working capital funds.

Liquidity

Liquidity refers to affirm continuous ability to meet its short-term maturing obligations. Since cash is used to meet a firm's obligations, emphasis is given on holding large investment in current assets which include cash and 'near cash' items like receivables, short-term securities etc. Thus, holding relatively large investment in current assets will result in no difficulty in paying the claims of the others creditors.

Working Capital Turnover

In order to test the efficiency with which working capital is utilized the working capital turnover is calculated. It is calculated by dividing the net working capital to cost of sales indicating whether a business is being operated with a small or large amount of net working capital is relation to the cost of sales.

A high working capital turnover may be the result of favourable turnover of inventories and receivables or may reflect an inadequacy of working capital. On the other hand, a low turnover of working capital may be an outcome of the excess of working capital of slow turnover of inventories and receivables or a large cash balance or investment of working capital in the form of temporary investment. However, a very high turnover of working capital might indicate that the working capital is insufficient for the given volume of business. A very low working capital turnover ratio should clearly be taken to mean that the capital is not sufficiently active.

So we can say a high ratio indicates that management is aggressive in its use of working capital. However, an excessive high ratio indicates poor working capital management may be inadequate at present sales.

Net Working Capital to Current Liabilities

(Net Working Capital/Current Liabilities):

It shows the financing mix that is used for financing the current assets. It also reveals the equity and long-term *vis-à-vis* current liability financed portion of current assets. From the

liquidity angle it throws light on the equity and long-term financed asset cushion for a given amount of current liabilities.

Gross Working Capital to Total Assets

(Gross Working Capital/total Assets):

This ratio indicates the amount of working capital per rupee of total assets. It also reveals the proportion of working capital in the total capital employed and thus the proportions of current and non-current assets in total. A high ratio may indicate higher liquidity and a law ratio the opposite.

Accounts Receivable Management

Accounts receivable represent the amount due from customers (book debts) as a result of selling goods on credit. The three characteristics of receivables the element of risk, economic value, and futurity explain the basis and the need for efficient management of receivables.

Receivables management, also termed credit management, deals with the formulation of credit policy, in terms of liberal or restrictive, concerning credit standard and credit period, the discount offered for early payment and the collection policy and procedures undertaken. It does so in such a way that taken together these policy variables determine an optimal level of investment in receivables where the return on that investment is maximum to the firm. Frequent examples of poor management of accounts receivable are: neglect of various overdue accounts, sharp rise in the bad expense, and the collection of debts expense and taking the discount by customers even though they pay after the discount date and

even after the net date. Since accounts receivable represent a sizable investment on the part of most firms in the case of public enterprises in India, it forms 16 to 20 per cent of current assets efficient management of these accounts can provide considerable savings to the firm. The following factors are of particular importance in shaping the size of the firm's investment in receivables:

1. The terms of credit granted to customers deemed creditworthy.
2. The policies and practices of the firm in determining which customers are to be granted credit.
3. The paying practices of credit customers.
4. The vigour of the sellers collection policies and practice.
5. The volume of credit sales.

In order to optimize investment in receivables effective credit granting and collection policies have to be formulated. A number of other factors which are considered in formulating a credit policy are:

1. The need to create demand for inventory that may otherwise become obsolete, *e.g.,* fashion goods.
2. Provision for extended credit periods to help out valuable customers over short-term liquidity risks.
3. General credit terms may be given as part of a promotional campaign relating to now or existing products.

4. More generous credit terms may be given during off-season so as to generate move consistent sales.
5. Competitive pressures may force a firm to revise its policies.
6. By offering price cut in the form of a discount may reduce competitors reactions due to their not recognizing or not-recognizing straightaway what has happened.

Credit Granting Policy

The decision involved in credit granting is to determine whether to extent credit to a customer and how much credit to extend. The firm must concern itself not only with the establishment of credit standards with the correct use of these standards in making credit decision. Appropriate sources of credit information and methods of credit information and methods of credit analysis must be developed. Credit standards, which define the minimum criteria for the extension of credit to a customer, have to be established and enforced.

These must be based on such elements as credit ratings, credit references, average payment periods, and certain financial ratios. The policy decisions to grant credit to a customer is based on either a liberal application or restricted application of the firm's overall credit standards.

Credit Analysis

After deciding upon the degree of acceptable risk by determining credit standards, the credit analysis of the customer desiring credit managing out whether the customer

falls above or below the acceptable limit in terms of his creditworthiness. The quality of customer chosen depends upon the depth of the analysis. First, the customer's willingness to pay the debts on time is tested with the help of his record of payment to other suppliers. Second, his ability to pay is ascertained as reflected in his financial statements. Here the primary reliance is upon an analysis of short-term position: current ratio, acid test ratio, turnover of receivables and inventory turnover.

Credit Terms

The second basic aspect of receivables management is to determine the credit terms, which cover the things: cash discount period, and credit period. Changes in any of the firm's credit terms may have an effect on its overall profitability. When a firm initiates or increases a cash discount the sales volume will increases average collection period, the cost of carrying accounts receivables and bad debt expense will decrease.

The negative aspect of an increased cash discount is decrease profit margin per unit. Decreasing or eliminating a cash discount would have opposite effects.

When the cash discount period is increased, there is a positive effect on profits. Many people who did not take the cash discount in the past will now take it, thereby reducing the average collection period. The negative effective on profit is the resulting slower average collection period because people who were already taking the cash discount will be able to still take it

and pay later. If the discount period is shortened the effects would be the opposite.

Changes in credit period also affect the firm's profitability. Increasing the credit period should increase in sales. But both average collection period and the bad debt expense are likely to increase as well. Thus the net effect on profits may be negative. A decrease in the credit period is likely to have the opposite effects on profits.

Collection Policy

The firm's collection policies are the procedures followed to collect accounts receivable when they are due. The effectiveness of the firm's collection policies can be partially evaluated by looking at the bad debt expenses. This level depends not only on the collection policies but also on the credit policies on which the extension of credit was based. Increased collection expenditure should reduce the bad debt expenses and the average collection period, thereby increasing profits. The costs of this strategy may include lost sales in addition to increase collection expenditure if the level of collection effort is too intense. The first step in the efficient management of receivable is to define its objectives. The more important of these objectives are:

1. To achieve growth in sales.
2. Meeting competitors.
3. Increase profits.
4. Finance the customer.

The two basic liquidity goals in receivables management are to concentrate on (a) the prospect of collecting the receivables when they become due, and (b) the prospect of shortening future receivable maturities.

Effective policies as regards credit granting and collection have to be evolved keeping in view the set objectives. Some of the possible credit policies are: (i) open (liberal) credit without approval of appropriate authority up to a certain limit or with approval if the credit exceeds that limit, (ii) limited credit, (iii) restrictive credit, and (iv) no credit. An effective collection policy has to be developed defining clearly the procedure for (i) determining delinquent accounts, (ii) developing collection correspondence, (iii) dealing with discount chiselers, (iv) legal action for collection, (v) adjustment proceedings, and (vi) liquidation proceedings.

Inventory Management

For purpose of our study, the term inventory comprises raw material, work-in-process, finished goods and stores and spares. Inventories represent a significant portion of assets in the case of most of the manufacturing firms and require substantial investments.

Inventory management is concerned with the determination of optimal level of investment for each component of inventory and the inventory as a whole, the efficient use of the components, and the operation of an effective control and review mechanism.

Inventory represents a continuum of possible investments. Its different items carry with them different risk to the firm. Financial manager ties inventory management to the overall objective of the firm. From the profitability point of view, the optimal level of average inventory and the optimal order quantity must be kept lower. Other things remaining constant, this is possible when the opportunity cost of funds invested in inventory is higher.

In inventory decisions management has to take into consideration factors like inventory carrying costs, ordering costs, costs of stock-outs, the rate of return on the investment, and the cost of capital. In the case of running enterprises, the decision in concerned also with additional returns and the net effect on the maximization of the value of the firm. While the technique of marginal analysis is found suitable in taking such decisions, the classification of costs into fixed, variable and relevant is considered essential. The decision to invest further in inventory should be based on consideration of trade of between the resulting savings associated with excesss investment and the total cost of holding added inventory.

Levels of inventory holding are also influenced by the operational flexibility it offers to the firm. A lower inventory level gives les flexibility while a higher inventory level gives greater flexibility. In evaluating the levels of inventories, management must, therefore, balance the benefits of economies of production, purchasing and increase production demand against the cost of carrying the additional inventory. Other

things remaining constant, the greater the efficiency with which the firm manages inventory the lower the required investment and the greater the owner's wealth. An important step in inventory management is the determination of investment in each component of inventory, *viz.*, raw material, work-in-process, finished goods and stores and spares. Some important factors which influences the levels of each component are stated here under:

Raw Material Inventory

1. The volume of safety stock should be maintained against material shortages that interrupt production.
2. Considerations of economy in purchase.
3. The outlook for future movements in the price of materials.
4. Anticipated volume of usage and consumption.
5. The efficiency of procurement and inventory control functions.
6. The operating costs of carrying the stocks.
7. The costs and availability of funds for investment in inventory.
8. Storage Capacity.
9. Re-component cycle.
10. Indigenous or foreign.
11. The lead time of supply.
12. Formalities for importing.

Work-in-process Inventory

1. The length of the complete production process.

2. Technological considerations influencing process time.
3. Management policies affecting length of process time.
4. Length of production in runs.
5. Actions that speed up the production process, *e.g.,* addition second or third production shifts.
6. Management's skill in production scheduling and control.
7. volume of production.
8. Sales expectations.
9. Level of sales and new orders.
10. Price levels of raw materials used, wages and other items that enter into production cost and the value added in production.
11. Customer's requirements.
12. Usual period of aging.

Finished Goods Inventory

1. The policy of the management to gear the production to meet the firm orders in hand.
2. The policy to produce for anticipated orders and stock-keeping.
3. Goods required for the purpose of minimum and safety stocks.
4. Sales, Policies of the firm.
5. Need for maintaining stability in production.
6. Price fluctuations for the product.
7. Durability, spoclage and obsolescence.
8. Distribution system.

9. ability to fill orders without delay.
10. Availability of raw material on seasonal basis while customers, demand spread throughout the year.
11. Storage capacity.

Stores and Spares Inventory

1. Nature of the product to be manufactured and its lead time of manufacture.
2. State of technology involved.
3. Consumption patterns.
4. Lead time of supply.
5. Indigenous or foreign.
6. Minimum and safety stocks and ordering quantities.
7. Capacity utilization.
8. Importing formalities.

Turning to the practical aspects of inventory management, the first step is to define its objectives. Some of these are:

1. To assure continuity of operations in the most efficient manner possible so that the enterprise may reach its overall objective.
2. To achieve a balance between economies of holding large inventories and of holding large inventories and of holding small inventories.
3. To minimize direct and indirect costs associated with holding inventories.

Some of the important inventory policies relate to:

1. Minimum, maximum and optimum stock.

2. Safety stocks, order quantities, order level and anticipation stocks.
3. Waste, scrap, spoilage and defectives.
4. Policies relating to alternative use; and
5. Policies relating to order filling.

Inventory management having become a separate function by itself, there should be a separate organization for it. The vision and control over inventory management.

The Financial Executive's role in inventory management may be stated as follows:

1. By understanding the implications of changing inventory policies and positions he has to anticipate changes in the need for funds.
2. Where finances are a limiting factor, he has to help directly in shaping inventory policies that are consistent with the realities of the firm's financial position.
3. He has to institute periodic inventory turnover audits for investigating questions like:

   --Are we exercising full vigilance against imbalances of raw material and in process inventory that limit the utility of stocks to that of the item in shortest supply?

   --Are we employing the shortest procurement lead time assumptions and leanest stock levels consistent with safety, recognizing that complete safety has a prohibitive cost?

--Do we keep the heat on uncompleted production items held in suspension to get them into saleable condition?

--Do we press hard enough to keep production scheduling firm so that unneeded materials and inventories should be avoided? Does purchasing get early notification of production schedule changes?

--Do we move vigorously to dispose off goods that are obsolete, surplus or for any other reason unusable for production ?

--Are we continually striving to shorten the production cycle? Are we sure that long production runs are worth the costs and risks of the extra inventory investment?

--Is design engineering making maximum use of standard materials and components available form supplies on short notices?

--Are we quick enough to use special pricing to move extremely slow-selling finished item?

--Are we doing all we can to flatten on seasonal sales patterns that bulk up inventories?

--He has to help in the formulation of inventory policies designed to speed up turnover and maximize return on investment.

The efficiency of inventory control affects the flexibility of the firm. There are several tools of inventory control. Some of these are:

1. The economic order quantity which enables determination of optimal size of order to place on the basis of demand or usage of the inventory.
2. The technique of safety stocks to overcome problems of uncertainty.
3. The order point formula, which tells us the optimal point at which to reorder a particular item of inventory. Together, these tools provide the means for determining an optimal average level of inventory for the firm.

Ratio analysis has a wider application as a measure of inventory control among most manufacturing firms.

Recommendations

The study in foregoing chapters and conclusions in this chapter point out the need of better working capital management in the cement industry for which following recommendations are made.

In our country, cement industry adequate concern is not shown for proper management of working capital. In order to make industry conscious about the need of better management. Cement Manufacturers Association should create awareness by arranging seminars and workshops in which top management and senior officers from the finance and marketing departments of the industry should be invited.

The Cement Manufacturers' Association should also publish literature about working capital management practices in other countries and invite foreign experts for talk on specific subjects of working capital management. If Association introduces awards for best working capital managed company, it may encourage companies to be more concerned to manage their working capital better.

Cash ratio to total current assets should be brought down to 2-4 per cent. If some companies can manage within this range there is no reason why others cannot do so. It is largely due to lack of awareness and planning, unreliability of forecast for cash flow specially from sundry debtors. There is also lack of planning with regard to sundry payments.

There is an urgent need of cash budgeting by all cement companies. This requires proper estimation of cash and credit sales, production planning, purchase planning for inputs, financing plan and capital budget. This also requires estimation of profits and cost of production properly, which is rarely done at present and if done it is far off from the mark. Therefore, there is need of accurate forecasting by using modern statistical techniques which need not be described in this study.

The most important fact however is awareness and monitoring. When there are deviations from the forecast the reasons must be analysed for it and those responsible should be taken to task and for future better assessment be made specially of sales and realisation from sundry debtors. Since there are a number of uncertainties in the business forecast it

should not be based on single set of assumptions but cash budgeting should be done on different assumptions. It is also desirable to estimate from the estimates that one may remain prepared to meet the eventualities if they arise. The modern models on computers should be worked out. There are various models available for the purpose like Baunal Model, General Model, Millen and ORR Model. The companies with past experience should draw the best model suited to them.

The one of the important factor in cash management is policy variable, which can be aggressive, moderate or passive. This should not be dependent merely on whims of the top management or on the recommendations and suggestions of sales department but cost benefit analysis should be done taking into consideration the risk factor of credit sales and its cost versus the benefit of larger sales on profitability. The following variables should be estimated before the policy is decided:

1. Increase in sales by providing credit to buyers.
2. Cost of credit in terms of bad debts to receivables and interest cost.
3. Impact of larger sales on profits.

It is regrettable that such calculations are not made and policy is decided without detailed calculations.

There is need of much faster billing than hitherto so that there should be no time lag between despatches and billing so that in case of cash prompt may not have opportunity to

complain for delay. Most of the companies use computers but still delays do take place.

As pointed out earlier in certain companies there is large amount of cheques in collection due to inefficiency of the system or staff. There is an urgent need to speed up the process of collection of cheques.

There is also scope to conserve cash by better management of payables. No payment should be made before it becomes due.

Payment should be made only from head office for better control and monitoring and not from depots. If an urgent payment is made by depots advise should be available with central office.

If certain goods can be purchased on credit without extra cost of interest or if interest cost is lower than additional price, credit purchase should be preferred. But at present no accurate details are worked out by many companies.

There are many companies in which huge unutilised surplus lies in current accounts. It can be transferred to six months fixed deposits earning 7.75 per cent interest (current rate) or lower or higher interest on higher interest on shorter or longer period deposits with the banks.

Other surplus funds are lent to sister concerns without due considerations of security and return. This had been responsible for increasing bad debts and low returns and should be avoided to optimize return from surplus cash.

As pointed out in earlier chapters gross sources of cash are net profit, depreciation, decrease in receivables, increase in bank loans, increase in payables, accruals, advances and deposits from dealers and customers, decrease in inventory increase in long-term loans and decrease in investment. The uses of cash are dividend, addition to fixed assets, increase in inventories, increase in prepaid expenses, increase in tax payment, deposits and advances to governmental authorities and suppliers, investment, increase cash and cash equivalent. All these factors should be taken into account in proper cash budgeting but such a detailed and accurate budgeting is greatly lacking and is a must for proper cash management.

There is also greater need of regular and accurate funds flow accounting by properly analyzing operating leverage, financial leverage and total or combined leverage. These anlyses are based on functional relationship between certain income statements. The finance department is quite competent to do these analyses but due to indifference of top management of many companies these techniques are not properly and adequately utilized. There is a need to think systematically about future to serve as a device for coordination, control and monitoring the complex operations of the business and provide a medium for communicating the plans of a firm to concerned officers.

If proper cash planning is done there will be no loss of interest, no cost of borrowing at short notice to meet

emergencies. There will be no surplus funds and if there are surplus funds they will be invested to yield the best return.

As stated earlier there is need of cash budgeting, cash forecasting, regular well structured reports for control purposes, proper monitoring, collection and disbursement of information and proper investment of surplus funds. It is regrettable that much remains to be improved in all these aspects largely by educating top policy makers.

It is also necessary to motivate mangers in sales, purchase, stores, accounts and finance departments at all levels to perform well. Standards should be fixed which should be compared with actual and those who are beyond tolerance limit should be penalized and who perform well should be rewarded.

Receivables

The management of receivables is very poor in cement industry in a number of respects. There is no proper assessment of credit worthiness of different customers. There is no exchange of information among various producers about a particular debtor. Sometimes even companies of the same group do not consult each other, which must be done in their own interest.

Companies often do not fix any credit limit of various parties, resulting in supplying more cement than their credit worth, which ultimately leads to over dues and bad debts.

Much remains to be done with regard to collection of dues in time. There is a need to activate sales department in this regard and make them responsible for timely collection.

It is also possible to establish Joint cash collection system on commission basis. This can be done not only for group companies but also for the industry as a whole. CMA should think to establish such an agency. It can charge suitable commission for the services provided.

The commercial banks should also help industry in assessing credit worthiness of parties more efficiently and collection of dues. The banks no doubt provide these services but there is an urgent need to activate them and improve the quality of services.

In foreign countries factoring plays an important role in collection of dues so far in India this is not much in vogue due to high risk and low volume of business. This type of activity has to be developed in big way not only for cement industry but for all industries to make it success. Actually banks and financial institutions should give a serious thought to provide such facilities.

There should be proper risk analysis as per formulae given in chapter on Management of Receivables and matter should not be left to chance.

The number of depots have been increasing due to increased competition but this adds inventory of finished goods in transit and at depots blocking larger funds than otherwise warranted. It is possible to have joint selling efforts

and joint depots of sister concerns specially in case where cement is marketed under same brand name. For instance, L&T, Ambuja who market their cement under same brand name for all factories can adopt this strategy for saving distribution cost through joint depots. However, this cannot be recommended for all industrial groups specially those where cement of one company competes with other company of the same group like JK's, Birla's (units of different Birla's).

Inventory

Inventory management in cement industry is poor whether of raw materials, fuels, stores or other items resulting in heavy blocking of funds, loss of interest and complete loss of investment when inventories are spoiled due to over stocking.

First, the raw material *i.e.* limestone should not be stocked at all or at the most of few hours requirement. The limestone should be on the basis of Just in Time *i.e.* it should go directly from quarries to crushing mill which will not only save cost of storage and interest but also save handling cost as is done in many countries. It is quite feasible by proper production planning in quarries and crushing mills and improvement in transport system whether by ropeways, railways or road transport.

The cement factories are generally over stocking coal, which must be brought down to one week's requirement through the cooperation of railways. This is very practical in case of factories not far off from coalfields but in cases it will depend upon improvement of railway services.

Most of the factories are overstocking gypsum. It is feasible to stock gypsum to one day's requirement by proper planning of demand and despatches form source of supply.

The other input is kiln bricks for lining, which should not be stocked. They can be purchased when needed. The management knows accurately at what intervals they have to be changed. Hence complete plan is possible. For emergencies small stock may be kept.

Packing material stock need not be kept for more than a day or two requirements by arranging proper supplies as per daily requirements. Suppliers may be instructed to supply in predetermined lots; only for daily fluctuations in production, one-day stock may be kept.

It has been found that factories overstock spares not only of imported and critical parts but of other items too. Two basic questions can determine the size of the order and level to be maintained.

Order quantity model or EOQ Model can be based on following assumption:

1. Properly forecast the requirement on daily, weekly, monthly and yearly basis.
2. To decide the dates when spares, stores will be needed.
3. The period which is required to replenish the stores and spares.
4. Determining the ordering and carrying cost in terms of price, storage space, interest, spoilage and handing.

Based on these assumptions EOQ Model can be worked out for each factory.

There should also be regular evaluation of consumption so that items, which are no longer used or consumed less than in the past, may be ordered accordingly and surplus stocks may be disposed off.

The one of the important reason of overstocking of inputs in faulty transport system specially uncertainty about availability of railway wagons. Since this cannot be solved in a short period there should be greater dependence upon road transport.

There is another proposal for consideration of cluster units. They may form a consortium for purchase and despatch of inputs to the member units of the cluster, which can save cost of carrying inventory of coal, stores and spares. The consortium may collect the order form various factories, make its own assessment of stock and carry stocks in its depots at a central place to be supplied at short notice to mills. The only hurdle is lack of cooperation because of fear of leaking information. If this hurdle can be overcome, considerable saving is possible.

There is no overstocking of goods in process because it cannot be more than capacity of various mills and kiln.

The stock of cement as percent age of sales has come down. But there is scope to reduce it further by proper planning of production and sales.

As already pointed out much needs to be done for proper management of miscellaneous current assets. As 50 per cent of these assets are payment of advance taxes and deposits there is little scope for improvement for this port but other half can be better managed.

First all out efforts should be made to reduce loans and advances to directors, which is quite possible through firm policy and its proper implementation.

Secondly, loans and advances to subsidiary and sister concerns should be on cost basis and should be on same rate of interest as it is possible to earn by lending it to other non-group companies.

There should be proper credit analysis of all loans/advances granted, in which financial institutions directors should take more active interest so that bad debts may be minimized.

APPENDIX

ASSOCIATED CEMENT COMPANY LTD:
Statement of Working Capital
(from 2002-03 to 2007-08)

Rs. in Lac

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
A. CURRENT ASSTES						
Inventories						
Raw materials	4411	4006	3293	3541	4322	4176
Work-in-progress	3551	3349	4695	3682	6380	7868
Finished goods	5352	6320	6449	4499	7046	6202
Stores and spares	13864	14234	13446	11968	11651	13034
Sundry Debtors	18176	21806	26079	27484	25745	24763
Cash and Bank balance		5054	6558	5115	3278	2795
Loans, Advances and other current assets		32679	9513	8076	9050	8397
Advances for goods		16015	18517	22313	23104	23513
TOTAL "A"		**103463**	**88550**	**86678**	**90576**	**90748**
B. CURRENT LIABILITIES						
Sundry Liabilities	36970	45015	43134	43582	52756	50336
Provisions		25507	3073	5306	5354	8318
TOTAL "B"		**70522**	**46207**	**48888**	**58110**	**58654**
WORKING CAPITAL (A-B)		**32941**	**41343**	**37790**	**32466**	**32094**

SOURCES – Various Annual Reports of Associated Cement Company Ltd. for the years 2002-03 to 2007-08.

GUJARAT AMBUJA: Statement of Working Capital
(From 2002-03 to 2007-08)

Rs. in Lac

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
A. CURRENT ASSTES						
Inventories						
Raw materials	617.49	657.72	649.62	509.38	597.31	855.65
Work-in- progress	1741.07	3342.89	3368.24	640.51	2642.82	3576.16
Finished goods	499.61	1517.89	1356.72	2552.82	1757.91	1902.31
Stores and spares	9970.73	11879.67	9659.83	7898.03	9755.48	9808.6
Sundry Debtors	1539.22	1625.66	2166.98	2634.03	3438.41	3343.83
Cash and Bank balance		4872.05	12729.59	6595.18	3942.26	1846.63
Loans, Advances and other current assets		7168.26	9164.59	9331.27	12360.88	8235.99
Advances for goods		3152.37	3947.07	7592.69	6542.97	9477.47
Total "A"		**34216.51**	**43042.64**	**37754.91**	**41038.04**	**39046.64**
B. CURRENT LIABILITIES						
Sundry Liabilities	7887.14	8697.5	8221.91	12267.82	15754.72	22228.04
Provisions		2145.56	3130.77	3975.99	2836.26	8144.38
TOTAL "B"		**10843.06**	**11352.68**	**16243.81**	**18590.98**	**30372.42**
WORKING CAPITAL (A-B)		**23373.45**	**31689.96**	**21511.1**	**22447.06**	**8674.22**

SOURCES – Various Annual Reports of Gujarat Ambuja Cement Company for the years 2002-03 to 2007-08.

INDIA CEMENT LTD: Statement of Working Capital
(From 2002-03 to 2007-08)

Rs. in Lac

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
A. CURRENT ASSETS						
Inventories						
Raw materials	207.76	236.97	336.48	319.93	416.95	476.26
Work-in-progress	259.15	733.58	1257.42	1199.38	1070.11	1333.35
Finished goods	198.49	299.51	484.35	477.54	970.90	797.42
Stores and spares	1715.77	1929.63	2007.92	1845.72	1600.90	1670.47
Sundry Debtors	796.21	984.21	1258.62	2213.59	3808.16	4324.85
Cash and Bank balance		827.80	461.62	585.83	513.34	240.77
Loans, Advances and other current assets		3420.90	9861.32	13725.81	19403.05	17241.65
Advances for goods		229.06	292.94	345.39	422.01	9069.04
Total "A"		**8661.67**	**15960.67**	**20713.18**	**28206.40**	**35153.80**
B. CURRENT LIABILITIES						
Sundry Liabilities	3172.14	3319.19	3856.25	6353.02	6971.71	8299.21
Provisions		530.79	530.79	648.38	730.21	686.71
TOTAL "B"		**3849.97**	**4387.04**	**7001.40**	**7701.92**	**8985.92**
WORKING CAPITAL (A-B)		**4811.69**	**11573.63**	**13711.78**	**20504.48**	**26167.88**

SOURCE – Various Annual Reports of India Cement Ltd. for the years 2002-03 to 2007-08

MANGALAM CEMENT LTD: Statement of Working Capital
(From 2002-03 to 2007-08)

(Rs. In Lac)

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
A. CURRENT ASSTES						
Inventories						
Raw materials	288.70	223.08	154.84	163.29	113.71	71.61
Work-in-progress	865.18	479.63	584.65	671.05	503.58	697.63
Finished goods	344.39	216.85	136.78	143.230	430.19	470.45
Stores and spares	1157.09	1156.94	1238.81	1077.16	1319.42	1170.14
Sundry Debtors	2117.8	1889.97	1605.75	1753.43	1540.59	1009.58
Cash and Bank balance		599.62	788.12	685.81	479.16	524.09
Loans, Advances and other current assets		377.25	275.49	281.56	306.94	384.51
Advances for goods		610.42	278.04	346.24	313.77	383.89
Total "A"		**5553.76**	**5026.48**	**5121.77**	**5007.36**	**4711.90**
B. CURRENT LIABILITIES						
Sundry Liabilities	1987.93	1772.42	2029.58	2189.73	3179.24	5844.35
Provisions	320.94	22.44	22.64	21.49	21.91	21.92
TOTAL "B"		**1794.86**	**2052.22**	**2211.21**	**3201.15**	**5866.27**
WORKING CAPITAL (A-B)		**3758.90**	**2974.26**	**2910.55**	**1806.21**	**-1154.37**

SOURCES – Various Annual Reports of Mangalam Cement Ltd. for the years from 2002-03 to 2007-08

SHREE CEMENT LTD: Statement of Working Capital
(From 2002-03 to 2007-08)

(Rs. in Lac)

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
A. CURRENT ASSETS						
Inventories						
Raw materials	940.62	737.33	1253.06	1337.13	1640.84	450.3
Work-in-progress	243.19	1147.24	789.91	421.15	1315.85	118.89
Finished goods	157.28	502.95	1400.54	709.44	708.29	573.4
Stores and spares	1603.13	2601.03	1968.3	2048.72	3012.84	2329.19
Sundry Debtors	2473.12	2817.9	4715.71	5095.53	5563.06	4081.88
Cash and Bank balance		279.06	929.76	1343.29	1188.3	1891.48
Loans, Advances and other current assets		3820.58	1291.44	2513.9	3985.95	4478.39
Advances for goods		711.84	1825.37	2259.14	2848.35	2018.16
Total "A"		**12617.93**	**14183.1**	**15728.3**	**20263.48**	**15941.69**
B. CURRENT LIABILITIES						
Sundry Liabilities	3164.36	5391.72	5661.41	5909.09	6397.87	5400.57
Provisions		-37.63	48.45	-20.43	4.05	598.93
TOTAL "B"		**5354.09**	**5709.86**	**5888.09**	**6401.92**	**5999.5**
WORKING CAPITAL (A-B)		**7263.84**	**8473.23**	**9839.64**	**13861.56**	**9942.19**

SOURCES – Various Annual Reports of Shree Cement Ltd. for the years from 2002-03 to 2007-08

Statement of Raw Material

(From 2002-03 to 2007-08)

Particulars	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Associated cement company						
Raw materials	4411.00	4006.00	3293.00	354100	4322.00	4176.00
Work-in-progress	3551.00	3349.00	4695.00	3682.00	6380.00	7868.00
Finished goods	5352.00	6320.00	6449.00	4499.00	7046.00	6202.00
Stores and spares	13864.00	14234.00	13446.00	11968.00	11651.00	13034.00
Gujarat Ambuja Cement						
Raw materials	617.49	657.72	649.62	509.38	597.31	855.65
Work-in-progress	1741.07	3342.89	3368.24	640.51	2646.82	3576.16
Finished goods	499.61	1517.89	1356.72	2552.82	1757.91	1902.31
Stores and spares	9970.73	11879.67	9659.83	7898.03	9755.48	9808.6
Shree Cement						
Raw materials	940.62	737.33	1253.06	1337.13	1640.84	450.3
Work-in-progress	234.19	1147.24	798.91	421.15	1315.85	118.89
Finished goods	157.28	502.95	1400.54	709.44	708.29	573.4
Stores and spares	1603.13	2601.03	1968.3	2048.72	3012.84	2329.19
India Cement						
Raw materials	206.76	236.97	336.48	319.93	416.95	476
Work-in-progress	259.15	733.58	1257.42	1199.38	1071.11	1333.35
Finished goods	198.49	299.51	484.35	477.54	970.90	797.42
Stores and spares	1715.77	1929.63	2007.92	1845.72	1600.90	1670.47
Manglam Cement						
Raw materials	288.70	223.08	154.84	163.29	113.71	71.61
Work-in-progress	865.18	479.63	548.65	671.05	503.58	679.63
Finished goods	344.39	216.85	136.78	143.23	430.19	470.45
Stores and spares	1157.09	1156.94	1238.81	1077.16	1319.42	1170.14

Source: Annual Reports of various of cement companies for the year 2002-03 to 2007-08

Statement of Fixed Assets

(From 2003-04 to 2007-08)

Years:	2003-04	2004-05	2005-06	2006-07	2007-08
ACC	265110.00	290190.00	290863.00	311408.00	338719.00
MANGALAM	24736.66	23077.93	22170.38	21334.79	19953.56
GUJARAT AMBUJA	190948.64	225617.28	210469.22	287578.02	347203.09
SHREE CEMENT	51863.56	54957.73	55069.89	82230.89	79117.97
INDIA CEMENT	28969.78	42242.65	57617.73	66678.95	73353.19

Source: Annual Reports of various cement companies from 2003-2004 to 2007-08

Statement of Liquid Assets

(From 2003-04 to 2007-08)

Years:	2003-04	2004-05	2005-06	2006-07	2007-08
ACC	27731.00	33611.00	32799.00	29229.00	28229.00
MANGALAM	2489.59	2393.86	2245.75	2019.74	1533.67
GUJARAT AMBUJA	6550.45	14992.42	9293.82	7383.26	5190.46
SHREE	3096.96	5645.47	6438.82	6751.36	8566.76
INDIA CEMENT	1812.01	1720.24	2799.42	4321.49	4565.62

Source: Annual Reports of various cement companies from 2003-2004 to 2007-08

Statement of Sundry Creditors

(From 2003-04 to 2007-08)

Years:	2003-04	2004-05	2005-06	2006-07	2007-08
ACC	7256.00	7054.00	5598.00	6953.00	8617.00
MANGALAM	941.13	891.12	1319.37	1406.34	2114.96
GUJARAT AMBUJA	6773.20	7087.81	5924.74	10126.84	12736.86
SHREE	1900.35	4141.51	4116.42	4416.42	4778.70
INDIA CEMENT	1783.82	1532.04	2213.06	3170.66	3662.68

Source: Annual Reports of various cement companies from 2003-2004 to 2007-08

BIBLIOGRAPHY

Anthony, Roberts N.: *Management Accounting Taxes and Cases* Homewood Illinois Richard D. Irwin, 1998.

Adesh Sharma, "Investment and Financing in Pesticides Industry in India," *Indian Journal of Finance and Research,* Vol.V. No.2 July 1999, p. 67-83.

Agarwal N.K.: *Analysis of Financial Management,* New Delhi, National Publishing House, 2001.

A. Vijaykumar and A. Venkatachalam, "Working Capital and Profitability – An Empirical Analysis," *The Management Accountant,* October 1995 p. 748-750;

"Working Capital Management in Sugar Mills of Tamil Nadu – A Cash Study," *Management and Labour Studies,* Vol.20, No.4, October 1995, p. 246-254.

Bari R.R. : *Cash Planning and Management,* Delhi, Triveni Publication, 2000.

Baranek William : *Working Capital Management,* Belmont California Workshop Publishing Company, 1998.

Bari R.R. (Ed.): *Selected reading in cash management,* Delhi Triveni Publication, 2000.

Batty J.: *Management Accountancy,* MacDonald and Evans, 4th ed., 1992.

Beckman Theodore N.: *Credit and Collection Management and Theory,* New York, McGraw Hill Company, 1995.

Bernstein Leopard A: *Financial Statement Analysis, theory applications and interpretations,* Irwin Richard D., revised ed., 1998.

Bierman H.K. and A.K. Macdams : *Managerial decision for cash and marketable securities,* New York: Cornell University, 2001.

Bogen, J. Jules: *Financial Hand Book,* New York, The Ronald Press Company, 1994.

Bolter S.E. : *Managerial Finance,* Boston Houghton Mifflin Co. 2001.

Brandit L.K. : *Analysis for Financial Management,* Englewood Cliffs N.J.: Prentice Hall, 1996.

Brandley J.F.: *Administrative Financial Management,* 4th Ed., New York, Druden Press, 1994

Brigham F. Biegene : *Fundamental if Financial Management,* New York, The Dryden Press, 3rd Ed. 1999.

Brown R.G. : *Decision rules for Inventory Management,* New York, Holt Rinchert and Winston, 2001.

Chadda R.S.: *Inventory Management in India,* Mumbai Allied Publications, 2002.

Chandra Prasanna : *Financial Management Theory and Practice,* New Delhi, Tata McGraw Hill Publication Co., 2001.

Chiumintto P.M. : "A Practical basis for Working Capital Management" in Doris William ed. *Hand Book of Business Finance,* New York: Prentice Hall, 2001.

Chapin and Hasset : *Credit and Collection, Principles and Practice,* New Delhi : McGraw Hill, 1986.

Chatterjee A.K.: *Managerial Techniques of Bank Lending,* Mumbai, Himalaya Publishing House, 1991.

Clements J.N. and Dyres L.S.: *Balance sheet and the leading Banker.* London Europe, 1992.

Dabler Donald W. and Lee Lomer: *Purchasing and Materials Management,* New York: MacMillan, 2002.

Dalip S. Swamy and V.G. Rao, "The Flow of Funds in Indian Manufacturing Sector," *Sankhya,* Series C. Vol. 37, 1975.

Ernest W. Walker, "Towards a Theory of Working Capital," *The Engineering Economist,* Winter 1964 pp. 21-35.

Frank J.R. and H.H. Scholefield: *Corporate Financial Management,* London, Gover Press, 2000.

F. Owen Irvine, Jr., "Retail Inventory Investment and the Cost of Capital," *The American Review,* September 1981, pp. 633-648.

Firth Michel: *Management of Working Capital,* New York, The McMillan Press, 2001.

Franco Modigliani, "Business Reasons for Holding Inventories and Their Macro Economic Implications," *Problems of Capital Formation, Studies in Income and Wealth,* Vol. 19, NBER, 1957, p. 495-511.

Foulke Roy A. : *Practical Financial Statements Analysis,* New York: McGraw Hill Co. Inc. 1994.

Gupta L.C.: *Banking and Working Capital Financial,* New Delhi, McMillan, 1991.

Howard B.B. and Upton M. : *Introduction to Business Finance,* New York: McGraw Hill, 1986.

Howard L.R.: *Working Capital its Management and Control,* London: MacDonald and Events Ltd., 1987.

Hilton, "Inventory Investment" in *Applied Macro Economics,* ed. By David Hathfield, 1976.

Harbans Lal Verma, *Management of Working Capital,* Deep and Deep Publication, New Delhi, 1989.

Jain Sugan C. : *Financial Management of Indian Industries,* Jaipur Prateeksha Publications, 1992.

J.F. Weston and E.F. Brigham, *Managerial Finance,* Holt, Rinehart and Winston, 4th Editon, 1972.

James C. Vanhorne, "A Risk-Return Analysis of a Firm's Working Capital Position," *The Engineering Economist,* Winter 1969, p.71-88.

Johnson R.W.: *Financial Management.* Boston Allyn and Bacon.

John Sagan, "Towards a Theory of Working Capital Management," *The Journal of Finance,* May 1955 pp. 121-129.

Joy D.M. : *Introduction to Financial Management,* Homewood: Illinois, Richard D. Irwin.

J.M. Warren and J.P. Shelton, "A Simultaneous Equation Approach to Financial Planning," *Journal of Finance,* Volume 26, December 1976, pp. 1123-1142.

Kennedy R.D. and McMullen S.Y.: *Financial Statements Forms Analysis and Interpretation.* Home Wood, Illinois Richard, Irwin.

Kent Reymond P. *Corporate Financial Management* Homewood Illinois : Rechard D. Irwin.

Khan M.Y. and Jain P.K. : *Financial Management* New Delhi, McGraw Hill.

Khera B.D.: Inventory Control, New Delhi, National Productivity Council.

Khan M.Y. : *Industrial Finance,* New Delhi McGraw Hill.

Kuchhal S.C. : *Financial Management, An Analytical and Conceptual Approach,* Allahabad : Chaitanya Publishing House.

Kulkarni P.V. : *Financial Management* Mumbai, Himalaya Publishing House.

K. Krishnamurthy, "Private Investment Behaviour in India : A Macro Time Series Study," *Arthaniti,* January 1964.

Kamta Prasad Singh, Anil Kumar Sinha and Subhas Chandra Singh, *Management of Working Capital in India,* Janaki Prakashan, New Delhi, 1986.

L. Loyd Metzler, "The Nature and Stability of Inventory Cycles," *Review of Economics and Statistics,* Vol. III, August 1941, pp. 113-129.

Mason Perry : *Cash Flow Analysis and Funds Settlement,* New York : American Institute of Certified Public Accounts.

Mehta Dileep R. *Working Capital Management,* Englewood Cliffs, New Jersey: Prentice Hall.

Mishra R.K. : *Problems of Working Capital,* Mumbai Somaiya Publications Pvt. Ltd.

Miller D.E.: *The Meaningful Interpretations of Financial Statements,* New York.

Mitchel W.E.: "Cash Forecastings – the Four Methods Compared" in Bari R.r. (ed) *Selected Readings in Cash Management.*

Mohan, Man and Goyal S.N. : *Principles of Management Accountancy,* Agra : Sahitya Bhawan.

Myres, John N. : *Financial Statements Analysis Principles and Techniques,* Englewood Cliffs, New Jersey : Prentice Hall.

Moses Abramovitz, *Inventories and Business Cycles – With Special Reference to Manufacturers' Inventories,* NBER, New York, 1950.

NCAER, *Structure of Working Capital,* New Delhi, 1966.

N.K. Agarwal, *Management of Working Capital,* Sterling Publication Pvt. Ltd. New Delhi, 1983.

Norgaard C.T. : *Management Accounting* Prentice Hall Inc.

N.C. Gupta, *Productivity, Investment and Import Substitution in Indian Industries (A Case Study of Non-Ferrous Metals),* Anmol Publications, New Delhi, 1987.

O. Donnel, John L and Goldberg Miltons S. : *Elements of Financial Administration,* New Delhi, Prentice Hall of India.

Orgler, Yair E.: *Cash Management Methods and Models,* Belmont : Wordsworth Publishing Company.

P.K. Ghosh and G.S. Gupta : *Fundamentals of Management Accounting* National Publishing House, New Delhi.

P.G. Darling and McLovell, "Factors Influencing Investments in Inventories," in the *Brookings Quarterly Econometric N Model of the U.S.,* J.S. Dusenberry *et al.,* eds. Chicago, 1965.

Pandey I.M. : *Financial Management,* New Delhi : Vikas Publishing House.

Paul Welter, "How to Calculate Savings Possible Through Reduction of Working Capital," *Financial Executive,* October 1970, pp. 50-58.

Parks Collin and Gladson John W.: Working Capital, New York, Macmillan Co.

P.V. George, "Inventory Behaviour and Efficacy of Credit Control." *Anvesak,* No.2, Vol.II, 1972, pp. 168-175.

R.J. Lambrix and S.S. Singhvi, "Managing the Working Capital Cycle," *Financial Executive,* June 1979.

R.A. Cohen and J.J. Pringle, "Steps Towards an Integration of Corporate Financial Theory," 1973 in K.V. Smith, *Readings on the Management of Working Capital,* West Publishing Company, USA, 1980.

Richard M. Goodwin, "Secular and Cyclical Aspects of the Multiplier and Accelerator", in *Income, Employment and Public Policy : Essays in Honour of Alvin H. Hanson,* Norton and Company: New York, 1948.

Ram Kumar Misra, *Problems of Working Capital (With Special Reference to Selected Public Undertakings in India),* Somaiya Publication Private Limited, Mumbai, 1975.

R.N. Agarwal, *Analysis of Profits, Investment and Financing Behaviour of Indian Automobile Manufacturing Industry,* Ph.D. Thesis, Delhi University, 1982.

S.K. Chakraborty, "Use of Operating Cycle Concept for Better Management of Working Capital," *The Economic and Political Weekly,* August, 1973, Vol.8, pp. M 69-M76.

S.K. Chakraborty, "Cash Working Capital Vs Balance Sheet Working Capital," *The Economic and Political Weekly,* March 1974, p. M11-22.

S.Krishnamurthy & D.U. Sastry, *Inventories in Indian Manufacturing,* Institute of Economic Growth Books Ltd., Mumbai, 1970; and *Investment and Financing in*

Corporate Sector in India, Tata McGraw Hill Publishing Company, New Delhi, 1975.

V. Appavadhanulu, "Working Capital and Choice of Techniques," *Indian Economic Journal,* July-Sept. 1971, Vol. XIX, pp. 34-41.

V.K. Sastry, *Dividends, Investment and External Financial Behaviour of the Corporate Sector in India,* Unpublished doctoral dissertation, University of Pennsylvania, 1966.

Vinod Prakash, *Manufacturers' Inventories in a Developing Economy,* Unpublished Ph.D. Thesis, MIT, Cambridge, 1970; and Industrialisation and Manufacturers' Inventories in India, IBRD, May 1973 (mimeo).

Reports, Journals, Bulletins and Periodicals:

Annual Reports of the various selected Cement Units

Tandon Committee Reports

The Hindu, Chennai

The Capital, Kolkatta

Management Accountants, India

The Journal of Industries and Trade

Chartered Accountant, New Delhi

Lok Udyog, New Delhi

Productivity, New Delhi

The Indian Economic Journal, Mumbai

The Indian Accounting Journal

Journal of Accounting & Finance

Accounting Review

Trading and P&L A/C Of ACC
(From 2003-04 to 2007-08)

Particulars	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**Particulars**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**
To Opening Stock						By Sales	246922	240001	260661	276006	295903
WIP	3552	3349	4695	3682	6380	Less Excise Duty	34027	34460	34362	37842	38266
Finished Goods	5352	6320	6449	4499	7046		212895	205541	226299	238164	257637
To Manufacturing expenses						By Closing Stock					
RM Consumed	77084	78993	80550	92556	97495	W/P	3349	4695	3682	6380	7868
Stores and spares consu.	2381	2197	1793	1901	1887	Finished Goods	6320	6449	4499	7046	6202
Power and Fuel	28655	27699	29966	35088	30912						
R&M	12146	9817	10108	11355	10834						
To GP	93395	88310	100919	102509	1171533						
	222564	216685	234480	251590	271707		222564	216685	234480	251590	271707
To Adm selling and districe	70543	74773	81415	85626	83867	By GP	93395	88310	100919	102509	117153
To finance exp	11829	11914	16245	16177	17018	By other income	5804	8472	13551	5860	7273
To Depreciation	7935	8551	10376	12451	14128	By net loss	-	-	-	5885	
To Profit Before tax	8892	1544	6434	-	9413						
	99199	96782	114470	114254	124426		99199	96782	114470	114254	124426

Source: Various annual reports of ACC Cement Company for the year 2003-04 to 2007-08

Trading and P&L A/C Of Gujarat Ambuja Cement
(From 2003-04 to 2007-08)

Particulars	2003-04	2004-05	2005-06	2006-07	2007-08	Particulars	2003-04	2004-05	2005-06	2006-07	2007-08
To Opening Stock						By Sales	92137.31	114553.04	125225.15	130249.82	144785.02
W/I	1896.33	3342.89	3368.24	640.51	2726.23	Less Excise Duty	12602.4	15813.42	19184.2	18542.11	17927.54
Finished Goods	499.61	1517.15	1356.72	2552.82	1757.91		79534.91	98739.62	106040.95	11177.71	126857.48
To Manufacturing expenses						By Closing Stock					
RM Consumed	2974.19	3036.29	3314.15	4236.4	5218.98	W/P	3342.89	3368.24	640.51	2642.82	3576.16
Stores and spares consu.	2824.9	3815.75	3659	4707.73	5360.32	Finished Goods	151789	1356.72	2552.82	1757.91	1902.31
Power and Fuel	23577.66	27393.52	24048.65	27858.21	29637.06						
R&M	9155.02	9315.98	10363.63	111696.45	13883.83						
To GP	43467.98	55040.26	63123.89	64416.32	73751.62						
	84395.69	103464.6	109234.28	116108.4	132336		8439.69	103464.58	109234.28	116108.44	132335.95
To Adm selling and district	17055.08	21809.81	27751.24	27489.61	28834.1	By GP	43467.98	55040.26	63123.89	64416.32	73751.62
To finance exp	6881.06	10776.22	10848.26	9871.04	13408.44	By other income	2133.91	2049.07	2830.43	30974.85	1480.38
To Depreciation	8116.39	10850.02	12295.84	12389.14	12929.73						
To Profit Before tax	13549.39	13653.28	15058.98	45641.38	20059.73						
	45601.89	57089.33	65954.32	95391.17	75232		45601.89	57089.33	65954.32	95391.17	75232

Source: Various annual reports of Gujarat Ambuja Cement Company for the year 2003-04 to 2007-08

Trading and P&L A/C Of India Cement Ltd.
(From 2003-04 to 2007-08)

Particulars	2003-04	2004-05	2005-06	2006-07	2007-08	Particulars	2003-04	2004-05	2005-06	2006-07	2007-08
To Opening Stock						By Sales	20419.6	22645.7	33691.6	35161.3	36046.7
WIP	860.2	1348.3	1887.4	1855.9	1712.9	Less Excise Duty	2210.5	2625.8	4774.8	5289.9	4623.1
Finished Goods	198.5	299.5	484.4	477.5	970.9		18209.2	20019.9	28916.7	29871.4	31423.6
To Manufacturing expenses						By Closing Stock					
RM Consumed	1835.0	2134.1	2759.3	3056.8	2939.3	WIP	1348.3	1887.4	1855.9	1712.9	1967.9
Stores and spares consu.	242.3	281.5	2759.3	3056.8	418.8	Finished Goods	299.5	484.4	477.5	970.9	797.4
Power and Fuel	5289.2	5763.4	8333.7	9181.0	8767.9						
R&M	1377.8	1016.2	729.4	506.2	512.7						
To GP	10054.0	11548.7	16710.6	17073.0	18866.5						
	19857.0	22391.7	31250.2	32555.2	34189.0		19857.0	22391.7	31250.2	32555.2	34189.0
To Adm selling and districe	6071.0	7141.4	10101.8	10113.0	10995.1	By GP	10054.0	11548.7	16710.6	17073.0	18866.5
To finance exp	1210.5	2122.3	3795.9	4260.4	4754.9	By other income	392.8	537.0	1104.3	330.2	237.5
To Depreciation	1101.7	1256.0	1740.4	1844.9	4754.9						
To Profit Before tax	2063.6	1565.8	2176.8	1185.0	1279.0						
	10446.7	12085.6	17814.9	17403.2	19104.0		10446.7	12085.6	17814.9	17403.2	19104.0

Source: Various annual reports of India Cement Ltd. for the year 2003-04 to 2007-08

Trading and P&L A/C Of Mangalam Cement Ltd.
(From 2003-04 to 2007-08)

Particulars	2003-04	2004-05	2005-06	2006-07	2007-08	Particulars	2003-04	2004-05	2005-06	2006-07	2007-08
To Opening Stock						By Sales	24449.9	21510.2	22656.7	27131.3	19826.1
WIP	865.2	479.6	548.6	671.0	510.7	Less Excise Duty	3996.4	3670.2	3867.3	4671.9	3174.0
Finished Goods	344.4	216.9	136.8	143.2	498.8		20453.5	17840.0	18789.4	22459.5	16652.1
To Manufacturing expenses						By Closing Stock					
RM Consumed	7392.8	7214.3	7373.5	8806.3	6509.7	WIP	479.6	548.6	671.0	503.6	697.6
Stores and spares consu.	707.1	482.6	681.3	648.7	680.0	Finished Goods	216.9	136.8	143.2	430.2	470.4
Power and Fuel	7768.9	7566.9	7087.3	9140.9	6872.6						
R&M	242.1	299.5	398.2	425.6	268.9						
To GP	3829.5	2265.6	3378.0	3557.4	2479.5						
	21150.0	18525.4	19603.7	23393.2	17820.2		21150.0	18525.4	19603.7	23393.2	17820.2
To Adm selling and district	1304.7	1471.5	1502.1	1587.5	1529.6	By GP	3829.5	2265.6	3378.0	3557.4	2479.5
To finance exp	2715.5	2694.8	2697.0	2560.6	1529.6	By other income	233.7	224.4	390.0	190.9	130.6
Depreciation	1178.5	1193.2	1189.1	1162.3	852.1	By net loss	1135.1	2869.5	162.3	1562.1	2008.4
	5198.3	5359.5	5388.2	5310.4	4618.6		5198.3	5359.5	5388.2	5310.4	4618.6

Source: Various annual reports of Mangalam Cement Ltd. for the year 2003-04 to 2007-08