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Working Capital Management of Fertilizer Industry of Gujarat

**A Thesis
Submitted to The
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For the Degree of
Doctor of Philosophy in Commerce**

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Statement of Declaration

I the undersigned Mr. Virendra C. Jani, a student of Doctor of Philosophy, Department of Business Management, Saurashtra University, Rajkot, hereby acknowledge that the work in this thesis is my own endeavor and that the work being supervised by Dr. Hitesh J. Shukla, Associate Professor, Department of business Management, Saurashtra university, Rajkot.

I acknowledge that the thesis has not been in any case submitted for any other degree or diploma award.

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This is to certify that Mr.Virendra C. Jani has carried out this work as present in this thesis under my supervision and guidance and that the presentation is his work.

Further that the work embodied in this presentation has not been previously submitted to any institution for any degree or diploma award.

Dr.Hitesh J.Shukla

PREFACE

Liquidity and profitability are the two aspects of paramount importance in a business. Liquidity depends on the profitability of business activities and profitability is hard to achieve without sufficient liquid resources. Both the aspects are closely inter related. Working capital is the warm blood passing through the arteries and veins of the business and sets it ticking. Even giants tumble like pack of cards through the drying up of working capital reservoirs. Working capital, like many other financial and accounting terms have been used by different people in different senses. One school of thought believes as all capital resources available to a business organizations from shareholders, bondholders and creditors "works" up in the business activities to generate revenues and facilitate future expansion and growth, they are to be considered as 'working capital'. Another school of thought link, 'working capital' with current assets and current liabilities. According to them, the excess of current assets over current liabilities is to be rightly considered as the 'working capital' of a business organization. Before providing the act definition of working capital needed for our discussion in this chapter, let us analyses a few more definitions available on working capital. Hoagland defines working capital as, "working capital" descriptive of that capital which is not fixed. But, the more common use of working capital is to consider it as the difference between the book value of the current assets and the current liabilities. Gerestenberg defines working capital as, "Circulating capital means current assets of a company that are changed in the ordinary course of business from one form to another as for example, from cash to inventories, inventories to receivables and receivables to cash." According to Shubin, "The amount of funds necessary to cover the cost of operating the enterprise. Working capital in a going concern is a revolving fund, it consists of cash receipts form sales which are used to cover the cost of current operations." Circulations of blood are essential in the human body for maintaining life similarly working capital is the lifeblood of a business. It is very essential to maintain the smooth running of a business. Even a fully equipped manufacturing firm is sure to collapse without an adequate supply of raw material to

process, cash to meet the wage bill, the capacity to wait for the market for its finished product and the ability to grant credit to its customers.

The fertilizer industry in India has grown tremendously in the last 30 years. The Government is keen to see that fertilizer reaches the farmers in the remote and hilly areas. It has been decided to decontrol the prices, distribution and movement of phosphatic and potassic fertilizers. Steps have been taken to ensure an increase in the supply of non-chemical fertilizers at reasonable prices. There are 53 fertilizer quality control laboratories in the country. Since bio-fertilizers are regarded as an effective, cheap and renewable supplement to chemical fertilizers, the Government is implementing a National Project on Development and Use of Bio-fertilizers. Under this scheme, one national and six regional centers for organizing training, demonstrating programs and quality testing of bio-fertilizers has been taken up. India today is the third largest producer of nitrogenous fertilizers in the world. There are at present 63 fertilizers units manufacturing a wide range of nitrogenous and complex fertilizers, including 38 units producing urea and 9 units producing ammonium sulphate as a by-product. Besides, there are about 79 units producing single superphosphate. In the industry having different dimensional importance, the main problem under the study is to check short term financial position, to analyze and comparative study after classification. The heading of the research study is, "Working Capital Management of Fertilizer Industry of Gujarat." The samples of the study are the units working in the state i.e. Gujarat Narada Valley Fertilizers Company, Gujarat State Fertilizers Corporation, Liberty Phosphate Ltd., and Indian Farmers Fertilizers Company. Two hypotheses will be used in this study. One, hypothesis based on Chi-square test is to understand interplant working capital direction and growth / efficiency. The statement of null hypothesis is, "The working capital indices of the sample units can be represented by the straight line trend based on the lest square method." The other null hypothesis to be tested is based on Kruskal Wallis one way analysis of variance test. It has been tested to see whether there is any significant difference between working capital ratios of the sample units. The statement of null hypothesis is, "There is no significant difference between the working capital of the sample units." The acceptance of the said hypothesis would reveal that the working

capital of various sample units is approximately equal. The whole work is divided into nine chapters.

The work has been completed under the able guidance and supervision of Dr. Hitesh J. Shukla, Associate Professor, Department of Business Management, Saurashtra University, Rajkot worlds are fall short to express my sense of sincere and deep gratitude and indebt ness to him for his large heartedness as he permitted me to work under his supervision. I thank him for his encouragement and inspirations. I also thank Dr. Pratapsinh Chauhan, Professor and Head, Department of Business Management, Saurashtra University, Rajkot for his all round support and co-operation in completing this study. I would be failing my duty if I don't express my indebtness to Prof. D.C.Gohil for her encouragement. I thank Dr. S.J. Bhayani, Dr.G.C.Bhimani, Ms. N.P.Shah, Dr.S.J.Parmar for their assistance.

It is a matter of great pleasure for me to acknowledge indebt ness to all my staff members especially to Ms. P.S. Shukla, Dr. .J. H. Patel, Prof. D. M. Shah, D.B. Patel, D.R. Jani, R.P. Shah and all my friends working with me for their motivation. I thank Ravi Achariya and Parag Thaker for providing their services for typing this work.

I am sure that it is because of the blessing and encouragement of my mother and other family members that the work could see the light of the day. I thank Prof. S. R Dave, former Vice Chancellor, Saurashtra University, (Principal S.S.P Jain College, Dhrangadhra) is a source of inspiration forever. He constantly offered insight and direction, often serving as a sounding board for revisions and new ideas. I am also grateful to my wife Nita as well as my son Mitul for injecting joy into tense moment of the work with their vivacious ways.

Virendra C.Jani

Working Capital Management of Fertilizer Industry of Gujarat

Contents

Chapter 1

Working Capital Management

Contents

1. Introduction and Meaning of Working Capital:

No one can ignore the necessity of funds in a business unit either a retail shop or a large manufacturing unit. Money is the only common factor in all units. Thus money management is must that is commonly known as financial management. Proper management of invested funds in a business results in effective financial management. Each and every business unit needs funds for two purposes (I) For establishment and (II) to carry out its day to day operations. Long term funds are required to facilitate production through purchase of fixed assets such as plant and machinery, land and building, furniture etc. and also for diversification and expansion of business, renovation or modernization of plant and machinery and research and development. The part of firms capital which is blocked on a permanent or fixed basis and is called fixed capital. Funds are also needed for short term purposes for the purchase of raw materials, payment of wages and for meeting routine expenses. All the goods which are manufactured in a given time period may not be sold in that period. Hence, some goods remain in stock, e.g. raw material, semi finished goods and finished marketable goods. These funds are known as working capital. In simple words working capital refers to that part of the firm's capital which is required for financing short or current assets such as each marketable securities debtors and inventories. In other words we can say it refers to all aspects of current assets and current liabilities. The management of a working capital is no less important than the management of long term financial investment.

Definitions:
Working capital, like many other financial and accounting terms have been used by different people in different senses. One school of thought believes as all capital

resources available to a business organizations from shareholders, bondholders and creditors "works" up in the business activities to generate revenues and facilitate future expansion and growth, they are to be considered as 'working capital'. Another school of thought link, 'working capital' with current assets and current liabilities. According to them, the excess of current assets over current liabilities is to be rightly considered as the 'working capital' of a business organization. Before providing the act definition of working capital needed for our discussion in this chapter, let us analyses a few more definitions available on working capital. Hoagland defines working capital as, "working capital" s descriptive of that capital which is not fixed. But, the more common use of working capital is to consider it as the difference between the book value of the current assets and the current liabilities. Gerestenberg defines working capital as, "Circulating capital means current assets of a company that are changed in the ordinary course of business from one form to another as for example, from cash to inventories, inventories to receivables and receivables to cash." According to Shubin, "The amount of funds necessary to cover the cost of operating the enterprise. Working capital in a going concern is a revolving fund, it consists of cash receipts form sales which are used to cover the cost of current operations." Working capital defined by The Accounting Principles Board of the American Institute of Certified Public Accountants is as under, "working capital" represented by the excess of current assets over current liabilities and identifies the relatively liquid portion of the total enterprise. Capital which constitutes a margin or buffer for maturing obligations within the ordinary operating cycle of the business."

2. Significance of Adequate Working Capital

Circulations of blood are essential in the human body for maintaining life similarly working capital is the lifeblood of a business. It is very essential to maintain the smooth running of a business. Even a fully equipped manufacturing firm is sure to collapse without an adequate supply of raw material to process, cash to meet the wage bill, the capacity to wait for the market for its finished product and the ability to grant credit to its

customers. The main advantages of maintaining adequate amount of working capital are as follows :

- Solvency of Business: Solvency of the business can be maintained by regular and constant production process. An adequate working capital makes it possible.

- Regular Supply of Raw Material: Sufficient working capital provides uninterrupted flow of production by regular supply of raw materials and continuous production.

- Regular payment of day - to – day commitments: Regular payments of salaries, wages and other day-to-day commitments which raises the moral of its employers, increases their efficiency, reduces wastages and costs and enhances production and profits and result of ample working capital.

- Exploitation of Favorable Market Conditions: Favorable market conditions such as purchase in bulk when the prices are lower and by holding its inventories for higher prices is possible only if adequate working capital is available.

- Goodwill: Sufficient working capital enables firm to make prompt payment and it increases the firm's credit or say goodwill.

- Easy Loans: Solvency and good credit standing of the firm enables it to get easy debt money on favorable terms.

- Ability to face crisis: Adequate working capital enables the firm to maintain its prompt position in critical situation.

1997, Management Accounting, L.N.Chopde, D.H. Choudhari, Bharat Parikh, Bharat Patel, Vivek S. Kajarekar, Ashok Dhinreja, Sheth Publishers, Mumbai

- Quick and Regular Return on Investment: Quick and regular return on investments receives the confidence of its investors and crates favorable market to raise additional funds in future. It is possible only by sufficient working capital.

- High Morale: Adequacy of working capital creates an environment of security, confidence, high morale and creates overall efficiency in a business.

3.   Disadvantages of inadequate Working Capital:

Deficiency or excess of nutrients causes deceases. Inadequate working capital is dangerous sign for the existence of the firm. It should have neither redundant not short working capital. Both position are bad for the firm. However, from the point of firms' view, the inadequacy of working capital is more dangerous. Disadvantages of Excessive Working Capital

- Excessive working capital means motionless funds which can not result in profit or in earning on investments.
- Redundant working capital may drag to unnecessary purchase and accumulation of inventories.
- Redundant working capital may create wrong impression and in defective credit policy which may causes higher incidence of bad debts.
- Overall inefficiency in the organization may be the only outcome.
- The excessive working capital may draw to speculative transactions.
- Due to low rate of return on investments, the value of shares may also fall.

Disadvantages of Short Working Capital

- Irregularity or late payment in short term liabilities results in lose of reputation and also makes firm unable to get good credit facilities.
- Regular supply of material can not be maintained due to inadequate working capital. This affects the whole production cycle.

- It can not buy its requirements in bulk and can not avail of discounts.
- It can not undertake profitable projects due to lack of working capital.
- It becomes difficult to pay day to day expenses of firm's operations and it creates inefficiency, increases cost and reduces the profits of the business.
- The rate of return on investments also falls with the shortage of working capital.

4. Components of working capital:

Working Capital is made of two components i.e. current assets and current liabilities. Let's check the items comprised in current assets and current liabilities. Current Assets are made of Cash, Account Receivables, Inventory, Marketable Securities. They are describes as:

- Cash: Cash is a basic need to start any business. Initially cash is required to procure fixed assets like plants machinery which enables a firm to produce products and generate cash by selling them. Cash is also required as a working capital that is require, as firms have to store certain quantity of raw materials and finished goods and also for providing credit terms to the customers.

- Accounts Receivable: Credit sales add in the total amount of sales of a business, as it is a competitive pressure forces most firms to offer credit. Selling goods or providing services on credit basis leads to accounts receivable. When credit is allowed to the customers in turn the business unit expects credit from its suppliers to match its investment in credit extended to consumers. The granting of credit from one business firm to another for purchase of goods and services is popularly known as trade credit.

- Inventories: Inventories consist of raw materials, stores, supplies, spares, work-in-progress and finished goods. Men using machines and tools convert the materials into finished goods. The success of any business goods. The success of any business unit depends on the extent to which these are efficiently managed. Inventory consists a good portion of working capital in manufacturing organization.

- Marketable Securities: Marketable securities are treated as cash in analysis of current assets although its convertibility is not so that it can be converted to cash at a very short notice. Excess cash is normally invested in marketable securities, which serves two purposes namely, provide liquidity and also earn a return.

Current Liabilities are made of goods purchased on credit, expenses incurred in the course of the business of the organization (e.g. wages or salarie3s, rent, electricity bills, interest etc.)which are not yet paid for) temporary or short tem borrowings from banks, financial institutions or other parties, advances received from parties against goods to be sold or delivered, or as short term deposits, other liabilities such as tax and dividends payable.

The above components of current liabilities are used to meet the need for funds to finance the current assets. It means the amount of needed current assets may be met from supply of goods on credit, and deferment on account of custom usage or arrangement of payment for expenses. The short term borrowing from banks fills in the balancing amount of needed working capital.

5. Classification of Working Capital: working capital can be classified on the following bases:

- **On the basis of concept:**
There are two concepts of working capital, namely
- Gross Concept
- Net Concept

- **Gross Working Capital:** According to this concept the term working capital refers to the gross working capital and represents the firm's investments in current assets. In gross concept of working capital current liabilities are not considered to be deducted from the current assets. Thus, the gross working capital is capital invested in

total current assets of the enterprise. In the ordinary course of business current assets are those assets that can be converted into cash within a short period of one accounting year. Constituents of Current Assets includes: cash in hand and cash in bank, sundry debtors (less provision for bad debts), bills receivables, short term loans and advances, inventories of stock as: raw materials, work in progress, stores and spares, finished goods, temporary investments of surplus funds.

1. Prepaid expenses
2. Accrued incomes

The proponents of the gross working capital concept advocate this for the following reasons:

- It enables the enterprise to provide current amount of working capital at the right time.
- An increase in the overall investment in the enterprise also brings about an increase in the working capital.
- Management is more concerned in the total current assets with which it has to operate then the sources from where it is made available.
- This concept is more useful in determining the rate of return on investments in working capital.

- **Net Working Capital:** The net working capital refers to the difference between current assets and current liabilities.

Net Working Capital = Current Assets – Current Liabilities

Current liabilities are those claims of outsiders which are expected to mature for payment within an accounting year. Net working capital can be positive or negative. When the current assets exceed the current liabilities the working capital is positive and negative working capital results when the current liabilities are more then current assets.

Constituents of Current Liabilities:

1.   Bills payable

2.   Sundry Creditors

3.   Accrued expenses

4.   Short tem loans, advances and deposits

5.   Dividends payable

6.   Bank overdraft

7.   Provision for taxation, if it does not amount to appropriation of profits.

The net working capital concept however, it also important for the following reasons:

-         Seeing the net working capital of the firm creditors and investors judge the financial soundness of the enterprise.

-         It is a qualitative concept which indicates the firm's ability to meet its operating expenses and short term liabilities.

-         It suggests the need for financing a part of the working capital requirements out of permanents sources of funds.

-         It helps to ascertain the current comparative financial position of companies having the same amount of current assets.

Both the concepts have operational significance for the management and there for neither can be ignored. While the net concept of working capital emphasizes the qualitative aspects, the gross concept underscores the quantitative aspect.

6. Distinguish between Gross Working Capital and Net Working Capital:

Gross working capital and net working capital are quantitative concepts that differ from each other in various respects. The distinguishing points are as follows.

-         Gross working capital is total current assets and net working capital is excess of current assets over current liabilities.

-         Gross working capital is a quantitative concept while net working capital is a qualitative concept.

- Gross working capital indicates the quantum of working capital available to meet current liabilities while net working capital is the portion of current assets which is financed by long term funds.

- Gross working capital is the current liabilities of the business can not be used to indicate the changes in working capital while net working capital being the difference of current assets and current liabilities is widely used in measuring the changes in the financial position of any business.

- The strength of current position of business unit is to be indicated by gross working capital while the index of solvency and liquidity of the business is considered by net working capital.

- Gross working capital can be measured by resorting to borrowings whole net working capital can not be easily measured except by profitable business operations over a considerable number of accounting periods.

Classification of Working Capital on the basis of Time:

On the basis of time working capital may be classified as

▪   Fixed working capital

▪   Fluctuating working capital

▪   Fixed working capital: Fixed working capital is the minimum amount that is needed to maintain the circulation of current assets and for ensuring effective utilization of fixed facilities. There is continuously required a minimum level of current assets by the business unit to over come its normal or regular transactions. e.g. Every firm has to maintain a minimum level of production and it concerned with maintaining a minimum level of raw material, work-in-progress, finished goods and cash balance. And this is what we call a fixed, regular or permanent working capital. A part of a capital that continuously remains in a business unit as current assets simply known as a fixed working capital. Permanently fixed working capital can further be classified as regular working capital and reserve working capital which complete an operating cycle i.e. circulation of current assets from cash to inventories from inventories to receivables and from receivables to cash and so on reserve working capital is the excess amount over the requirement for regular working capital

which may be provided for contingencies that may arise at unstated periods such as strikes, rise in prices, depression etc.

▪ Fluctuating working capital: Change in production and sales create the need of working capital over and above the permanent working capital which is termed as temporary, variable or fluctuating working capital. Fluctuating working capital may be required due to change in seasonal demand or some special exigencies. Variable working capital, thus, can be classified as seasonal working capital and special working capital. Most of business units have to provide additional working capital to meet the seasonal and special needs. The essential capital required to meet the seasonal need is called seasonal working capital. And similarly the essential capital required to meet the special need is called special working capital. Special working capital is that part of working capital which is required to meet special exigencies such as launching of extensive marketing campaigns for conducting research, etc. Fluctuating working capital differs from fixed working capital as fluctuating working capital is not permanent requirement of a business unit but a short period requirement. Figures given bellow illustrate the difference ting concept of fixed and fluctuating working capital.
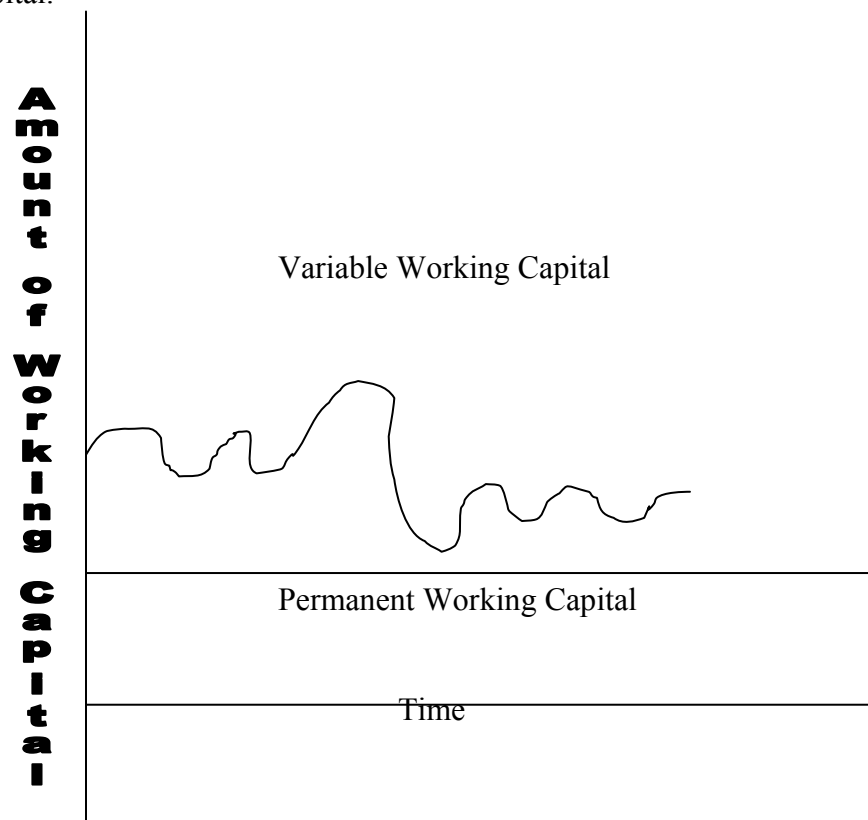
In the above figure a horizontal straight time of fixed working capital shows that it remains unaffected by seasonal variations in production or sales and does not feel the impact of business cycles. While fluctuating working capital is changing sometimes increasing and sometimes decreasing.

Permanent Working Capital
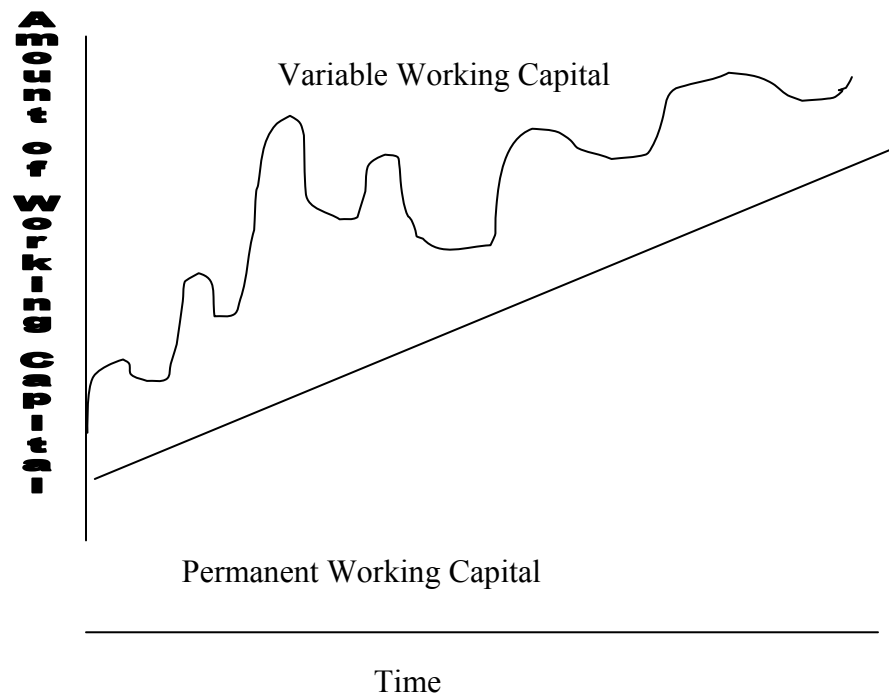
Time

(Source: Sharma R.K. and Gupta S.K. Management Account, Kalyani Publishers: New Delhi, 2000)

In the above figure fixed working capital is also increasing as shown by upward slopping curve, with passage of time due to expansion of business or increase in sales, etc. but even then it does not fluctuate as variable working capital which sometimes increases and sometimes decreases.

Distinguish between fixed working capital and fluctuating working capital:

Fixed and fluctuating working capital is bases on the time factor and is more useful compared to quantitative basis classification. Fixed and fluctuating working capital differ from each other in various respects which are as follows:

- Fixed working capital remains permanently in the business while fluctuating working capital disappears from the business once the purpose is served.
- The requirement of the fixed working capital remains as long as the business exists as a going concern.
- The fixed working capital is the quantum of funds required permanently while fluctuating working capital is circulating working capital required for unregular expenses.
- The need of fixed working capital increases with the growth of business. While the change in fluctuating working capital is not necessarily related with the growth of business.

KINDS OF WORKING CAP

Time Basis			
	Quantitative Basis	Gross Working	Net Working Capital
	Permanent W. C.	Initial Working	Regular
	Temporary W. C,	Seasonal W. C.	Special W. C.
	Measurement Basis	Positive W. C,	Negative W. C.
	Accounting Basis	Cash W. C.	Net W.C.

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7. Kinds of Working Capital

KINDS OF WORKING CAPITAL

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                        KINDS OF WORKING CAPITAL
                                  |
          ┌───────────────────────┴───────────────────────────┐
  On The Basis of Concept                              On the Basis of Time
          |                                                    |
    ┌─────┴─────┐                                        ┌──────┴──────┐
 Gross Net    Net W.C.          ┌──────────────────── Fixed W.C.   Fluctuating W.C.
                                |                                        |
                          ┌─────┴─────┐                           ┌──────┴──────┐
                    Regular W.C.   Reserve W.C.              Seasonal  W.C.   Special W.C.
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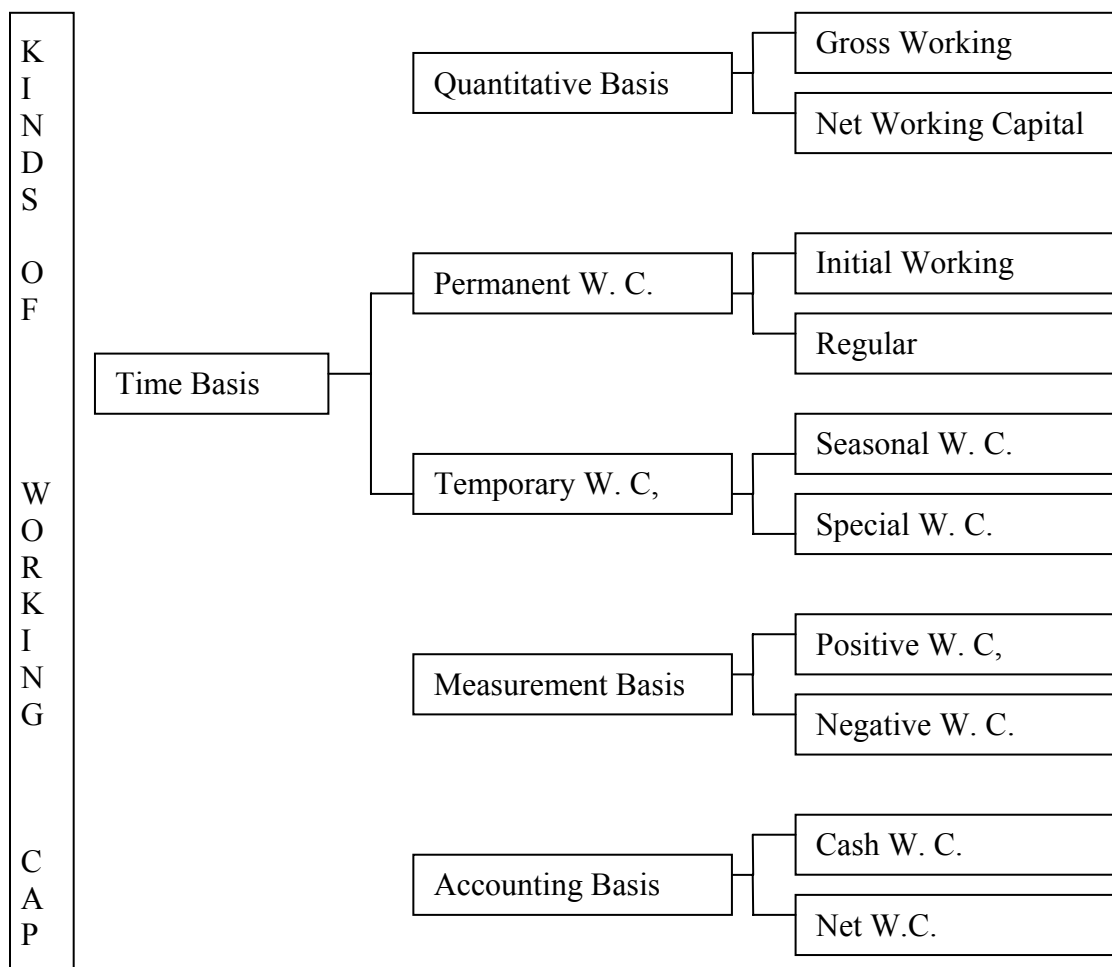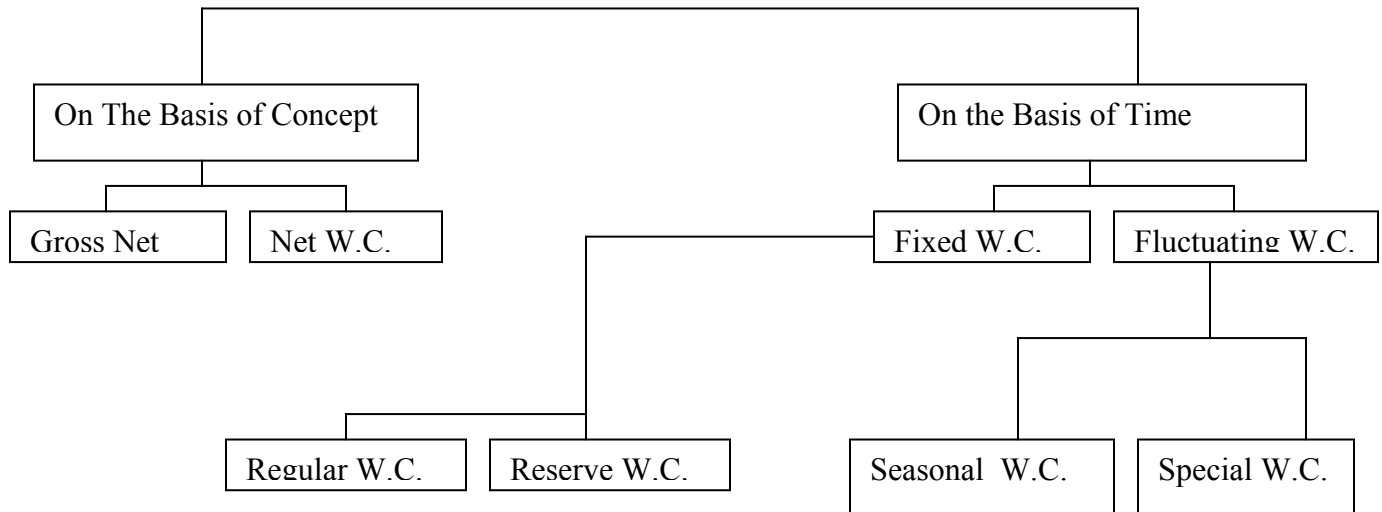
8. Object of Working Capital:

The need of working capital can not be ignored as well as over emphasized. Working capital is a need of every business unit. The need of working capital comes into existence due to the time gap between production and realization of cash from sales and it is known as operating cycle. There are time gape between purchase of inventory items and production, production and sales and sales it's conversion into cash. Thus, working capital is needed to fulfill the following objects :

- For the purchase of inventories, components and spares.
- To overcome day-to-day expenses and overheads cost such as fuel, power or electricity, office expenses.
- To pay wages and salaries to the employees.
- To provide the credit facilities to the customers.
- To meet the selling expenses i.e. packing, advertising, etc.
- For maintaining sufficient stock of raw material, work-in-process, stores and spares and finished goods. These are the objects, which can be fulfilled by ready cash i.e. working capital. The amount of working capital defers with

change in circumstances in the same enterprise as well as it defers from firm to firm. For determining the amount of working capital in a business. One has to study the business under varying circumstances such as a newly started business a growing business and a matured business. A newly invented business requires more working capital to attain the initial expenses like promotion, production, advertisement etc. at the same time the amount of these preliminary expenses depends on the size and type of business. The amount of needed working capital increases with increasing growth and expansion of business till it attains maturity. At maturity the amount of working capital needed is called normal working capital. There are many other factors, which influence the need of working capital in a business.

9. Determinants of Working Capital Needs:

There are large number of factors upon which the working capital need of a concern depends such as size a nature of a firm, operations done by the firm, length of production cycles, stock turnover rate, change in economic circumstances etc. We can't rank the above factors as each of them has different importance and influence. However the following factors are considered important when the working capital needs are determined.

- Nature of Business: The working capital needs are basically influenced by the nature of the business. Trading and financial firms require a working capital in large amount as they have to carry large stocks of a variety of merchandise to satisfy their customer's varied demand. Such firms have low investment in fixed assets. On the other hand public utilities like electricity, water supply and railways require a large amount invented in fixed assets. Their working capital needs are nominal because they offer cash sales only and supply services, not products, and as such no funds are tied up in inventories and receivables. The manufacturing units also require sizable working capital along with fixed investments.

- Size of Business: Size of the business directly affects the working capital requirements. Greater the size of a business unit generally large will be the requirements of working capital. Actually size may be measured in terms of the scale of operations. A firm with larger scale of operations will need more working capital than a small firm. However, in some cases even a smaller concern may need more working capital due to high overhead charges, inefficient use of available resources and other economic disadvantages of small size.

- Manufacturing Cycle: Needs of working capital is in direct proportion to length of manufacturing cycle i.e. longer the process period of manufacture, large is the amount of working capital needs. The longer manufacturing time blocks money in purchase of raw material and other suppliers, labor and service costs for long period before the finished product is finally obtained.

- Production Policy: The needs of working capital depends upon the production policy followed by the business unit. If a firm follows steady production policy, even when demand is seasonal by accumulating inventories during stock period with a view to meet high demand during the peak season it will require higher working capital. Even a firm may adopt the policy of varying its production schedule in accordance with the changes in demand. Thus, production policies may differ from firm to firm, depending upon the circumstances. According, the need for working capital will also vary.

- Working Capital Cycle: The time between purchase of inventory items and their conversion into cash is known as working capital cycle.

Operating cycle of a manufacturing unit
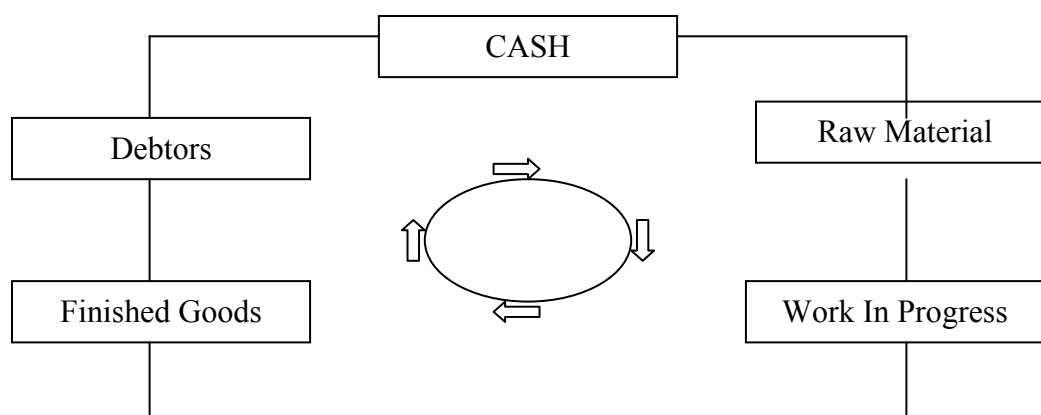
At the initial stage of the unit the operating cycle starts with the purchase of raw materials a stores, it is converted into stock of finished goods through work-in-progress with increment of labor and service costs, finished goods converts into sales debtors and receivables and ultimately cash is realized and thus cycle continue till the existence of the unit. The speed with which the working capital completes one cycle determines the requirement of working capital longer the period of the cycle larger is the needs of working capital.

- Seasonal Variations: The certain industries availability of raw material is seasonal and can not be obtained through out the year/ in such a situation it becomes must to buy raw material in bulk to ensure the constant production during the entire year. Thus, a large amount remains block in the form of raw material and it gives size to more working capital needs generally, during the busy season, a firm. Requires larger, working capital than in the stack season.

- Credit terms: The credit terms followed by the firm in dealing with its creditors and debtors considerably affects its working capital needs. If a firm enjoys a credit from its creditors and doesn't allow credit tot its customers, it requires less working capital than the firm purchases its inventories on cash and allow credit to its customers. Even in a small business unit requirement of working capital may be larger due to the credit policy followed by it.

- Rate of Stock Turnover: Another influencing and important factor deciding the requirement of working capital in a firm is rate of stock turnover. Due to high rate of stock turnover sales gets easily converted into cash and ultimately the length of operating cycle decreases or say operating cycle moves fast and it results into less requirements of working capital. In the opposite situation the effect will be inverse i.e. law rate will be inverse i.e. law rate of stock turnover increases the length of operating cycle and more working capital is needed.

- Rate of Growth of Business: As a company grows, logically, larger amount of working capital will needed, though it is difficult to state any firm rules regarding the relationship between growth in the volume of a firms business and its working capital needs. However, it is true that the relation between rate of growth capital needs can not be stated in a particular number, at the same time it can't be ignored that they are related in direct proportion with each other.

- Earning Capacity and Dividend policy: The earning capacity differs from firm to firm as the quality of their products is different and the conditions like monopoly also affect it. Firms with high earning capacity receive cash profit that adds to the working capital amount. The dividend policy followed by the unit also affects the needs of working capital. A firm requires more working capital when rate of cash dividend irrespective of its generation of profits. While a firm that retains larger part of its profits and does not pay so high rate of cash dividend requires less working capital.

- Price Level Changes: Generally rising price level needs a higher investment in working capital. With rising prices the same legel of current assets need enhanced investment. Rising prices affects differently in different firms due to variations in individual policies. However firm, which can immediately revise prices of their products upwards, may not face a serve working capital problem in periods of rising levels.

- Business Fluctuations: Business fluctuations refer to alternate expansion and contraction in general economic activities. In boom period, an upward swing in the economy leads to increased sales, resulting in an increase in the firms' investment in inventory and receivables or book debts. On the other hand during depression, a decline in the economy may register a fall in sales and consequently, a fall in the levels of stocks and book debts.

▪   Other Factors: Certain other factors such as operating efficiency, management ability, irregular supply, import policy, assets structure, importance of labor, banking facilities etc also affects the working capital needs of a business.

10. Management of Working Capital:

Working capital is closely related with day-to-day operations of a business. Thus, the management of working capital becomes compulsory. In general practice it refers to the excess of current assets over current liabilities. Working capital management therefore, deals with the problems which occur to mange the current assets, current liabilities and the inter relationship exists between them. In short it refers to the administration of both current assets and current liabilities. A satisfactory level of working capital is to be maintained is the basic goal of working capital management because both the situation is bad for a business unit i.e. inadequate working capital and excessive working capital. Inadequate working capital may lead the firm to insolvency and excessive working capital implies idle funds which earn more profits for the business. working capital management policies of a firm have a great effect on its profitability, liquidity and structure heath of the organization. In this context, working capital management is three dimensional in nature.
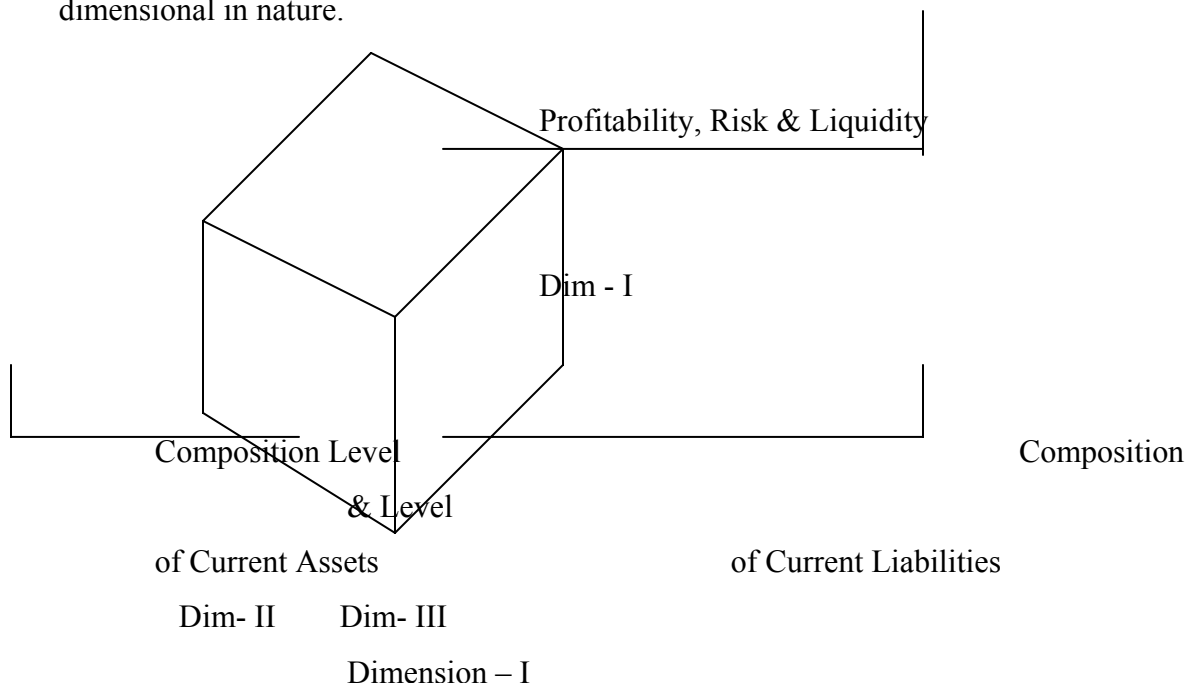
Profitability, Risk & Liquidity

Dim - I

Composition Level

& Level

Composition

of Current Assets

of Current Liabilities

Dim- II   Dim- III

Dimension – I

The formulation of policies with regard to profitability, risk and liquidity.

Dimension – II The decisions about the composition and level of current assets.

Dimension – III The decision about the composition and level of current liabilities.

11. Principles of Working Capital Management:

The following are the general principles of a   sound working capital management policy.
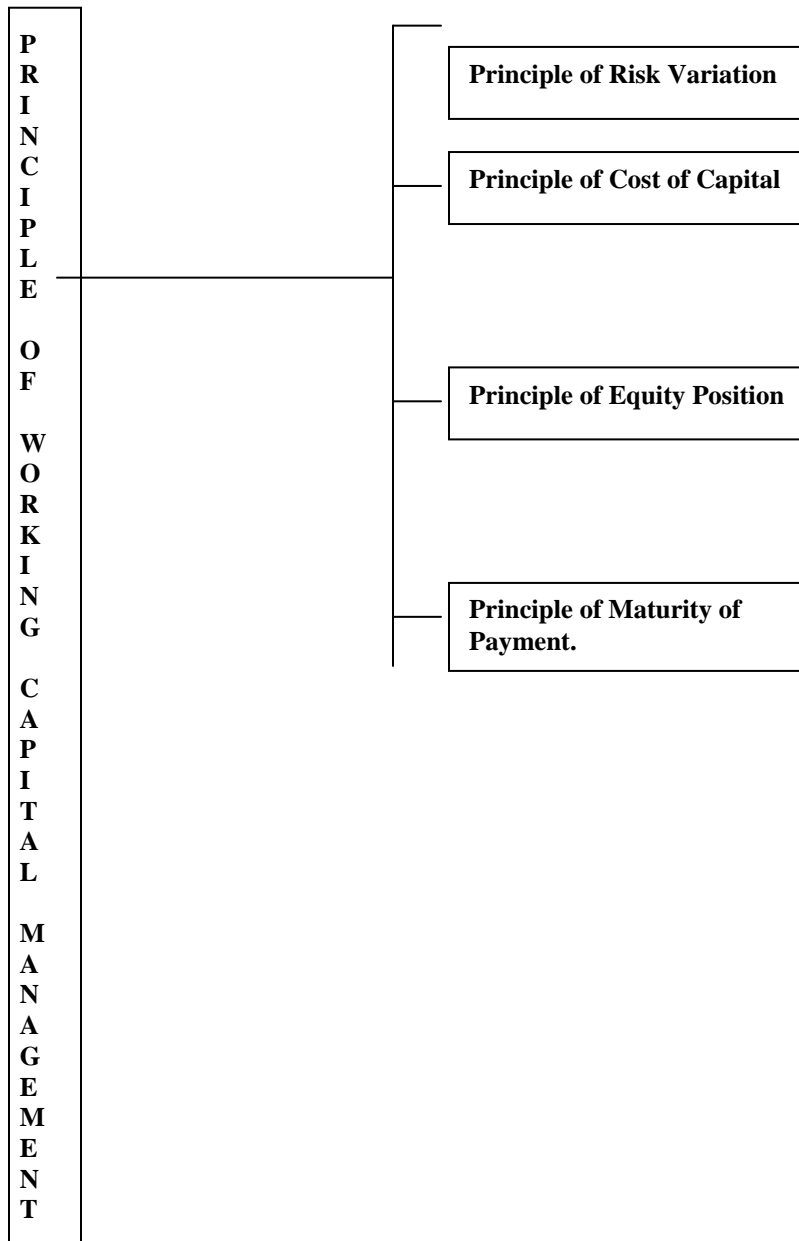
```
P
R                              ┌──  ┌──────────────────────────┐
I                              │    │ Principle of Risk Variation │
N                              │    └──────────────────────────┘
C                              │
I                              │    ┌──────────────────────────┐
P                              ├──  │ Principle of Cost of Capital │
L                              │    └──────────────────────────┘
E                              │
                               │    ┌──────────────────────────┐
O                              ├──  │ Principle of Equity Position │
F                              │    └──────────────────────────┘
                               │
W                              │    ┌──────────────────────────┐
O                              └──  │ Principle of Maturity of   │
R                                   │ Payment.                   │
K                                   └──────────────────────────┘
I
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Principle of Risk Variation: When a firm is enable to meet its obligations as and when they become due for payment is termed as a risk. When the current assets are made up of long term investment it increases liquidity, reduces dependence on short-term borrowings, reduces risk and thereby decreases the opportunity for gain and loss. On there hand if it is made up of short term barrowings, reduces liquidity, increases the dependence increases risk and profitability. It means, there is a definite inverse relationship between the degree of risk and profitability. A conservative management prefers minimum risk with less profitability while a liberal management go with high degree risk and wants high profit. However, the goal of the management should be to establish a suitable trade off between profitability and risk.
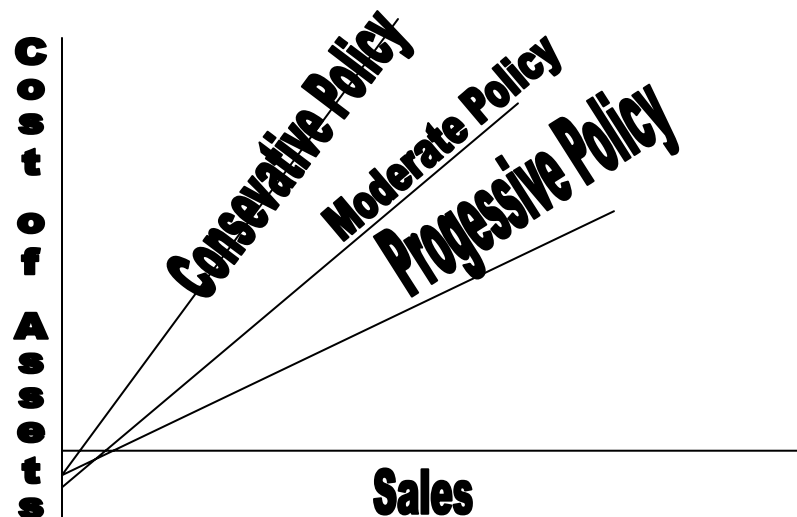
The various working capital policies indicating the relationship between current assets and sales are depicted back.

- **Principle of Cost of Capital:** The sources of working capital have different cost with changing degree of risk involved. A sound working capital management should always try to achieve a proper balance between cost and risk. Generally lower the risk higher is the cost and higher the risk lower is the cost.

- **Principle of Equity Position:** The principle deals with defining the amount of working capital out of the total investment. According to this principle every rupee invested in the current assets should contribute to the net worth of the firm. The level of current assets may be measured with the help of law ratios:
  - (1) Current assets as a percentage of total sales and
  - (2) Current assets as a percentage of total assets.

- **Principle of Maturity of Payment:** The principle deals with the ability of a firm to meet the current liabilities. According to this principle, a firm attempts to pay matured liabilities from internal funds. Generally, shorter the maturity schedule of current liabilities in relation to expected each inflows the greater the inability to meet the obligations in time.

12. Functions of Working Capital Management:

Working capital management is an integral part of financial management as well as overall corporate management." We need to know when to look for working capital funds, how to use them and how to measure, plan and control them."

According to this statement a firm willing to achieve a good management of working capital, the

financial manager has to perform the following basic functions:

- Forecasting the need of working capital
- Sources of working capital
- Analysis and control of working capital

▪ Forecasting the need of working capital:

"Working capital is the life-blood and controlling nerve center of a business." It is impossible to run a business successfully without an adequate amount of working capital and it is also not possible to run a business successfully with a shortage of working capital. To avoid both the situations arrangements can be made to procure adequate working capital. But the estimation of working capital is not an easy task and there are many factors to be faced. With an example we can get an idea. Of complexity in forecasting the working capital need.

Methods of forecasting the need of Working Capital: There are two methods for forecasting the need of working capital i.e. conventional Method and operating cycle method. In conventional method greater emphasis is laid down on liquidity of a business and cash inflows and outflows are matched with each other. While operating cycle method is more dynamic as working capital is decided on the basis of length of the operating cycles.

Following aspects are considered while forecasting the need of working capital:

▪ Level of Activity: Level of activity is an important aspect while estimating working capital needs. This estimation is normally based on past experience, installed and utilized capacity of the factory and likely demand.

- Raw Materials: Raw materials consist a good portion of working capital which can be estimated based on the level of activity. Besides the length of production cycle i.e. time period during which material gets converted into produced goods is also to be considered. And storage expenses are also added with the same.

- Labour and Overheads: Method for the payment of wages i.e. daily payment, weekly payment or monthly payment and of overhead expenses decide on the working capital need of a business.

- Work – in – Progress: The period of process is an important aspect as longer the processing cycle, greater will be the working capital requirement. For this period the cost of raw materials, wages and overheads are to be considered. If wages and overheads accrue evenly during the time the process of manufacture is in progress, then on an overage, the total cost of labor and overheads outstanding will only be for half the time.

- Finished Goods: Time period for which the finished goods remains in godowns before it is converted into sales plays an important roll in deciding the amount of working capital. If the items produced by the firm are seasonal, godown expenses increase as the finished goods are to be kept for the long period.

- Sundry Debtors: Credit period allowed to debtors affects the working capital need. Longer the credit period allowed to debtors, greater will be the working capital requirements. Some analysts, while calculating the time – lag on payments by debtors, estimate the book debts less the profit element in tem while other analysts take debtors at book values inclusive of the profit element.

- Cash and Bank Balances: On the basis of past experience the necessity of cash and bank balances to meet the day-to-day payments can be estimated and the amount is to be added to the working capital requirements.

- Sundry Creditors: Credit period allowed by creditors affects the working capital need. Longer the credit period allowed by creditors, lower will be the working capital needs.

- Creditors for Expenses: Time – tag in payments of wages and overheads also decide the amount of working capital. If there is no time- lag involved in payments of wages and overheads, more working capital will be required and less, if there is a time – tag in payments of wages and overhead.

- Contingencies: Beyond the all planning the contingencies affect the amount of working capital need. There are always an unforeseen expenses and the amount of same is added to working capital needed.

For a manufacturing organization, the following factors have to be taken into consideration while making an estimate of working capital requirements:

Factors to be considered while estimating working capital.
- (1) Total cost of material, wages & overheads.
- (2) The length of raw material cycle.
- (3) The length of production cycle.
- (4) The length of sales turnover period.
- (5) The average period of credit allowed to customers.]
- (6) The amount of cash need to pay day to day transactions.
- (7) The average amount of cash need to make advance payments, if any
- (8) The average credit period expected to be allowed by suppliers.
- (9) Time – lag in the payment of wages and other expenses.

From the total amount blacked in current assets estimated on the basis of the first seven items given above, the total of current liabilities i.e. the last two items is deducted to find out the need of working capital.

In cash of purely trading concerns, points 1 to 3 are omitted and remaining 4 to 9 points are to be taken into consideration. As a margin of safety, some extra amount generally calculated and added in the working capital to facilitate contingencies.

13. Sources of Working Capital:

The working capital need of a business unit can be classified as

- Fixed Working Capital Need
- Variable Working Capital Need

In a business unit, a part of working capital need remains permanently blocked in current assets to carry out day to day transactions and its minimum and can't be expected to reduce at any time. This minimum level of current assets is permanent investment in fixed assets. The other part of working capital is to be required to meet the seasonal demands and some special exigencies such as ruse in prices, strikes etc. this part of working capital is variable which can not be permanently employed gainfully in business. The fixed portion of working capital should be generally financial from the fixed capital sources while the variable working capital needs of a business unit may be met from the short term sources of capital.

The various sources of working capital are as follows under two headings

1. Sources of Fixed Working Capital
2. Sources of Variable Working Capital

1. **Sources of Fixed Working Capital**:

Sources of fixed working capital should facilitate an uninterrupted use for a sufficiently long period. The important five sources of fixed working capital are; owner's capital, borrowed capital, internal sources, public deposits and loans. Let us discuss them in detail.

- **Owner's Capital** (Shares): Owner's capital is an important source for permanent or fixed working capital. For a company different types of shares like equity shares, preference shares, differed shares are sources of a long-term working capital. Preference shares enjoy the preferential right over equity shares in receiving dividend at a fixed rate and in regard to the payment of capital at the time of winding up the company. While equity shares do not have any fixed rate of dividend to receive and is to be paid subject to the availability of sufficient profits. A company can raise it fixed working capital by the issue of shares.

- **Borrowed Capital** (Debtors): Barrowed capital is a good and important source of raising long term or fixed working capital. For companies debentures is an instrument to obtain capital from outside i.e. borrowed capital. The debenture – holders are the creditors of the company and they are paid interest at fixed rate. Interest on debenture is an expenses for the company which is charged against profit and loss account. The debentures are generally given floating charge on the assets of the company. Company can issue different types of debentures like simple, naked or unsecured debentures, secured or mortgaged debentures, redeemable debentures, irredeemable debentures, convertible and non-convertible debentures. It is a good source of finance and beneficial for both the parties i.e. investors and the company. The interest on debentures is paid periodically on fixed rate. It is considered expense for the company so deducted from the profit and also debentures get priority on repayment at the time of liquidation. The firm issuing debentures also enjoys a number of benefits such as trading on equity, retention of control, tax benefits, etc.

- **Internal Sources** (Plowing Back of Profit):

Internal sources refer to the surplus earnings in a business by the firm. It is a suitable source for an established firm for its expansion modernization and replacement etc. A surplus profit is ploughed back in a business and the firm is not required to pay any fixed rate interest, there is no need to keep securities, there is no dilution of control, it ensures

table dividend policy and gains confidence of the public, excessive finance by internal source may lead to misuse of funds, monopolies, over capitalization and speculation, etc.

- **Public Deposits:** Now a days the public deposits are replaced by banking facilities. Public deposits are accepted directly form the public as fixed deposits by a business enterprise for raising short term and medium term finance. Public deposits as a source of finance have a large number of advantages such as very simple, and commitment source of finance, taxation benefits, trading on equity, no need of securities and an inexpensive source of finance. Against it, it has certain dangers such as, it is uncertain, unreliable, unsound and inelastic source of finance. The RBI has also laid down certain limits on public deposits. Non banking concerns can not borrow by way of public deposits more than 25% of its paid up capital and free reserves.

- **Loans:** The word 'Loan' has been popular after the banking facilities came into existence. Loans are one type of borrowed capital, a fixed rate interest is charged on it and the amount of the loan is to be paid by way of installment in a number of years.

Sources of Variable Working Capital:

Sources of variable or short term working capital are; sharafs (indigenous bankers), trader credit, installment credit, advances, factoring or accounts receivables, accrued expenses, deferred incomes, commercial paper, commercial banks.

- **Sharafs** (Indigenous Bankers): Sharafs and Shets were the only source of finance in the early stage of monetary development. Before the establishment of commercial banks these indecencies bankers (sharafs) used to charge very high rates of interest and the consumers were exploited to the large extent possible. Though

today their monopoly has been broken, some business houses have to depend upon indigenous bankers for obtaining loan to meet their working capital need.

- **Trade Credit:** Trade credit is a good source for short term financing and also shows a healthy atmosphere in the business market. Trade credit refers to the credit extended by suppliers of goods in the normal course of business. Confidence of suppliers in firm's credit worthiness is the base of trade credit. Here, suppliers send goods to the buyers for the payment to be received at future date as per terms of sales invoice. Amount payable at future date should be paid at decided date. Delay in such payment is called stretching accounts payable, and interest is charged for the delayed period. If a firm delay, the payments frequently, it adversely affects the credit worthiness of the firm and it may not be allowed such credit facility in future.

Trade credit is an easy convenient, flexible and spontaneous source of finance at the cost of cash discount and higher prices have to be paid.

- **Installment Credit:** In this method goods or assets are purchased and immediately the possession is received while the payment is made in the installment. Amount payable should be paid within a decided time period and interest is charged on due amount. Thus the payment of large amount can be avoided at a time and the working capital need can be maintained.

- **Advances:** Advances from customers and agents against their order is one of the cheapest sources of short term finance. Advance payment can be received from the customers and agents only if the demand of products or services rendered by a business unit is higher and no near substitute is available in the market.

- **Factoring or Accounts Receivables:** When commercial banks offer finance for bills receivable it becomes a good source of raising short term capital. After discounting the bill bank pays immediately for sales made on credit. A factor is a financial institution which offers services relating to management and financing of debts arising out of credit sales. Such financing facilities provided by banks or factors

are becoming more popular as they include administration of credit sales including maintenance of sales ledger. Collection of accounts receivable, credit control and protection from bad debts, provision of finance and rendering of advisory services to their clients. At present factoring is not popular in India and only a few institutions render the services. The negative side of the source is it is costly compared to other short term finance and the though stance taken by factor may affect adversely.

- **Accrued Expenses:** Accrued expenses refer to expenses already incurred and hence not yet paid. Such expenses are recorded in the books under the heading of liabilities for which the services are already received. Wages, salaries, interest taxes are the important items of accrual expenses, which are paid periodically. Generally taxes and interest are paid at the end of the year while wages and salaries are paid monthly, fortnightly or weekly basis for the services already rendered by employees. The longer the payment period the greater is the amount of liability towards employees or the funds provided by them. Thus, all accrued expenses can be used as a source of finance.

The amount of accruals varies as the level of activity of a firm changes. As the level of activity expands, the accruals also increases and hence they provide a spontaneous source of finance. No interest is charged on accruals make it cost free source of finance. At the same time it must not be forget that the payment can not be postponed for a long period. The payment period of wages and salaries is determined by provisions of law and practice in industry. Similarly, the payment dates of taxes are governed by low and delay may attract penalties. This spontaneous, interest free and limited source of short term finance is beyond the control of the management.

- **Deferred Incomes**: Deferred incomes refer to the advance payment by the customers before supplying goods or services. Such funds are available to a firm only when it is having a great demand for its goods or services with good reputation in market. It is a good source of short term finance as it increases the liquidity of a firm.

- **Commercial Paper:** Commercial paper is the source of short term funds for the large companies enjoying high credit rating and sound financial health. The concept of commercial paper, an unsecured provisory notes issued by firms to raise short term finance has come from advanced countries like USA. In India, only a comparing listed on the stock exchange, having a net worth of at least Rs. 10 croses and a maximum permissible bank finance of Rs. 25 crores can issue commercial paper not exceeding 30 percent of its working capital limit with a maturity period of 91 to 150 days. Investors including banks, insurance companies, unit trusts and firms to invest surplus funds for a short period usually buy commercial paper. A credit rating agency, called CRISIL, has been set up in India by ICICI and UTI to rate commercial paper. Commercial paper becomes a easier and cheaper source of finance against the bank credit and during period of tight bank credit. Hence, only large companies enjoying high credit rating and sound financial health can use it as a source of finance. The drawback of the easy finance method is that it cannot be redeemed before the maturity date. Even if the issuing firm has surplus funds to pay.

- **Commercial Banks:** Commercial banks are most popular source providing short-term finance in forms of loans and advances. The different forms of loans and advances. The different forms of loans and advances are as follows: Loans, Overdrafts, Cash Credit, Purchasing and Discounting of Bills

(a) **Loans:** A loan is an advance in lump sum against some security. In case of a loan, the specified amount is given to the customer on whom he is required to pay interest from the date of the sanction. A loan may be repaid in lump sum or installments; the interest is calculated at quarterly rests on the reduced balances. Generally commercial banks provide short term loans up to one year but now a days term loans exceeding one year are also provided.

(b) **Cash Credit:** A bank allows his customer to borrow money up to a certain limit against some tangible securities is known as cash credit. The customer can withdraw

money according to his need up to cash credit limit and required to pay an interest on daily balance than the entire amount of the account. Surplus amount also can be deposited in the some amount. Thus, it becomes the most favorite mode of short-term finance.

(c)   **Purchasing and Discounting of Bills:** Today credit is the base of commerce so purchasing and discounting of bills has become the most important source of short term finance. The seller receives a bill of exchange accepted on the goods sold from the buyer immediately. The bank purchases the bills payable on demand and credits the customer's amount with the amount of bill less discount. At the maturity of bill, it is presented to the acceptor for payment. In case the bill discounted is dishonored by non-payment, the bank recovers the fall amount of the bill from the customer along with expenses in that connection.

14. Analysis and Control of Working Capital:

Blood circulation is must to maintain a life in human body. Working capital being lifeblood for the business is essential for the smooth and profitable running of a business. No business can run without an adequate amount of working capital. However. It must also be noted that working capital is a means to run the business smoothly, and not an end. Generally a business unit has a positive balance of working capital i.e. the excess of current assets over current liabilities, but sometimes due to more uses of working capital results in the negative balance of working capital. Which can be covered after other transaction in the following period. At this time it becomes necessary to study the changes in the use and sources of working capital to evaluate the efficiency with which the working capital is employed in a business. It creates the need of working capital analysis. The means for working capital analysis are; ratio analysis, funds flow analysis, budgeting,

- **Ratio Analysis:** A ratio show the relationship between two numbers in a simple arithmetic form. A short term liquidity of a capital i.e. working capital position

of a firm can be measured by the technique of ratio analysis. The following ratios may be calculated for this purpose.

- Current ratio
- Acid test ratio
- Absolute liquid ratio, Cash position ratio
- Inventory turnover ratio
- Receivables turnover ratio
- Payables turnover ratio
- Working capital ratio
- Working capital leverage
- Ratio of current liabilities to tangible net worth.

- **Funds Flow Analysis:** Funds flow analysis is a technique of finding out a total inflow of funds through out an accounting period against a total out flow of funds through the same. It is an effective tool to study changes in the financial position of a business enterprise between beginning and ending financial statements dates.

(I)   Preparing schedule of changes in working capital and

(II) Statement of sources and application of funds are consist in funds flow analysis.

- **Budgeting:** Estimation of the expenses to be occurred in the next financial period is known as budgeting. It is an expression of business plans and policies to be pursued in the future period of time. Being a part of total budgeting process of a business, working capital is prepared for long term and short term requirement of working capital observing the available sources form the market according to the need of the business, and then comparing the budgeted figures with the actual performance for calculating variances, if any, so that corrective actions may be taken in the future. The objective of a working capital budget is the same as the objective of

overall budgeting of the process of business i.e. to ensure availability of funds as and when needed and to ensure effective utilization of these resources.

- **Determine The Working Capital Financing Mix:** Mainly, there are two sources of financing working capital requirements i.e. long temr sources and short term sources as discussed earlier. Now question arises to decide the proportion of working capital obtained form different sources. What portion of working capital should be financed by long term sources and how much by short term sources ?

There are three basic approaches for determining an appropriate working capital financing mix.

1. The Heading or Matching Approach
2. The Conservatives Approach
3. The Aggressive Approach

1. **The Heading or Matching Approach:** The term "Matching" usually refers to matching the transactions of a simultaneous but opposite in nature and the effect of each other is counterbalanced with reference to financing mix, the term heading and matching refer to 'A process of matching maturities of debt with the maturities of financial needs'. According to this approach the maturity of funds should match with need of working capital therefore it is known as matching approach. According to this approach need of working capital is classified into two categories.
- Permanently required working capital i.e. fixed working capital
- Temporary required working capital i.e. variable working capital

According to heading approach permanent requirement of working capital is financed with long term sources while short term requirement is financed with short term sources.

2. **The Conservative Approach:** According to this approach overall finance of working capital in a business is considered as a long term requirement and

satisfied from long term sources and the short term sources are used only for emergency requirements. This conservative approach increases the liquidity and minimize the risk. On other hand the negative aspect of the approach is that the cost of financing is higher and interest has to be paid even in season for entire period.

3.   **Aggressive Approach:** Aggressive approach is exactly inverse in nature while compared with the conservative approach. According to this approach overall finance of working capital in a business is financed with short term sources. Even a part of fixed assets investments be financed from short term sources. This approach makes the finance mix more risky, less costly and more profitable.

14. Banks approach in Financing Working Capital

Banks, on the basis of security, provide finance to industry and trade. It becomes the subject of government to ensure equitable distribution in the right channels. Since November 1965, a Credit Authorization Scheme has been in operation s part of the Reserve Bank of India's credit policy. Under this scheme, all scheduled commercial banks are required to obtain prior authorization of the Reserve Bank before sanctioning any fresh credit limits of Rs. One crore or more to any single party or any limit that would enable the party avail Rs. One crore or more from the entire banking system on secured or unsecured basis. The limit of Rs. One crores was subsequently raised to Rs. Five crores. The Reserve Bank of India regulates and controls bank finance and from time to time provide directions and guidelines to the bank by the recommendations of certain specially constituted committees entrusted with the task of examining various aspects of bank finance to industry. Bellow, the important findings and recommendations of the following committees are discussed.

- Dehejia Committee
- Tandon Committee
- Chore Committee

- Marathe Committee

- Chakravarty Committee

- Kannan Committee Report

- **Dehejia Committee:** National credit council constituted a committee under the chairmanship of Shri V.T. Dehejia in 1968 to determine the extent to which credit needs of industry and trade are likely to be inflated and how such trends could be checked and to go into establishing some norms for lending operations by commercial bank.

Finding and Report: Short term credit can be diverted for long term assets was prevailing tendency.

- Evolvement of norms for lending to industrial concerns was difficult.

- A study of borrowers total operations should be the basis of finance rather than security basis alone.

- The total need of the borrower should be segregated according the minimum level of inventories which the industry was required to hold for maintaining a given level of production should be put on a format term loan basis and subject to repayment schedule.

- **Tandon Committee:** Under the chairmanship of Shri P.L. Tandon in July, 1974. Reserve Bank of India set up a committee. The terms of reference of the committee were.

  - To suggest sound financial basis in relations to borrowings and criteria regarding satisfactory capital structure.
  - To recommend sources for financing the minimum working capital needs
  - To make suggestions for prescribing inventory norms for both private and public sectors.
  - To recommend the change in the existing pattern of financing working capital, if required

- To suggest guidelines for commercial banks to ensure proper end use of funds and keeping a watch on the safety of advances.
- To suggest the information or data to be collected periodically from borrowers and by the RBI from the leading banks.

Opinion Report:

- Bank credit is extended on the amount of security available not considering the level of operations.
- Finance from bank should be treated as the first source instead of being taken as a supplementary to other sources of finance.
- To control the bank finance, certain modifications are suggested for the continuation of the existing cash credit system.
- To control the ban finance, certain modifications are suggested for the continuation of the existing cash credit system.
- Operational plans of customers should be known in advance by the bank.
- Recommendation regarding lending norms have been suggested under three alternatives.
- minimum 25% of the working capital is to be financed from long tem funds.
- Minimum 25% of the total current assets from long term funds .
- Contribution from long term fund will be to the extent of the entire core current assets and a minimum of 25% of the balance current assets.

- **Chore Committee:** Under the chairmanship of Shri K.B. Chore in March, 1979. Reserve Bank of India set up a committee. The term of reference of the committee was to review the working of cash credit system in recent years with particular reference to the gap between sanctioned limits and the extent of their utilization and also to suggest alternative type of credit facilities which should ensure greater credit discipline. Recommendation of the Committee:

- The banks should obtain quarterly statements in the prescribed format from all barrowers having working capital credit limit of Rs. 50 lack and above

- The banks should undertake a periodical review of limits of Rs. 10 lack and above.

- The banks should not bifurcate cash credit accounts into demand loan and cash credit components.

- If a borrower does not submit the quarterly returns in time the banks may charge penal interest of one percent on the total amount outstanding for the period of default.

- banks should discourage sanction of temporary limits by charging additional one per cent interest over the normal rate on these limits.

- The banks should fix separate credit limits for peak level and non peak level, wherever possible.

- Banks should take steps to convert cash credit limits into bill limits for financing sales.

- **Morathe Committee Report**: Under the chairmanship of Marathe in 1982, Reserve Bank of India set up a committee to review the working of credit authorization scheme (CAS) and suggest measures for giving meaningful directions to the credit management function of the Reserve Bank. Reserve Bank of India accepted the recommendations of the committee with minor modifications. Recommendation by the Committee:

  - The third method of lending suggested by the Tondon Committee was dropped. Hence, the second method of lending is accepted.

  - The committee has suggested the introduction of the 'Fast Track Scheme' to improve the quality of credit appraisal in banks. It recommended that commercial banks can release without prior approval of the Reserve Bank 50% of the additional credit required by the borrowers where the following requirement are fulfilled :

- The projections in regard to production, sales chargeable current assets, other current assets, current liabilities other than bank borrowings and net working capital are reasonable in terms of the past, trend and assumptions regarding most likely trends during the future projected period.

- The classification of assets and liabilities as 'current' and 'non-current' is in conformity with the guidelines issued by the Reserve Bank of India.

- The projected current ratio is not below 1.33%

- The borrower has been submitting quarterly information and operating statements for the past fix months within the prescribed time and undertakes to do the same in future also.

- The borrower undertakes to submit to the bank his annual account regularly and promptly further, the bank is required to review the borrower's facilities at least once in a year even if the borrower does not need enhancement in credit facilities.

- **Chakravarty Committee**: The Reserve Bank of India appointed another committee under the chairmanship of Sukhamoy Chakravarty to review the working of the monetary system of India. The committee submitted is report in April 1985. The committee made two major recommendations in regard to the working capital finance:

(i) Penal Interest for Delayed Payments: The committee has suggested that the government must insist that all public sector units, large private sector units and government departments must include penal interest payment clause in their contracts for payments delayed beyond a specified period. The penal interest may be fixed at 2 percent higher than the minimum lending rate of the supplier's bank.

(ii) Classification of Credit Limit Under Three Different Heads: The committee further suggested that the total credit limit to be sanctioned to a borrower should be considered under three different heads.

- For Cash Credit Portion :
  Maximum prevailing lending rate of the bank
- For Bill Finance Portion :
  2% below the basic lending rate of the bank
- For Loan Portion:
  The rate may vary between the minimum and maximum lending rate of the bank.

▪ **Kannan Committee:** Under the chairmanship of Shri K. Kannan, a Managing Director of Bank of Baroda in 1996, the Indian Banks Association constituted a committee to examine all the aspects of working capital finance including assessment of maximum permissible bank finance. Major recommendations of the committee Report

▪ The arithmetical rigidities of MPBF as suggested by Tandon Committee and reinforced by Chore Committee should be scrapped.

▪ To serve various borrowers more effectively freedom to each bank be given in regard to faster credit delivery.

▪ The committee suggested to shift emphasis from the liquidity level lending to the cash deficit lending called desirable bank finance.

▪ Banks may now adopt cash budgeting system for assessing the working capital finance in respect of large borrowers.

▪ The banks have also been allowed to retain the present method of MPBF with necessary modification or any other system as they deem fit.

▪ Banks should lay down transparent policy and guidelines for credit dispensation in respect of cash broad category of economic activity.

References:

(1) James C. Van Horne : Fundamentals of Financial Management, Prentice Hall of India, Private Ltd. New Delhi, III ed. P. 139.

(2) AICPA : Accounting Research Bulletin No. 43, p. 27.

(3) State Agro Industries Annual Report 1980, Schedule 'G' p. 76.

(4) RSHC Annual Report 1982-83, Annexure, p. 26.

(5) RIICO 11th Annual Report & Accounts 1979-80, Schedule 'F' p. 72.

(6) RSEB, Annual Statement of Accounts 1980-81, Schedule 12, p. 68.

(7) RSWC 22nd Annual Report and Accounts 1979-80, p. 15.

(8) RFC. Annual Report and Accounts 1980-81, p. 43.

(9) N. Rajan Classifies the inventories relating to the public enterprises into the following four groups : (i) raw materials, components, tools, stores & spares, (ii) work-in-progress, (iii) finished goods, and (iv) other miscellaneous goods See Rajan. N. "Materials Managements in Public undertakings", Lok Udyog, Bureau of Public Enterprises, New Delhi, Vol. III No. 6, September 1969, p. 607.

(10) Controller and Auditor General of India, New Delhi, Audit Report (Commercial), 1967, p. 10.

(11) "The profitable use of capital in Industry" by Institute of Cost and Works Accountans, London, ed. 1965, p. 47.

(12) R. S. Chadda : Inventory Management in India, Allied Publishers, Bombay, 1971, p. 17.

(13) John F. Magee : "Guide to Inventory Policy ; Functions and lot sizes," Harvaed Business Review, 34 (January-February,1956) pp. 49-60.

(14) Harry Gross : "Financing for Small and Medium Sized Business." Op. cit, p.61.

(15) Ibid p. 62.

(16) Starr, Martin K. and David W. Miller : Inventory Control Theory and Practice, Englewoos Cliffs, N. J. : Prentice Hall, 1962 p. 17.

(17) I. M. Pandey : Financial Management op. cit p. 394.

(18)   Robert N. Anthony : Management Accounting Text and Cases. Richard, D. Irwin, Inc., 1964, p. 182.

(19)   Harry Gross : "Financing for small and medium sized business." Op. cit. p. 29.

(20)   L. R. Howard : Working Capital- Its Management and Control, Macdonold & Evans Ltd., London, 1971, p. 92, C. Gordon Hill, Accountancy Age (13th November 1970).

(21)   Prasanna Chandra : 'Financial Management' – Theory and Practice, op. cit p. 321.

(22)   Harvey M. Wagner : Principles of Operations Research with special Reference to 'Manufactures' inventories NBER, 1950, p. 315.

(23)   B. D. Khare : Inventory Control, National Productivity Council, New Delhi, 1971, p. 15.

(24)   Ibid, p. 14.

(25)   Robert N. Anthony : 'Management Accounting' : op. cit pp. 683—684.

(26)   Synder, Arthur : "Principles of Inventory Management," Financial Executive XXXII (April, 1964)

(27)   Raymond, A. Hoffman : Inventories : A Guide to their Control, Costing and Effects upon Income and taxes, Ronald Press Company, New York, 1962, pp. 22—37 (for details).

(28)   (i) Bereau of Public Enterprises, Annual Report on the working of industrial and commercial undertakings of the Central Government for the year 1967—68, p. 116, and (ii) Chatopadhyaya, Paresnath, "Interfirm comparisons : scope and application in public enterprises" Northern Indian Regional Council of the ICWA, New Delhi, September 1969, p. 23.

(29)   See Bhandari, M. C. : "Budgeting and Materials Management", Commerce, Bombay, Vol. 116 : No. 2981, June 1968, p. 15.

(30)   John N. Myer : "Financial Statement Analysis" IV edition Prentice – Hall of India Pvt. Ltd. New Delhi, 1974, p. 190.

(31)   Tarrif Commission as quoted in Venketsubbiah, H. : The Anatomy of Indian Planning, Vora and Co., Bombay, First Edition, 1969, p. 214.

(32)   Rao, S. R. K. : "Inventory Investment in Public Sector Enterprises". Lok Udyog, Bureau of Public Enterprises, Government of India, New Delhi, Vol. II, No. 11, February, 1969, p. 1140.

(33)   Prasanna Chandra, op. cit p. 344.

(34)   Figures derived from Annual Accounts of GSM for 1983—84, p. 18. (Review of Accounts of the GSM by the Controller and Auditor General of India).

Chapter 2

Fertilizer Industry in India

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1 Introduction:

India today is the third largest producer of nitrogenous fertilizers in the world. There are at present 63 fertilizers units manufacturing a wide range of nitrogenous and complex fertilizers, including 38 units producing urea and 9 units producing ammonium sulphate as a by-product. Besides, there are about 79 units producing single superphosphate. The production capacity of nitrogen has increased from a modest 85,000 tonnes in 1951-52 to 105.20 lakh tonnes as on 30 November 1998 and that of phosphatic fertilizers from 63,000 tonnes to 31.70 lakh tonnes of P2O5 during the same period. Against the nominal production of 16,000 tonnes of nitrogen and 11,000 thousand tonnes of P2O5 in 1951-52, the country produced 100.86 lakh tonnes of nitrogen and 29.76 lakh tonnes of P2O5 during 1997-98. The public sector has been playing a dominant role in the fertilizer industry. The first State-owned fertilizer unit was set up in 1951 at *Sindri* in Bihar which was followed by another plant at *Nangal* in Punjab. With the coming up of another fertilizer plant at *Trombay*, the government decided to bring all the public-sector fertilizer units under the management of a single undertaking and the Fertilizer Corporation of India (FCI) was accordingly incorporated in January 1961. At present, there are nine public sector undertakings under the administrative control of Department of Fertilizers. FCI has now four units, one each at *Sindri* (Bihar), *Gorakhpur* (U.P), *Talcher* (Orissa) and *Ramagundam* (Andhra Pradesh). Other fertilizers plants under the control of other undertakings are located at *Bhatinda, Panipat, Vijaipur, Trombay, Namrup, Durgapur, Cochin, Paradeep, Talcher and Rourkela.*

The Indian fertilizer industry has succeeded in meeting almost fully the demand of all chemical fertilizers except for MOP. The industry had a very humble beginning in 1906, when the first manufacturing unit of Single Super Phosphate (SSP) was set up in *Ranipet* near Chennai with an annual capacity of 6000 MT. The Fertilizer & Chemicals Travancore of India Ltd. (FACT) at Cochin in Kerala and the Fertilizers Corporation of India (FCI) in *Sindri* in Bihar were the first large sized - fertilizer plants set up in the forties and fifties with a view to establish an industrial base to achieve self-sufficiency in food grains. Subsequently, green revolution in the late sixties gave an impetus to the

growth of fertilizer industry in India. The seventies and eighties then witnessed a significant addition to the fertilizer production capacity.

The fertilizer industry in India has grown tremendously in the last 30 years. The Government is keen to see that fertilizer reaches the farmers in the remote and hilly areas. It has been decided to decontrol the prices, distribution and movement of phosphatic and potassic fertilizers. Steps have been taken to ensure an increase in the supply of non-chemical fertilizers at reasonable prices. There are 53 fertilizer quality control laboratories in the country. Since bio-fertilizers are regarded as an effective, cheap and renewable supplement to chemical fertilizers, the Government is implementing a National Project on Development and Use of Bio-fertilizers. Under this scheme, one national and six regional centers for organizing training, demonstrating programs and quality testing of bio-fertilizers has been taken up.

It was a challenging decision of the Government to take Bombay High gas through a 1,700-km pipeline to feed fertilizer plants located in the consumption centers of North India. However, the major policy which has ensured the growth of the fertilizer industry is the thrust on accelerating fertilizer consumption by fixing, on the one hand, low and uniform price for fertilizers, and on the other hand providing the manufacturers adequate compensation through the retention price and subsidy scheme. As expected, fertilizer nutrient demand has gone up from 0.29 million tons in 1960-61 to 13.9 million tons at the end of 1995-96, compared to 12.15MT during 1992-93.

2 Growth of Fertilizer Industry:

The fertilizer industry in India consists of three major players; The Government owned Public Sector undertakings, Cooperative Societies like IFFCO,KRIBHCO and units from Private sector. There are about 33 major producers producing N and NP/NPK fertilizers in the country at present. The fertilizer industry of India had made constructive use of the fertilizer subsidy provided by the Government of India to ensure that the country achieved reasonable self-sufficiency in food grain production. The fertilizer industry has organized itself through Fertilizer Association of India to coordinate with the

Government of India to achieve the macro-economic objectives related to agricultural sector and to provide other services.

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Table –I Fertilizer industry development in India at a glance:

Year of Comm.	Unit	Feed stock and sector	Indtalled Capacity (Lakh/MT)	Project cost Rs/Crore
1967	GSFC-Baroda	Gas-Privae	3.706	63.22
1969	SFC-Kota	Naphtha-Private	3.790	30.00
1970	DIL-Kanpur	Naphtha-Private	7.220	52.12
1971	MFL-Madras	Naphtha-Public	4.868	63.22
1973	ZIL-Goa	Naphtha-Private	3.993	48.82
1973	FACT-Cochin	Naphtha-Public	3.300	618.43
1975	SPIC-Tuticorin	Naphtha-Private	6.200	73.56

1976	MCFL-Manglore	Naphtha-Private	3.800	74.90
1978	NFL-Nangal	FO/LSHS-Public	4.785	132.50
1978	IFFCO-Kalol	Gas-Coop.	5.445	71.23
1979	NFL-Bhatinda	FO/LSHS-Public	5.115	239.30
1979	NFL-Panipat	FO/LSHS-Public	5.115	223.50
1981	IFFCO-Phulpur	Naphtha-Coop.	5.511	205.18
1982	RCF-Trombay-V	Gas-Public	3.300	174.60
1982	GNFC-Bharuch	FO/LSHS-Private	6.360	445.00
1985	RCF-Thal	Gas-Public	17.068	890.00
1986	KRIBHCO-Hazira	Gas-Coop.	17.292	890.00
1987	HFC-Namrup-III	Gas-Public	3.150	285.55
1988	NFL-Vijaipur	Gas-Public	8.646	507.35
1988	IFFCO-Aonla	Gas-Coop.	8.646	647.84
1988	Indogulf-Jagdishpur	Gas-Private	8.646	701.52
1992	NFCL-Kakinada	Gas-Private	5.970	1185.54
1993	CFCL-Kota	Gas-Private	8.646	1153.15
1994	TCL-Babrala	Gas-Private	8.646	1479.74
1995	OCFL-Shahjahanpur	Gas-Private	8.646	960.00
1996	IFFCO-Aonla expansion	Gas-Coop.	8.646	955.00
1997	NFL-Vijaipur expansion	Gas-Public	8.646	1071.00
1997	IFFCO-Phulpur expansion	Naphtha-Coop.	8.646	1190.00
1997	IFFCO-Kalol expansion	Gas-Coop.	1.500 (additional)	149.71
1998	MFL-Manali (TN) revamp	Naphtha-Public	0.760 (additional)	601.43
1998	NFCL-Kakinada expansion	Naphtha-Private	5.970	970.00
1999	GFCL-Gadepan expension	Naphtha-Private	8.646	1256.00

(Publication by fertilizers' association, Derectory- 2000)

Table II Production by product - 2004/05

Fertilizer products	Production ('000 tonnes)
Ammonium chloride	79
Ammonium sulphate	601
CAN	141
DAP	4 709
NP / NPK complexes	4 507
SSP	2 483
Urea	19 038
Total	31 558

(Publication by fertilizers' association, Derectory- 2006)

3 Understanding Fertilizers:

Organic manures and bio fertilizers

The use of organic manures (farmyard manure, compost, green manure, etc.) is the oldest and most widely practiced means of nutrient replenishment in India. Prior to the 1950s, organic manures were almost the only sources of soil and plant nutrition. Owing to a high animal population, farmyard manure is the most common of the organic manures. Cattle account for 90 percent of total manure production. The proportion of cattle manure available for fertilizing purposes decreased from 70 percent in the early 1970s to 30 percent in the early 1990s. The use of farmyard manure is about 2 tonnes/ha, which is much below the desired rate of 10 tonnes/ha. At the present production level, the estimated annual production of crop residues is about 300 million tonnes. As two-thirds of all crop residues are used as animal feed, only one-third is available for direct recycling (compost making), which can add 2.5 million tonnes/year. The production of urban compost has been fluctuating around 6–7 million tonnes and the area under green manuring is about 7 million/ha.

Unlike fertilizers, the use of organic material has not increased much in the last two to three decades. The estimated annual available nutrient (NPK) contribution through organic sources is about 5 million tonnes, which could increase to 7.75 million tonnes by 2025. Thus, organic manures have a significant role to play in nutrient supply. In addition to improving soil physico-chemical properties, the supplementary and complementary use of organic manure also improves the efficiency of mineral fertilizer use. The use of biofertilizers is of relatively recent origin. Biofertilizers consist of N fixers (Rhizobium, Azotobacter, blue green algae, Azolla), phosphate solubilizing bacteria (PSB) and fungi (lmycorrhizae). A contribution of 20–30 kg N/ha has been reported from the use of biofertilizers. There was good growth in biofertilizer production and use in 1990s. At present, biofertilizers use is about 10 000 tonnes (Table 10). Among biofertilizers, most growth has occurred with phosphate-solubilizing micro-organisms, which account for about 45 percent of total biofertilizer production and use. Biofertilizer production and use is concentrated in Maharashtra, Tamil Nadu, Karnataka, Madhya Pradesh and Gujarat.

Table -3

Growth in bio fertilizer production

Year	Capacity (tonnes)	Production	Distribution
1992/93	5 401	2 005	1 600
1995/96	10 680	6 692	6 288
1998/99	16 446	8 010	5 065
2003/04	20 000	12 000	10 000
2004/05*	22000	15000	13500

* Estimated

The Government is promoting the concept of the integrated nutrient supply system (INSS), i.e. the combined use of mineral fertilizers, organic manures and bio fertilizers. Farmers are also aware of the advantage of INSS in improving soil

health and crop productivity. However, the adoption of INSS is limited by the following constraints:

- increasing trend to use cow manure as a source of fuel in rural areas;
- increasing use of crop residues as animal feed;
- extra cost and time required to grow green-manure crops;
- handling problems with bulky organic manures;
- problems in timely preparation of the field when agricultural waste and green manure have to be incorporated and their decomposition awaited;
- poor and inconsistent crop response to bio fertilizers

Fertilizers have different component and different important considering its use. The main components are mentioned below.

About (Single Super Phosphate Fertilizer)

The main raw materials required are rock phosphate and sulphuric acid. SSP is a straight phosphatic multi-nutrient fertilizer which contains 16% water soluble P2O5, 11% sulphur, 21% calcium and some other essential micro nutrients in small proportions. SSP, which is a poor farmer's fertilizer (price-wise), is an option to optimize the use of phosphatic fertilizers. It also helps to treat sulphur deficiency in soils (40% Indian soil sulphur deficient) as well for further nhancement of yields at the least cost. In various crops, which require more of sulphur and phosphate like oilseeds, pulses, sugarcane, fruits and vegetables, tea etc, SSP is an essential fertilizer.

Advantages of SSP Fertilizer:

- Provides 15% of total phosphate requirement of the country.
- Lowest price per kg, preferred by small and marginal farmers.
- Multi-nutrient fertilizer containing P2O5 as primary nutrient and Sulphur and Calcium as secondary nutrients.
- It is the cheapest source of Sulphur for the soil.

- Only phosphatic fertilizer which can utilize Indian rock phosphate deposits.
- Least foreign exchange per unit of P2O5.

Importance of Phosphorus for Crops:

1. It is an important source of energy for plants.
2. It develops roots of the plants in better way which helps them to absorb elements from soil.
3. It helps the crops to ripe in time.
4. It makes grains healthy which fetch farmers a good consideration for their crops.
5. It increases storage capacity of crops for long duration, and also prevents fruits and vegetables from being rotten.

Agriculture Scientists have proved that it is profitable to administer Super Phosphate along with Urea in place of Di-ammonium Phosphate (DAP) to crops of Pulses and Oil-seeds.

Importance of Sulphar for Crops:

1. 17 essential elements like- Nitrogen, Phosphorous, Potash required for plants, Sulphur is also an essential element for high productivity of crops.
2. Because of growing crops year after year, the soil becomes Sulphur deficient. The deficiency of Nitrogen, Phosphorous is compensated by farmers by using Urea & DAP but, they do not use anything to eliminate sulphur deficiency which affects productivity of crops.
3. Generally, crops of Grains absorbs 3-4 Kg. of sulphur to produce 1 MT of product, 6-8 Kg.of sulphur to produce Pulses and 10-12 Kg.of sulphur to produce Oil-seeds.
4. If the deficiency of Sulphur is compensated to soil, it gives 15-30% high productivity of crops besides giving good quality of product.
5. It increases capacity of plants to cope up with diseases

Importance of Calcium for Crops:

1. It strengthens the plants.
2. It makes always soil cultivated.
3. It helps in improving pH in acidic land.
4. It helps in developing roots and overall growth of plants.
5. It helps to make the grain of Ground-nut crops strong and healthy.

It gives strength to stem of plants thereby they absorb contents from soil at maximum level which prevents them from diseases resulting into healthy crops.

▪ **CONSUMPTION**

Fertilizer consumption was less than 1 million tonnes before the mid-1960s. With the introduction of high-yielding variety (HYV) seeds, there was acceleration in the growth of fertilizer consumption. It reached 12.73 million tonnes in 1991/92 as against 0.78 million tonnes in 1965/66. After the decontrol of P and K fertilizers the growth in consumption slowed. The highest consumption was recorded in 1999/2000 (18.07 million tonnes of nutrients). Since then, the growth in consumption has been erratic. In 2003/04, total nutrient consumption was 16.8 million tonnes. The consumption of N, P_2O_5 and K_2O was 11.08, 4.12 and 1.60 million tones, respectively. Table 8 shows the production, importation and consumption of N, P_2O_5 and K_2O from 1999/2000 to 2003/04.

▪ **CONSUMPTION AT STATE LEVEL**

The consumption of fertilizers varies significantly from state to state. The all-India per-hectare consumption of total nutrients was 89.8 kg in 2003/04. While the North and South zones have a consumption of more than 100 kg/ha, in the East and West zones the consumption is lower than 80 kg/ha. Among the major states, the per-hectare consumption is more than 100 kg in West Bengal (122 kg), Haryana (167 kg), Punjab (184 kg), Uttar Pradesh and Uttaranchal (127 kg),

Andhra Pradesh (138 kg) and Tamil Nadu (112 kg). In the remaining states, the consumption per hectare is lower than the all-India average. Table 4 shows fertilizer consumption per hectare of the gross cropped area in the major states.

Table No 4. Consumption of fertilizers by state 2004/05

Zone/State	N	P$_2$O$_5$	K$_2$O	N + P$_2$O$_5$+ K$_2$O
	(kg/ha)			
East zone	49	15.8	11	75.8
Assam	22.2	12.7	11.7	46.6
Bihar & Jharkhand	68.7	8.7	3	80.5
Orissa	26.7	8.5	6.3	41.4
West Bengal	63.8	33.4	25.2	122.4
North zone	102.9	32	5.3	140.1
Haryana	125.6	38.9	2.6	167.1
Himachal Pradesh	32.6	9.2	7.6	49.4
Jammu & Kashmir	50	18.1	3.2	71.4
Punjab	139.6	40	4.5	184
Uttar Pradesh & Uttaranchal	91.2	29.4	6.1	126.7
South Zone	60	26.1	19.2	105.4
Andhra Pradesh	84.1	35	17.7	136.8
Karnataka	40.1	19.6	15.2	74.9
Kerala	28.3	12.9	22.4	63.6
Tamil Nadu	59.7	25	27.8	112.5
West Zone	38	17.1	4.4	59.4
Chhattisgarh	30.7	11.9	3.9	46.5
Gujarat	64.3	23.9	6.9	95.1
Madhya Pradesh	32.8	19.5	2.7	55
Maharashtra	38.9	18.8	7.9	65.7
Rajasthan	29.3	10.6	0.6	40.5
All India	59.2	22.1	8.5	89.8

- **CONSUMPTION BY PRODUCT**

While India uses many types of fertilizers, urea accounts for most of the consumption of N and DAP for most of that of P_2O_5. Urea accounts for 82 percent of the total consumption of straight N fertilizers. Other straight N fertilizers, such as AS, CAN and ammonium chloride account for only 2 percent. The share of N through DAP and other complex fertilizers is about 16 percent. DAP accounts for 63 percent of total P_2O_5 consumption and other complex fertilizers for 27 percent. Single superphosphate (SSP) accounts for 10 percent of total P_2O_5 consumption. Figure 4 shows the shares of the various fertilizers in total N and P_2O_5 consumption in 2003/04

- ## Fertilizer Use by Crop

Fertilizer consumption in India has increased signifi-cantly in the last three decades. Total NPK (N, P2O5 and K2O) consumption increased nine-fold (from 2 million to 18 million tonnes) between 1969/1970 and 1999/2000. Per-hectare NPK consumption increased from 11 to 95 kg in the same period. After reaching a record level in 1999/2000, fertilizer consumption in India has been irregular. It has fluctuated around 17 million tonnes since 2000/01 (Table 5).

Table-5
Growth in fertilizer consumption in India

Year	Fertilizer (NPK) consumption	
	(million tonnes)	(kg/ha)
1969/70	1.98	11.04
1979/80	5.26	30.99
1989/90	11.57	63.47
1999/2000	18.07	94.90
2000/01	16.70	89.30
2001/02	17.36	92.80
2002/03	16.09	86.01
2003/04	16.80	89.80
2004/05	17.20	91.93

Source: Fertilizer Association of India, 2004/05

- **Fertilizer use by crop**

Before the 1950s, fertilizer use was very low and was confined to plantation crops. The introduction of fertilizer-responsive HYVs and expansion in the irrigated area led to a sharp increase in fertilizer application on field crops. Per-hectare fertilizer consumption is higher in the case of crops with a larger proportion of irrigated area. About 40 percent of the agricultural area in India is irrigated, accounting for 68.5 percent of total fertilizer consumption (Table 6). Six crops (rice, wheat, cotton, sugar cane, rapeseed and mustard) are estimated to account for more than two-thirds of the total fertilizer consumption in the country. The fertilizer-use pattern for major crops is discussed below.

Table-6

Fertilizer use on important crops, 2005

Crop	Gross cropped area (million ha)	Share in fertilizer consumption (%)	Fertilizer consumption (kg/ha)			
			N	P_2O_5	K_2O	Total
Cotton	8.5	6	89.5	22.6	4.8	116.8
Irrigated	2.9	2.7	115.7	30.9	7	153.5
Rainfed	5.6	3.3	75.8	18.2	3.6	97.7
Groundnut	6.6	2.9	24.4	39.3	12.9	76.6
Irrigated	1.2	0.8	35.3	53.8	28.9	118
Rainfed	5.4	2.1	21.9	36	9.2	67.2
Jute	0.8	0.2	38	11.5	5	54.4
Irrigated	0.3	0.1	55.9	22.4	10.2	88.6
Rainfed	0.5	0.1	28.9	6	2.3	37.1
Maize	6.6	2.3	41.7	14.7	3.8	60.2
Irrigated	1.5	0.8	59.6	27.7	4.8	92.1
Rainfed	5.1	1.5	36.6	11	3.6	51.1

Paddy	44.7	31.8	81.7	24.3	13.1	119.1
Irrigated	24	22.2	103.4	32.8	18.8	155
Rainfed	20.7	9.6	56.6	14.5	6.5	77.6
Pearl millet	9.8	1.7	21.9	5.5	0.8	28.2
Irrigated	0.8	0.4	62.2	13.9	3.4	79.5
Rainfed	9	1.3	18.4	4.8	0.6	23.8
Pigeon pea	3.6	0.8	20.9	13.3	2	36.2
Irrigated	0.2	0.1	36.9	20.9	2.2	60
Rainfed	3.5	0.7	19.6	12.6	2	34.2
Rapeseed & mustard	6	3.4	69.1	25	2.9	97
Irrigated	3.8	2.6	81.7	30.4	4.3	116.5
Rainfed	2.2	0.8	45.9	15	0.4	61.3
Sorghum	9.9	2.9	29.2	14.2	4.1	47.5
Irrigated	0.8	0.5	58.5	29.1	10.7	98.3
Rainfed	9.1	2.4	26.9	13	3.6	43.6
Sugar cane	4.3	5.4	124.8	44	38.3	207.1
Irrigated	4.2	5.3	126.4	45	40.6	212
Rainfed	0.1	0.1	106	32	12.4	150.4
Wheat	25.7	21	99.6	30.2	6.9	136.7
Irrigated	22.8	19.7	105.6	32.1	7.3	144.9
Rainfed	2.9	1.3	55.7	15.9	4.3	75.9
Other crops	60.4	21.6	34.5	18.5	7.1	60.1
Irrigated	12.6	13.3	113.5	46.8	16.5	176.7
Rainfed	47.8	8.3	13.6	11	4.7	29.3
All crops	187	100	59.2	22.1	8.5	89.8
Irrigated	75.1	68.5	103.2	35.3	14.5	153.1
Rainfed	111.9	31.5	29.7	13.1	4.5	47.3

- **Paddy rice**

Paddy rice is the most important crop in India in terms of both area and fertilizer use. Occupying an area of 44.7 million ha, it accounted for 31.8 percent (5.34 million tonnes) of total fertilizer consumption in 2003/04. Fertilizer use on irrigated paddy (155 kg/ha) is double that on rainfed paddy (77.6 kg/ha). The shares of irrigated and rainfed paddy in total fertilizer consumption were 22.2 and 9.6 percent, respectively. The average per-hectare use of fertilizer on paddy was 119.1 kg (81.7 kg/ha N, 24.3 kg/ha P_2O_5 and 13.1 kg/ha K_2O).

- **Wheat**

Wheat is the second most important foodgrain crop, grown on an area of 25.7 million ha. It is grown largely under irrigated conditions and accounts for 20.5 percent (3.44 million tonnes) of total fertilizer consumption. Fertilizer use per-hectare is 137 kg (100 kg/ha N, 30 kg/ha P_2O_5 and 7 kg/ha K_2O). Fertilizer use on irrigated wheat (144.9 kg/ha) is almost double that rainfed wheat (75.9 kg/ha) with the same trend for all the nutrients (N, P_2O_5 and K_2O).

- **Sorghum**

Sorghum is an important cereal crop in India. Occupying an area of 9.9 million ha, it accounted for 2.9 percent (0.49 million tonnes) of total fertilizer consumption in 2003/04. Fertilizer use on irrigated sorghum (98.3 kg/ha) was more than double that on rainfed sorghum (43.6 kg/ha). The shares of irrigated and rainfed sorghum in total fertilizer consumption were 0.5 and 2.4 percent, respectively. The verage per-hectare use of fertilizer on sorghum was 47.5 kg (29.2 kg/ha N, 14.2 kg/ha P_2O_5 and 4.1 kg/ha K_2O).

- **Pearl millet**

Pearl millet is another important cereal crop in India. It occupied an area of 9.8 million ha and accounted for 1.7 percent (0.29 million tonnes) of total fertilizer consumption in 2003/04. Fertilizer use on irrigated pearl millet (79.5 kg/ha) was more than three-fold that of rainfed pearl millet (23.8 kg/ha). The shares of irrigated and rainfed pearl millet in total fertilizer consumption were 0.4 and 1.3 percent, respectively. The average per-hectare use of fertilizer on pearl millet is 28.2 kg (21.9 kg/ha N, 5.5 kg/ha P_2O_5 and 0.8 kg/ha K_2O).

- **Maize**

Occupying 3.5 percent of GCA, maize accounts for 2.3 percent of total fertilizer consumption. Maize is grown mostly under rainfed conditions. Per-hectare fertilizer use is 60.2 kg, which consists of 41.7 kg/ha N, 14.7 kg/ha P_2O_5 and 3.8 kg/ha K_2O. The rate of fertilizer use on irrigated maize is 92 kg/ha compared with 51 kg/ha on rainfed maize. On rainfed maize, N, P_2O_5 and K_2O use is 36.6, 11.0 and 3.6 kg/ha, respectively, and 59.6, 27.7 and 4.8 kg/ha, respectively, on irrigated maize.

- **Pigeon pea**

Pigeon pea is one of the major pulse crops in India. It accounted for 0.8 percent (0.13 million tonnes) of total fertilizer consumption on an area of 3.7 million ha in 2003/04. Fertilizer use on irrigated pigeon pea (60.0 kg/ha) was nearly double that on rainfed pigeon pea (34.2 kg/ha). The shares of irrigated and rainfed pigeon pea in total fertilizer consumption were 0.1 and 0.7 percent, respectively. The average per-hectare use of fertilizer on pigeon pea was 36.2 kg (20.9 kg/ha N, 13.3 kg/ha P_2O_5 and 2.0 kg/ha K_2O).

- **Rapeseed and Mustard**

Rapeseed and mustard are the major oilseed crops of India. They occupied an area of 6.0 million ha and accounted for 3.4 percent (0.57 million tonnes) of total fertilizer consumption in 2003/04. Fertilizer use on irrigated rapeseed and mustard (116.5 kg/ha) was almost double that on rainfed rapeseed and mustard (61.3 kg/ha). The shares of irrigated and rainfed rapeseed and mustard in total fertilizer consumption were 2.6 and 0.8 percent, respectively. The average per-hectare use of fertilizer on rapeseed and mustard is 97.0 kg (69.1 kg/ha N, 25.0 kg/ha P_2O_5 and 2.9 kg/ha K_2O).

- **Groundnut**

Groundnut is the most important oilseed crop of India after rapeseed and mustard. Occupying an area of 6.6 million ha, it accounted for 2.9 percent (0.49 million tonnes) of total fertilizer consumption in 2003/04. The major groundnut-growing states are Gujarat and Karnataka. Fertilizer use on irrigated groundnut (118.0 kg/ha) was higher than on rainfed groundnut (67.2 kg/ha). The shares of irrigated and rainfed groundnut in total fertilizer consumption were 0.8 and 2.1 percent, respectively. The average per-hectare use of fertilizer on groundnut was 76.6 kg (24.4 kg/ha N, 39.3 kg/ha P_2O_5 and 12.9 kg/ha K_2O).

- **Sugar cane**

Sugar cane is the major sugar crop of India. Being a long-duration crop, its nutritional requirements are high. In 2003/04, it occupied an area of 4.3 million ha and accounted for 5.4 percent (0.91 million tonnes) of fertilizer consumption. The major sugar-cane-growing states are Uttar Pradesh, Tamil Nadu, and Maharashtra. Fertilizer use on irrigated sugar cane was 212.0 kg/ha compared with 150.4 kg/ha on rainfed sugar cane. The shares of irrigated and rainfed sugar cane in total fertilizer consumption were 5.3 and 0.1 percent, respectively. The average per-

hectare use of fertilizer on sugar cane was 207.1 kg (124.8 kg/ha N, 44.0 kg/ha P2O5 and 38.3 kg/ha K2O).

- **Cotton**

Cotton is the major fibre crop of India. In 2003/04, it occupied an area of 8.5 million ha and accounted for 6.0 percent (1.01 million tonnes) of total fertilizer consumption. Fertilizer use on irrigated cotton (153.5 kg/ha) was higher than on rainfed cotton (97.7 kg/ha). The shares of irrigated and rainfed cotton in total fertilizer consumption were 2.7 and 3.3 percent, respectively. The average per-hectare use of fertilizer on cotton was 116.8 kg (89.5 kg/ha N, 22.6 kg/ha P2O5 and 4.8 kg/ha K2O).

- **Jute**

After cotton, jute is the next most important fibre crop. Occupying an area of 0.8 million ha, it accounted for 0.2 percent (0.03 million tonnes) of total fertilizer consumption in 2003/04. Fertilizer use on irrigated jute (88.6 kg/ha) was more than double that on rainfed jute (37.1 kg/ha). The share of irrigated and rainfed jute in total fertilizer consumption was 0.1 percent. The average per-hectare use of fertilizer on jute was 54.4 kg (38.0 kg/ha N, 11.5 kg/ha P2O5 and 5.0 kg/ha K2O).

- **Other crops**

Crops other than those mentioned above occupied an area of 60.4 million ha and accounted for 22.1 percent (3.71 million tonnes) of total fertilizer consumption in 2003/04. Per-hectare fertilizer use on irrigated crops (182.9 kg/ha) was more than six times that on rainfed crops (29.2 kg/ha). The shares of irrigated and rainfed crops in total fertilizer consumption were 13.7 and 8.4 percent, respectively. The average per-hectare use of fertilizer on other crops was 61.3 kg (34.5 kg/ha N, 18.5 kg/ha P2O5 and 8.4 kg/ha K2O).

- **Rice-wheat system**

Rice-wheat is the most important cropping system in terms of area, fertilizer use and crop productivity. It is practised in various environments and on different soil types and covers an estimated area of about 10 million ha on the IGP. Per-hectare fertilizer use under the rice-wheat cropping system in the IGP is estimated at 334 kg. It varies from 258 kg in the Lower Gangetic Plain (LGP) region to 444 kg in the Trans-Gangetic Plain (TGP) (Haryana) region (Table 14). In the IGP, farmers apply 117.3 kg/ha N, 35.2 kg/ha P_2O_5 and 11.8 kg/ha K_2O on rice and 120.3 kg/ha N, 38.2 kg/ha P_2O_5 and 11.1 kg/ha K_2O on wheat. The productivity of rice and wheat crops in the IGP is estimated to be 2.95 and 3.95 tonnes/ha, respectively. In the IGP, the productivity of rice-wheat cropping systems decreases from west to east.

4. Fertilizer distribution and credit

In 1944, the Government of India established the "Central Fertilizer Pool" as the official agency for the distribution of all available fertilizers at fair prices throughout the country. All fertilizers, whether domestically produced or imported, were pooled together and distributed through state agencies. In 1966, manufacturers were allowed to market 50 percent of their production. By 1969, the domestic manufacturers had been given complete freedom in marketing. However, this was short-lived. Fertilizer shortages in the early 1970s led the Government to pass the Fertilizer Movement Control Order in 1973, which brought the distribution of fertilizers under government control.

In the mid-1970s, the supply and distribution of fertilizers were regulated under the Essential Commodities Act (ECA). Manufacturers were allocated a quantity of fertilizers in different states according to a supply plan. All the fertilizers were distributed by the manufacturers according to their ECA allocation during the two

cropping seasons, kharif and rabi. This system continued up to August 1992. Thereafter, all P and K fertilizers were decontrolled. AS, CAN and ammonium chloride (ACL) were also decontrolled. All these fertilizers were free from distribution control. Only urea continued to remain under control.

With effect from 1 April 2003, the Government implemented the "New Fertilizer Policy", which allowed urea manufacturers to market initially 25 percent and subsequently 50 percent of their production outside the purview of distribution control. This practice continues today. Urea manufacturers can now market 50 percent of their production as they wish.

The total quantity of fertilizer materials distributed annually increased from 0.3 million tonnes in 1951 to 34.9 million tonnes in 2003/04. This large volume of fertilizer is distributed through a well-developed marketing network spread throughout the country. Cooperatives supply almost 35 percent of the total quantity available from domestic production and importation. Private channels distribute the balance (65 percent). As on 31 March 2004, the total number of sale points was 282 468. Of these, 77 percent were privately owned and 23 percent were in cooperatives and other institutional channels.

FIGURE Fertilizer marketing and distribution channels

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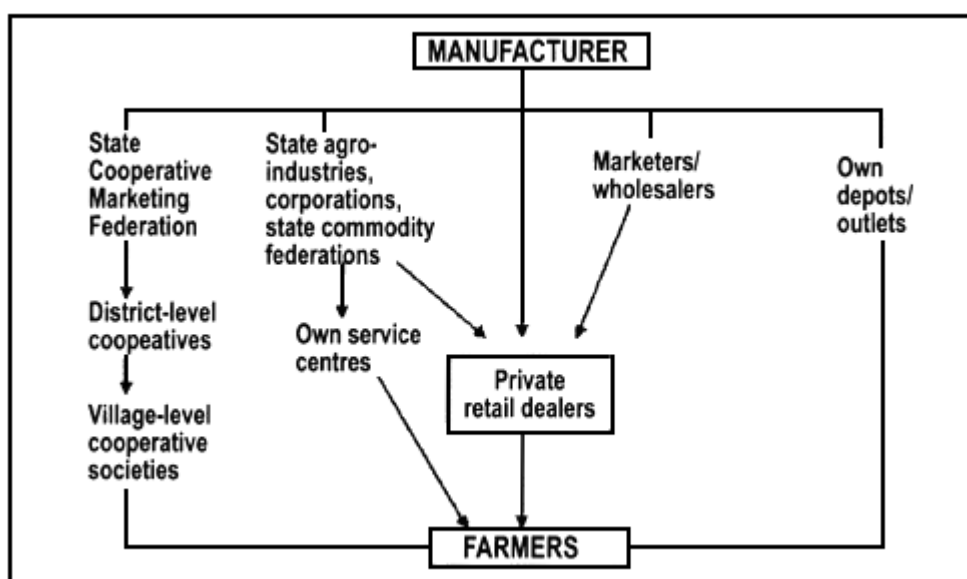
Currently, about 75 percent of the total quantity of fertilizer is moved by rail and the remaining 25 percent by road. The average distance of fertilizers moved by rail is about 850 km. However, within a radius of 200 – 250 km from the plant, most of the fertilizer materials are moved by road. The economics of movement favours road transportation up to this distance.

Figure 5 shows the present system of fertilizer marketing and distribution is presented. Indigenous fertilizers are distributed through institutional channels (cooperative societies, agro-industry corporations, state commodity federations, etc.) and private trade. The cooperative marketing structure varies from state to state (two to four tiers). Handling agents distribute imported urea. State agencies and domestic manufacturers distribute imported DAP and complex fertilizers, MOP and SOP.

5 The World fertilizer an overview, 1920/21 to 2000/01

Fertilizer nutrient consumption

1950 to 1989. During this period, with temporary setbacks notably due to the oil crises in the 1970s, there was a sustained increase of world mineral fertilizer consumption, which increased from 14 to 143 million tonnes $N+P_2O_5+K_2O$, nitrogen, phosphate and potash, or almost 6% per annum.

1989/90 to 1993/94. During these four years world fertilizer consumption fell by 23 Mt, from 143 to 120 Mt total nutrients. The reduction was due to a 23 Mt decline of fertilizer nutrient use in the countries of Central Europe and of the Former Soviet Union, the FSU, and also, to a lesser extent, a fall of almost 5 Mt in West Europe. The falls were partly offset by increases in Asia.

1993/94 to 1999/2001. During this period, world total nutrient consumption increased from 120 to an average of 138 Mt. Consumption in Socialist Asia, South Asia and Latin America increased, that of West Europe stabilized while demand in the FSU fell again.

By 1996 world nitrogen consumption had regained its 1989 level, with increases in developing countries offsetting falls in Europe and the FSU. However, world phosphate consumption remains below its 1988/89 peak (33 versus 38 Mt P2O5), as does that of potash (22 versus 28 Mt K2O).

During the period 1998/99 to 2000/01 Socialist Asia, mostly China, accounted for 27% of world fertilizer consumption, South Asia, mostly India for 16%, North America, mostly the USA also for 16%, West Europe for 12% and Latin America for 8% i.e. all together for almost four fifths of total world consumption. Sub-Saharan Africa excluding South Africa accounted for 1%.

Thirty-Year Outlook: Since the end of the 1970s, The Food and Agriculture Organization of the United Nations, the FAO, has prepared forecasts of worldwide yields and areas. According to the latest survey, the projected absolute increment in world crop production from 1995/97 to 2030, i.e. 34 years, will be 57%. The rate of increase will be greater in developing countries than in developed countries. The developing countries should account for 72% of world crop production in 2030 compared with 53% in 1961/63.

Future fertilizer requirements have been related to FAO's latest forecasts of worldwide crop yields and areas*. In order to attain the yields projected by the FAO, it is forecast that fertilizer consumption will have to increase from the present level of 138 million tonnes $N+P_2O_5+K_2O$ to between 167 and 199 million tonnes per year by 2030. This represents an annual growth rate of between 0.7 and 1.3 percent per annum, which compares with an average annual increase of 2.3% p.a. between 1970 and 2000.

Most of the increase will be in South and East Asia and in North and South America.

Fertilizer nutrient consumption, by South Asia, 1970/71 to 2000/01

India accounts for 80% of fertilizer consumption in the region, but Pakistan and Bangladesh also have large fertilizer requirements. This region is facing considerable population pressures, with very limited reserves of good agricultural land. Economic progress is boosting the demand for agricultural products. The region depends on adequate and efficient fertilization for its economic well-being.

Following twelve years of favorable monsoons fertilizer use in India decreased by 8% in 2000/01 mostly as a result of adverse weather conditions, but recovered partially in 2001/02. Fertilizer use in Pakistan is hampered by a nutrient imbalance in favour of nitrogen, and in Bangladesh by periodic floods.

6 About the Sample Units:

▪ Gujarat State Fertilizers & Chemicals Ltd:

Gujarat State Fertilisers & Chemicals Ltd., previously known as The Gujarat State Fertilizer Company (GSFC) was promoted by the Government of Gujarat in 1962, in the joint sector, for the manufacture of fertilisers and heavy chemicals. GSFC, along with the Gujarat government, promoted Gujarat Narmada Valley Fertilizer Company (GNFC), which has the largest fuel-based ammonia plant and the largest single stream urea plant in the world when commissioned. GSFC Investment and Leasing Company Ltd is a subsidiary of the company.

In 1994-95, the company signed a MoU with the Uganda Development Corporation to set up a phosphatic fertilizer project in Uganda. It promoted Gujarat Airways along with the Gujarat government to operate flights to and from Bombay. Besides this, GSFC has signed an agreement with GSFC and Tahal Consulting Engineers, Israel, have formed a joint-venture consulting company in water management to bring relief to Gujarat's arid zones.

In 1999-2000, with a view to diversify in the field of information technology, the

Company signed an MOU with L & T. The Company has also incorporated a separate company in the name of GSFC Infopark Limited.

The Company is engaged in the implementation of the DAP expansion project of the capacity of 4.0 lakh tonnes per annum at Sikka, Jamnagar. During 2004-05 the company has also considered to incorporate necessary modification at Sikka DAP Plant to produce NPK Fertilizer at an estimated cost of Rs.3 crores. During 2003-04 the company decided to set up a production facility of MEK-Oxime with a capacity of 6500 MTPY at an estimated cost of Rs.7.5 crores with is expected to be completed by May 2005. Further the erection of MEK-Oxime was completed and the trial production has commenced from 23rd April 2005. During 2004-05 the company has decided to go for additional production facility of Mek-Oxime plant with completion by end of May 2005.

- **Gujarat Narmada Valley Fertilizers Company Ltd:**

Incorporated in May'76, Gujarat Narmada Valley Fertilizers Company (GNFC) is a joint-sector company jointly promoted by the Gujarat government and Gujarat State Fertilizers Company. The Company has its presence in Fertilizer Business, Industrial Chemical Business and Information Technology Business. In Jul.'92, GNFC came out with a rights issue to meet normal capital expenditure, augment long-term working capital requirements and revamp ammonia/urea plants at a project cost of Rs 234 cr. GNFC has the world's largest single-stream, fuel-oil-based ammonia and urea plants. It tied up with Kemira, Finland, and Leonard, US, to set up a 10,000-tpa formic acid plant in 1988. It established a joint venture with Chematur, Sweden, and IBI Chematur, Bombay, to form Narmada Chematur Petrochemicals, to produce 20,000 tpa of toluene di-isocyanate with DuPont technology. In 1985, it implemented a 20,000-tpa methanol project. It commissioned a 50-MW captive power project in two phases, the first in 1987 and the second in 1989. In 1991, it established a 1,42,500-tpa nitro-phosphate plant and a calcium ammonium nitrate plant.

During 1999-2000, the Company inaugurated Infotower at Ahmedabad. The Company through Infotower has diversified into Information Technology. The Company has signed MOU's with business partners having technical strength for strategic alliances. The Projects include Telemedicine, Software Development, V-Sat Services, Internet Service Provider (ISP) services, Internet Gateway, Certification Authority etc.

The Company signed an agreement with B P Chemicals UK for revamping of the Acetic Acid Plant. Subsequent to the capacity was enhanced from the existing 50,000 TPA to 1,00,000 TPA. The company has decided to convert the Pneumatic instrumentation system of the Ammonia plant into Digital Control System. During 2004-05 the company completed the capacity enhancement of Formic Acid plant by revamping of the purification section utilizing spare columns and its reboiler available from Acetic Acid Plant and further the company has successfully revamped and commissioned a new parallel Methyl Format Section. This project was completed at an investment cost of Rs 9 Crores. Some of the projects of the company which are under implementation are Air Separation Unit Revamping at an estimated cost of Rs.58 crores and this project is expected to be completed by July 2005. Hydrogen PSA Revamping by increasing the production about 1200 NM3/Hr and this project was completed in April 2005 and was commissioned on 15th May 2005. A New Methanol Synthesis Unit is being setup up utilizing the spare reactor available from Methanol-I plant after Isothermal reactor revamping. The project is estimated at an cost of Rs.30 crores and expected to be completed by February 2006. A New Ammonium Nitrate Melt filling station with a capacity of about 400MT per day is being set up at a cost of Rs.11 crores and this is expected to be completed and commissioned by September 2005. The company has also decided to shifts its existing filling stations of all industrial products at a distant locations from the plants at a estimated cost of Rs.25 crores and this is expected to be commissioned in January 2006.

The Company has planned to install an urea plant at an cost of Rs.15 crores and this is expected to completed by 2005-06. The company has also planned to increase the production of Methanol about 175 MT per day by capacity enhancement of SGGU, Methanol reformer revamping and synthesis section revamping and forming a new Methanol Distillation Unit and this project is expected to be completed by 2007. During the year 2004-05 the company has increased the installed capacity of Methanol and Formic Acid by 30000 MT and 5000 MT respectively. With this expansion the total installed capacity of Methanol and Formic Acid has increased to 150000 MT and 10000 MT respectively.

During October 2005 the company has decided to merge Narmada Chematur Petrochemicals Ltd, a wholly owned subsidiary of the company, with the company. The Scheme of Merger is subject to approvals. The Company has commissioned PKI Project during 2004-05 and the construction of this project was completed by May 2004. It is a separate division named (n)Solutions.

- **Indian Farmers Fertilizer Co-operative Limited:**

During mid- sixties the Co-operative sector in India was responsible for distribution of 70 per cent of fertilizers consumed in the country. This Sector had adequate infrastructure to distribute fertilizers but had no production facilities of its own and hence dependent on public/private Sectors for supplies. To overcome this lacuna and to bridge the demand supply gap in the country, a new cooperative society was conceived to specifically cater to the requirements of farmers. It was a unique venture in which the farmers of the country through their own Co-operative Societies created this new institution to safeguard their interests. The number of co-operative societies associated with IFFCO has risen from 57 in 1967 to 38, 155 at present.

Indian Farmers Fertilizer Co-operative Limited (IFFCO) was registered on November 3, 1967 as a Multi-unit Co-operative Society. On the enactment of the Multistate Cooperative Societies act 1984 & 2002, the Society is deemed to be registered as a Multistate Cooperative Society. The Society is primarily engaged in production and distribution of fertilizers. The byelaws of the Society provide a broad frame work for the activities of IFFCO as a Cooperative Society. IFFCO commissioned an ammonia - urea complex at Kalol and the NPK/DAP plant at Kandla both in the state of Gujarat in 1975. Another ammonia - urea complex was set up at Phulpur in the state of Uttar Pradesh in 1981. The ammonia - urea unit at Aonla was commissioned in 1988.

In 1993, IFFCO had drawn up a major expansion programme of all the four plants under overall aegis of IFFCO VISION 2000 . The expansion projects at Aonla, Kalol, Phulpur and Kandla have been completed on schedule. Thus all the projects conceived as part of Vision 2000 have been realized without time or cost overruns. All the production units of IFFCO have established a reputation for excellence and quality. A new growth path has been chalked out to realize newer dreams and greater heights through Vision 2010 which is presently under implementation. As part of the new vision, IFFCO has acquired fertilizer unit at Paradeep in Orissa in September 2005. As a result of these expansion projects and acquisition, IFFCO's annual capacity has been increased to 3.69 million tonnes of Urea and NPK/DAP equivalent to 1.71 million tonnes of P2O5. IFFCO has made strategic investments in several joint ventures. Godavari Fertilizers and Chemicals Ltd (GFCL) & Indian Potash Ltd (IPL) in India, Industries Chimiques du Senegal (ICS) in Senegal and Oman India Fertilizer Company (OMIFCO) in Oman are important fertilizer joint ventures. Indo Egyptian Fertilizer Co (IEFC) in Egypt is under implementation. As part of strategic diversification, IFFCO has entered into several key sectors. IFFCO-Tokio General Insurance Ltd (ITGI) is a foray into general insurance sector. Through ITGI, IFFCO has formulated new services of benefit to farmers. 'Sankat Haran Bima Yojana' provides free insurance cover to farmers along with each bag

of IFFCO fertilizer purchased. To take the benefits of emerging concepts like agricultural commodity trading, IFFCO has taken equity in National Commodity and Derivative Exchange (NCDEX) and National Collateral Management Services Ltd (NCMSL). IFFCO Chattisgarh Power Ltd (ICPL) which is under implementation is yet another foray to move into core area of power. IFFCO is also behind several other companies with the sole intention of benefiting farmers.

The distribution of IFFCO's fertilizer is undertaken through over 37,000 co-operative societies. The entire activities of Distribution, Sales and Promotion are co-coordinated by Marketing Central Office (MKCO) at New Delhi assisted by the Marketing offices in the field. In addition, essential agro-inputs for crop production are made available to the farmers through a chain of 158 Farmers Service Centre (FSC). IFFCO has promoted several institutions and organizations to work for the welfare of farmers, strengthening cooperative movement, improve Indian agriculture. Indian Farm Forestry Development Cooperative Ltd (IFFDC), Cooperative Rural Development Trust (CORDET), IFFCO Foundation, Kisan Sewa Trust belongs to this category. An ambitious project 'ICT Initiatives for Farmers and Cooperatives' is launched to promote e-culture in rural India. IFFCO obsessively nurtures its relations with farmers and undertakes a large number of agricultural extension activities for their benefit every year.

At IFFCO, the thirst for ever improving the services to farmers and member co-operatives is insatiable, commitment to quality is insurmountable and harnessing of mother earths' bounty to drive hunger away from India in an ecologically sustainable manner is the prime mission. All that IFFCO cherishes in exchange is an everlasting smile on the face of Indian Farmer who forms the moving spirit behind this mission.

IFFCO, to day, is a leading player in India's fertilizer industry and is making substantial contribution to the efforts of Indian Government to increase food grain production in the country.

Table-7 Types of Mineral Fertilizers

(Some of the well known fertilizers used in India are)

Nitrogenous Fertilizers	
Urea	46%N
Ammoniam Sulphate (As)	21%N
Ammoniam Chloride (ACl)	26%N
Calcium Ammoniam Nitrate (CAN)	25%N
Phosphatic & Potassic Fertilisers	
Single Super Phosphate (SSP)	16% P2O5
Muriate of Potash (MOP)	60%K2O
Sulphate of Potash (SOP)	48%K2O
Di-ammonium Phosphate (DAP)	18 - 46
Rock Phosphate (RP)	16 - 20% P2O5
NPK Grades	
	10:26:26
	12:32:16
	14:35:14
	15:15:15
	16:20:00
	17:17:17
	19:19:19
	20:20:00
	23:23:00
	28:28:00

(Source: Company web)

Till mid sixties cooperatives in India had no production facility despite marketing nearly 70% of fertilizers. IFFCO was established as the farmers' own initiative in Cooperative Sector on 3rd Nov.'67 with the proposed plants at Kalol & Kandla. With the enactment of Multi State Co-operative Societies Act 2002, the Society is

deemed to be registered as a Multi State Co-operative Society. Largest producer of fertilizers in the country, No. of Plant Locations : Five, Installed Annual Capacity ('000 MT) UREA – 3689, NPK/DAP - 4335.0 TOTAL ' N' -2380.7, TOTAL 'P2O5' -1784.5. Only Fertilizer Institution in the country to have surpassed 60 lakh MT per annum in terms of production and 80 lakh MT per annum in respect of sales Contributed about 18.3% to the total 'N' and 23.0% to the total "P2O5" produced in the country during the year 2005-06 Fertilizers marketed through 37424 Cooperative Societies and 158 Farmers Service Centers Service to the Farmers through a variety of programme IFFCO - IN BRIEF Authorized Share Capital : 1000.00, Subscribed and Paid up Capital : 422.51, (All Share Capital by Cooperatives only) (As on 31st March 2006) (Rs Cr), Fertilizer production 899.284 Lakh MT., Fertilizer sales 946.394 Lakh MT., Turnover Rs. 69512 Crore, Profit before tax Rs. 5813.1 Crore, Profit after tax Rs. 4561.8 Crore, Contribution to exchequer Rs. 3791.3 Crore

- **Liberty Phosphate Ltd.:**

International public company74/75 and 83 GIDC, Nandesari, Vadodara 391 340, India 1 0265 284 0217/8, 91 0265 284 0890 fax, Primary SIC: Industrial Inorganic Chemicals, Not Elsewhere Classified, Primary NAICS: Inorganic Dye and Pigment Manufacturing. Manufacturing: Production and distribution of phosphate and fertilizers Medieval agriculture to modern farming are the strides and contribution of our 90 Million dedicated farmer community to the development of Indian agriculture during the last 50 years. Achieving self-sufficiency in farming, food grain production is the major premise of Fertilizer Industry in India. To ensure timely and proper availability of essential plant nutrients for increasing the crop production "Liberty" took birth in 1977 and carried out expansion time to time to enhance its capacity to cope up with the increasing demand. Now the Group is having manufacturing capacity of 7,25,000 MTs. per annum of SSP Fertilizer and 1,65,000 MT per annum of NPK, claiming

to be one of the major SSP manufacturing company in the country known as *"LIBERTY PHOSPHATE LIMITED"*. The Group company has 6 units situated at different parts of the country. They are at Udaipur & Kota in Rajasthan, Baroda in Gujarat, Pali in Maharashtra, Nimrani in Madhya Pradesh & Munirabad in Karnataka. The Group has the business of SSP manufacturing as well as manufacturing of NPK in their different units. The Group as a whole caters about 18% of the SSP fertilizer demand in the country.

The Turnover of the Group, as a whole, is about 200 crores. The company is a Public Limited Company and listed in the major Stock Exchanges of the country. The Group Company can lay claim to be the catalyst in the transformation of Indian Agriculture with high capacity and strong dealership network catering 13 States in the country directly as well as through co-partners and pioneer fertilizer companies like Chambal Fertilizers & Chemicals Ltd., Gujarat Narmada Valley Fertilizer Co. Ltd., Zuari Industries Ltd. Its quality fertilizer enjoys the farmer's unassailable confidence and provide cutting edge.

Needless to say, it has helped to millions of farmers to reap bumper harvest year after year on sustainable basis maintaining the soil health. The Group has future plan, looking into the demand and popularity of its brand and product, to put-up new projects in other States like Uttar Pradesh, Haryana & Central Madhya Pradesh by 2007 and thereby increasing its production capacity to One Million Metric Ton per annum.

Because of its Multi-location establishment, the Group has an advantage of viable cost-effective manufacturing and selling in the different locations even to the interior to reach the Farmers of the country. A predominant quote have been followed & we are adhering to same principle & consequently Liberty Group is right now the Giant/Leaders of SSP Industry. The stage is reached not in a single day, but gradually by virtue of devotion/hard working by employees of Liberty & Guidance from Hon'ble CMD. SSP industries has over the years shows many up & down due to certain constraints whether climatic or internal or availability of

Raw Material and on account of these many industries has been closed. But our CMD/ Management has shown extra confidence only in his employees and kept patience over the years to continue the industry and as a result of it, we have captured the entire SSP markets, though certain areas are left uncovered. The success of any industry depends on efficiency of the management. Fortunately, Liberty Group has team of efficient personnel who are performing with their best efforts with implementation of New Policies.

Liberty group of industries is having six manufacturing units through out the India with a manufacturing capacity of 7,25,000 MTs per annum.

At present, we have 14.25% market share of the total consumption of SSP in the country. The group is engaged mainly in the production and sales of SSP and beside this supplying 100% water soluble to the farmers of Gujarat, Madhya Pradesh and Maharastra in various grade i.e. 19:19:19, 13:0:45, 0:52:34, 0:0:50, calcium nitrate. The Group is importing the same from well reputed manufacturer SQM from Belgium in loose form and packed in India in very popular "Double Horse" Brand before supply.

The management of the group has finalized following upcoming projects :

- To establish a SSP plants at Visakappatnum with capacity of 1.32 MT per annum to fulfill the demand of farmers of southern part of India.
- Management has also decided to import MOP, SOP and Ammonium sulphate during the year 2006-2007 for providing the range of fertilizer to the network.
- Liberty group will establish 4-5 mobile laboratories for testing of fertilizer/ soil for the farmers of Rajasthan, Gujarat and M.P. State.
- The group has made a separate budget to adopt 45 villages during current financial year for work as product promotional activities.

An only Source to fulfill all the three Ingradients – Phosphorous, Sulphur and Calcium in Plants. It is a product of largest Single Super Phosphate manufacturing company in India having ISO 9001:2000 Certification. This is only

a company manufacturing Single Super Phosphate in India who received this Certificate of quality of its product. It has six manufacturing unit located in Rajasthan, Gujarat, Madhya Pradesh, Maharashtra & Karnataka thereby catering manure requirement of farmers of almost 20 States in our country. It is fully dedicated to farmers to cater their requirement of manure for the last 30 years with proven quality product. We are thankful to all those Indian Agriculturists who made our "Double Horse" Brand SSP so popular with highest sale in India.

Product Range :

The company has facilities to manufacture the following range of product as per the requirement and specification of the customers:

1. SSP	: 16% WSP205	: Powder	Grade-l
2. GSSP	: 16% WSP205	: Granulated	Grade-l
3. N.P.K.	:17:17:17 : 19:19:19 : 20:20:0 : 15:05:05 : 20:10:10 : 18:18:10 : 08:18:15 : 23:21:0		

Uses:

Double Horse Single Super Phosphate's required quantity for various crops:

Crops Name	Quantity of DOUBLE HORSE at the time of Sowing (Kg. Per Acre)
Mustard	100 Kg.
Pulses	100 to 150 Kg.
Vegetables	200 Kg.

Soya bean	150 to 250 Kg.
Wheat	150 Kg.
Barley	150 Kg.
Sugarcane	200 Kg.
Opium	100 Kg.
Potato	300 Kg.
Cotton	100 to 150 Kg.
Groundnut	150 to 250 Kg.
Jawar	100 to 150 Kg.
Maize	100 Kg.
Fruit lants (Mango, Guava,)	1 to 1.5 Kg. Per plant

7 Contribution of Fertilizer industry in the Indian Economy:

Fertilizer industry has a good impact on the development of Indian economy. The following points may reflect its contribution.

1. Agricultural development: with the help of fertilizer industry, Indian agricultural development was made possible. It has played a vital role in the green revolution as well the areas where lands were not having good fertility.

2. Capital investment: fertilizer industry to day has more than Rs. 5700 Cr investment and is become one of the important industries of the economy.

3. Corporate development: in the last thirty – fourth years this industry is becoming a structured. It has made many joint ventures, multinationals and co-operatives that is one of the unique characteristic of the industry development in the nation.

4. Regional development: Gujarat, Maharashtra, Punjab, Uttar prades, Andhra, Assam, Bangal, Rajasthan, Bihar are the states who has many plants of fertilizers. These states' economy has a high impact of fertilizers units.

5. Employments: this industry has provided shelter to 3.5 laks families in the last fifty years directly and a numbers of supporting industry during the last three decay.

8 Challenges of Fertilizer units working in India:

- Efficiency: the demands of fertilizers have increased and is increasing day by day. To meet the requirement the units have to increased its productivity through researches, reducing wastages and by handling the material carefully. It is also found that the productivity of the Indian units is not in the line of the developed countries.

- Investment: considering the high demand world over, this industry is required to invest more capital. The co-operative sector has its own limitations for the investment while other units can generate funds through the open market.

- Capacity: the demand of the fertilizer industry is increasing and to meet the demand of the market industry is required to expand its capacity. Even there is a high potential demands from underdeveloped countries for the fertilizers and to meet them it is urgent need to increased the capacity of the plants. Again it requires more investment.

- Subsidy: According to the agreement with the WTO, Indian industry is required to reduce the subsidy given on the prize of fertilizers. Due to this the prices of the fertilizers go up and it may not be within the rich of the poor farmers. This may affect the industry adversely.

- New fertilizer policy: the new fertilizer policy of the Indian government is also one of the important challenging factors for the industry. The main provision of the policy are as:
    - make Urea free from control by 2006
    - introduction of group reward in 2001
    - increased prices of Urea every year by 7%

Productivity: it is found that the agricultural productivity of Indian land is inferior to the developed countries. Even the size of the farm in India is also small so the use of the fertilizer is not found proper by the India farms.

Liquidity: fertilizer industry in India is depend on the Government subsidy, more over the efficient usage of the various resources is not found proper among the various units. This results in the insufficient financial liquidity for the units.

Competition: after globalization Indian market is open for the foreign companies. This result in the high competition for the Indian companies. Indian production cost is very high as well quality is also required to improve to match the international standard. This affect the industry adversely.

9. Future prospects

India's food grain requirement to feed the estimated population of 1 400 million by 2025 will be 300 million tonnes (based on rice, i.e. unhusked paddy rice). There will be a corresponding increase in requirement of other crops such as cotton, sugarcane, fruits and vegetables. The country will require about 45 million tonne of nutrients (30 million tonnes for food grains and 15 million tonnes of nutrients for other crops) from various sources of plant nutrients, i.e. fertilizers, organic manures and bio fertilizers. The further increase in crop production will have to come from an increase in yields as there is limited scope for increasing cultivated area. The yields of the majority of the crops are relatively low and there is great potential for increasing them through the increased use of inputs such as fertilizers. Fertilizer use will remain key to the future development of agriculture.

The handling of increasing quantities of fertilizers will put pressure on storage and handling facilities and transport. Products and practices that improve fertilizer-use efficiency will need special encouragement. Fertilizer promotion will have to include activities that promote not only increased rates of use but also

better balances between the nutrients and higher efficiency. Attention also needs to focus on the availability of credit, an essential factor in ensuring the availability of fertilizers to farmers.

India will continue to be a major importer of raw materials, intermediates as well as finished products. The fertilizer product pattern is unlikely to change in the near future, and urea and DAP will continue to dominate fertilizer production. Attention will need to focus on ensuring the availability of good-quality micronutrient fertilizers.

References:

(1)   Gupta R. K., Public Enterprises in India, Agra : Sahitya Bhawan, 1978

(2)   Gross Harry, Financing Small and Medium Sized Business, (N.J.) : Prentice Hall INC. Englewood Cliffs.

(3)   Hanson A. H., Managerial Problems in Public fertilizer Enterprises, Bombay, 1962.

(4)   Harvey M. Wagner, Principles of Operations Research with Special Reference to fertilizer Manufactures, Inventories, NBER, 1950.

(5)   Juma Volter Mwapachu, Management of fertilizer units in Developing Countries, Oxford and I. B. H. Publishing Company, 1983.

(6)   Khera, S. S., Government in fertilizer Business, Delhi, National Publishing House

(7)   Laxmi Narain, fertilizers in india, Delhi 1968.

(8)   Mishra, R. K., & Ravi Shanker S., Current Perspective in fertilizers , Delhi : Ajanta Publications (India), 1985.

(9)   Sanker T. L., Mishra R. K. and Ravishanker, Public Enterprises in India – The Focus on Researches, Bombay : Himalaya Publishing House, 1983.

(10)   United Nations Some Problems in the Organisation and Administration of fertilizers, New York : 1954

(11)   Ziauddin Khan and Arora R. K., Fertilizers in India, Ed. 1975.

(12)   Association of Fertilizers bulletin june 2003

Chapter 3

Research Methodology

Contents

1. **Introduction**

2. **About the Industry**

3. **Problem of the Study**

4. **Objectives of Study**

5. **Significant of the Study**

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7 **Review of existing literature**

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9 **Periods of study and Data collection**

10 **Data collection and analysis**

11 **Scope of research**

12. **Chapter plan**

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1. Introduction

Present age is the age of research and development. Results of primary research have gifted the society and nation with new bounties. The results of such research by any nation may be proved useful of international level. The value of research has been increased in the field of commerce, as it is important in the medical and science field. Indian management system and administration get a valuable direction form such resources. From last four to five decades, researches have not remained limited to the production and advertisement fields but it has covered vast areas like commercial system, decision-making process, maintaining relations, financial liquidity and development and other practical and strategic fields. And they are helping lot in building strong and effective commercial field. Even it caused kinetivity and result oriented success in Indian industrial development.

In commercial field, a researcher may elect different researches as sub fields for research purpose and can check tendencies of chosen industry or service sector. According to this study system the researcher has chosen the chemical Fertilizer Industry of India for research purpose. India is agriculture-oriented country and scientific increment in agricultural productivity can be the important object of different interested groups in India. In such group farmer himself, regional government, central government and people are counted important. In India conventional farming abstracts scientific increment in productivity. Small piece of lands, traditional inventories, unscientific plugging, harvesting, farming and irrigative system infertility of land, along with the absence of use of pesticides and insecticides or other scientific methods unskilled labor mostly family members are the main facto or obstacle in development. Besides such main challenges. Indian fertilizer industry faces the problems of financial liquidity, industrial competition and changing government policies. At this time all the

working areas are included in commerce. What type of financial liquidity prevails in India chemical fertilizer industry specially industry established in Gujarat state? What is the tendency of development resulted due to commercial systems etc aspects are tried to evaluate under different heading by researcher. Other details too of this subject are presented in this chapter.

2. About the Industry:

India is agriculture oriented country and scientific increment in agricultural productivity can be the important object of different interested groups in India. In such groups farmers, regional government, central government and people are important. In India conventional farming abstracts scientific increment in productivity. Small piece of lands, traditional inventories, unscientific plough, harvesting, farming and irrigative system infertility of land, along with the absence of use of pesticides and insecticides or other scientific methods unskilled labor mostly family members are the main facto or obstacle in development. Besides such main challenges, Indian fertilizer industry faces the problems of financial liquidity, industrial competition and changing government policies. At this time all the working areas are included in commerce. What type of financial liquidity prevails in India chemical fertilizer industry especially industry established in Gujarat state. What is the tendency of development resulted due to commercial systems? etc. aspects are tried to evaluate under different heading by researcher. India's chemical fertilizer industry is mainly stabled in the state of Gujarat, Punjab, Haryana, Madhya Predesh, Karnataka, Tamilnadu, Maharastra and Andhra Pradesh. Some units are established in other states too. As a vehicle of development, chemical fertilizer is the basic industrial product in the states which are putting more emphasis in agriculture field. And it is used to bring more effectiveness by the medium of productivity. This industry is important from two view points. One, its share in industrial development and other, its direct and indirect share in agriculture based industries. Its financial capacity is also important from the view point of industrial development. It makes the highest quality fertilizer available at the lowest cost and also results in maximum

productivity in agricultural sector. Even industries using agricultural products as raw material can improve quality and productivity at a time.

The trend in the development of the fertilizer industry in India is somewhat similar to global industrial growth. For instance, ammonium nitrate and urea were already chemically defined in 1659 and 1773 respectively. The exploitation of their potential as fertilizers came only two to three centuries later. Large scale commercialization of fertilizer began with the discovery of sodium nitrate in Chile in 1809.Although other deposits were subsequently discovered in France (1925) USA (1925) and Russia (1930). Germany continued to be the world's largest supplier unit 1944. Today's world largest producer Canada discovered its potash deposits only in 1943. The era of the modern fertilizer industry took off in the early 1960's. The green revolution provided the necessary impetus through breeding cereals that respond well to nutrient inputs. The public sector has indeed played a significant role in India's economic development but it also faces problems. The large number of public sector enterprises that are not commercially profitable. The main reasons are poor location selection and high cost.

In the industry having different dimensional importance, the main problem under the study is to check short term financial position, to analyze and comparative study after classification. The heading of the research study is, "Working Capital Management of Fertilizer Industry of Gujarat." The samples of the study are the units working in the state i.e. Gujarat Narada Valley Fertilizers Company, Gujarat State Fertilizers Corporation, Liberty Phosphate Ltd., and Indian Farmers Fertilizers Company.

3. Problem of the Study

India's chemical fertilizer industry is mainly stabled in the state of Gujarat, Punjab, Haryana, Madhya Predesh, Karnataka, Tamilnadu, Maharastra and Andhra Pradesh. Some of the units are established in other states too. As a

vehicle of development, chemical fertilizer is the basic industrial product in the states that are putting more emphasis in agriculture field. And it is used to bring more effectiveness by the medium of productivity. This industry is important from two viewpoints. One is its share in industrial development and other is its direct and indirect share in agriculture-based industries. Its financial capacity is also important from the viewpoint of industrial development. It makes the highest quality fertilizer available at the lowest cost and also results in maximum productivity in agricultural sector. Even industries using agricultural products as raw material can improve quality and productivity at a time. The industry having different dimensional importance, the main problem under study is to check financial liquidity position of the sample units. The title of the research study is, "Working Capital Management of Fertilizer Industry of Gujarat."

4. Objectives of the Study

The purpose of the research is to discover answers of the following question through the application on scientific procedures. The main objective of the research is to understand the liquidity management of fertilizer units as well the problems in liquidity management of these units. This broader objective is classified into:

I.   To know the position of working capital of unit under study of chemical fertilizer industry.

II.   To know the tendency of raw material of the unit under study of chemical fertilizer industry.

III.   To know credit tendency of the unit under study of chemical fertilizer industry.

IV.   To know cash tendency of the unit under study of chemical fertilizer industry.

V.   To know suppliers tendency of the unit under study of chemical fertilizer industry.

5.   Significant of the study:

Fertilizer industry despite of all limitations is very important as agriculture sector contributes about 24% to the gross domestic product of the nation. The usage of fertilizer is increasing in India. But this industry is facing the problems of liquidity and profitability. Considering the above problems, it is very essential to look into the working capital management of these units. For this purpose, various components of liquidity will be analyzed and the researcher will try to find out the major problems of the liquidity management

6.   Hypothesis of the Study

Two hypothesis will be used in this study. One, hypothesis based on Chi-square test is to understand interplant working capital direction and growth / efficiency. The statement of null hypothesis is, "The working capital indices of the sample units can be represented by the straight line trend based on the lest square method." The other null hypothesis to be tested is based on Kruskal Wallis one way analysis of variance test. It has been tested to see whether there is any significant difference between working capital ratios of the sample units. The statement of null hypothesis is, "There is no significant difference between the working capital of the sample units." The acceptance of the said hypothesis would reveal that the working capital of various sample units is approximately equal. The level of significance used in this study will be at 5 %. The researcher has selected the following hypothesis for the study.

7.   Review of existing literature:

The research study analyses the chemical fertilizer industry keeping specific financial liquidity factors at center. Keeping in mind such specific factors, it becomes necessary to know the scrutiny of previous researches and articles. The referred literature is listed under. According to Dr. A.S. Kolharns

study use of chemical fertilizer in the are without irrigation is less productive than it is in the irrigated areas. Farming in Saurastra region of Gujarat state depends mainly on rain. Irrigation facilities are limited or not enough. As a result use of chemical fertilizer decreases. According to a study, in India farming about demand of chemical fertilizer and private capital investment have also done. In which Joknstan 1986. Gujarat 1988 and Kautsoinz 1977 are important studies. Some experts have also given the estimations of demand function of chemical fertilizer. Pertaining to this, Parikh 1965, Rao 1973 and Subramangam & Nirmala 1991 are important one. According to these studies demand of chemical fertilizer is based on proportion of irrigated area to total land (area) under cultivation, proportion of cultivated area with high quality seeds to total area under cultivation, prices of chemical fertilizers, prices of agricultural product, rainfall etc. these five variables explain the increased demand of chemical fertilizer.

Chemical fertilizer is an important factor for agricultural productivity. Use of chemical fertilizer increases agricultural production and productivity. Some studies also have proved the same. High breed seeds and chemical fertilizer caused notable increase in agricultural production. As shown in study by Badrinathan 1978 seeds, fertilizer and irrigation play important role in agricultural productivity. Studies by Zha S.K. Raheja and others say that use of chemical fertilizer has increased the production of cotton, paddya and wheat. Opposite to this study by Sharma and Gandhi 1990 says that importance of chemical fertilizer is lesson in agricultural production. Study by Sindhu and Bayarali 1992 also agrees with the same.

Position of chemical fertilizer industry in the years of 1960, 1970 and 1980 are discussed in the article headed "Fertilizer Industry – Not Green Enough" published in Chemical Industry Digest. In the decode of 1990, development in chemical fertilizer industry received a U – turn. Establishment of world Trade Organization, globalization etc are liable. An article headed "Forever Weeded to Subsidies?" published in Fertilizer Marketing discussed the subsidy policies of

chemical fertilizer industry in Asian countries. "Who will survive?" a study by G.S. Gogia discussed uncertainties of Indian chemical fertilizer industry. In the time of WTO challenges against chemical fertilizer industry are shown as problems and solutions. An article, "Trends in fertilizer use and agricultural productivity in south Africa" by Hilmar Ventar discussed the use of regional fertilizer industry in South Africa. According to it the use of chemical fertilizer has gone up in main crops. An article, "IT Application in fertilizer marketing" by V.S. Deshpande discussed about the use of information technology in chemical fertilizer industry marketing. Information technology will play main role in expanding the chemical fertilizer information market at information level. Use of information technology will not remain limited till the accounting and sales digits but now days it is believed to play a significant role in decision making process in international marketing.

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strategically methods to increase the uses of chemical fertilizer in Punjab. In the same research article farmers tendency towards using chemical fertilizer and encouragement of using it have also been discussed. A research article headed "India's Fertilizer Demand out Look." By Dr. Pratap Narayana discussed demand and supply of chemical fertilizer industry and also financial position. In its two sections, the first and second sections respectively discussed about Government policies and financial position of chemical fertilizer industry. A research article headed "Reorientations of Promotional Strategy under Emerging Environment" by Virendrakumar discussed sales incremental strategy in the time of globalization with reference to chemical fertilizer industry. An article headed "Restriction of Indian Fertilizer Industry in Contexts of Emerging WTO" by T T. Thomason directed chemical fertilizer industry working under Government subsidy project for last two decades to be free and competitive in free competition.

A research article headed "Role of Information Technology in Fertilizer Industry" by N. Vijay Raghawan discussed the use of information technology in chemical fertilizer industry with new economic development. A business unit can achieve highest position with overall analysis from collected information by information technology. Research papers headed "Emerging Availability of Fertilizer in Changing Scenario" presented by Shri Gahlot in seminar organized by fertilizer industries association discussed about agriculture and chemical fertilizer industry from the globalization point of view in detail. In these papers assumptions are made about the capacity of Indian chemical fertilizer industry of facing global competition in coming (near) future). An article headed " long term policy for fertilizer sector in India" by U.S. Avasthi says that form the globalization point of view, capital investment will be adversely affected in financial management and it also affects price, consumption and agricultural production in chemical fertilizer industry and national incomer and development.
An article headed "Information Technology in Fertilizer Marketing" by Shri S.C. Mittal and Shri T.Sudhakar show the probability of use of information

technology in marketing. They have presented information about new turning point in fertilizer financial liquidity due to Information Technology Act – 2000. A research article headed "Fertilizer use and credit Need" by G. Kalara, discussed about the use of chemical fertilizer with reference to the production of crops and vegetables. According to them to increase the use of chemical fertilizer, institutional and non-institutional credit is necessary. An article headed "Nitrogen Fertilizer Planning and Market in a Changing World" by Hingis B. discussed political, financial, commercial, social and economic circumstances related with chemical fertilizer industry.

An article headed "Challenges in fertilizer Market an Innovative Approach" by Mahapatra N.K.S. discussed the challenges of liberal chemical fertilizer policy. Bakane ubhesh bhaurao discussed use of fertilizer and its effect on economy in his Ph.D. research study. According to Saxena Padyaja's Ph.D. research report, Indian agriculture industry is affected by fertilizer subsidy and increase or decrease in subsidy in directly related with financial liquidity. Venkatraman V.S. Ph.D. research report discussed price of fertilizer, distribution policy and its financial effects. Kalbhore Kulendrakumar's Ph. D. research study has presented analytical study on distribution of chemical fertilizer production of IFFCO. Rajendrakumar's Ph.D. research study has discussed necessary of nitrogen and sulpher in fertilizer. Azad Mhumad Abdul Kalam's Ph.D. research study has comparatively discussed about the financial arrangement in chemical fertilizer industry in India and Bangladesh. In K.K. Ganatra's Ph.D. research study, comparative discussion about management of chemical fertilizer industry in Gujarat is done.

8.   ample of the study

Total 4 units have been covered in this study considering their operation and age. They are namely; Gujarat Narmada Valley Fertilizers Co. Ltd., Gujarat State Fertilizer and Chemical Ltd., Liberty Phosphate Ltd., and Indian Farmers Fertilizers Co-operatives Ltd. The above sample consist variety of forms of

organization of the industry. Deepak fertilizer and Adarsh fertilizers were not included in the study as their annual reports were not available.

9.   Periods of Study:

This study is based on secondary data taken from published annual reports of the sample units for the period from 1996-97 to 2004-05, various reports of fertilizes association of India and relevant publications were taken into consideration. Most of the work is based on books, periodicals news papers and various government reports are taken into consideration.

10.   Data collection and Analysis:

Information used for the analysis of financial liquidity of fertilizer industry of Gujarat State is availed from the annual reports presented at the end of every accounting year. Annual accounting reports of the units under study are important. The data is collected from head office of the respective units and other sources vita in internet website. Thus, the research is particularly based on secondary data.

Researcher has used secondary data for the presented research study. Sources of secondary data for the research study are as under. Reference books of financial liquidity, books of research methodology, books of fertilizer and agriculture production, specific bulletin, magazines of financial management and chemical fertilizer industry, special articles or news from different economic news papers, annual reports of the sample units, information available at different website on internet,

.

Different ratios related to financial liquidity are obtained form data available which is collected from annual reports by chemical fertilizer industry units and also arranged properly analyzing financial liquidity, comparative study of both the units is done.

1. **Analysis of the Date:**

Data availed for the presented study is classified and tabulated according to different statistical methods and analyzed with proper for formula which are as under.

Ratio Analysis: Very first in 1909 A.D. Alexander Pole presented methodological theory of ratio analysis. With the help of ratios financial statements are analyzed. The success of analysis of financial liquidity of chemical fertilizer industry in Gujarat is seen because of ratios.

Inter relation, expressing comparison between two particulars form financial report is ratio. Accounting ratios show significance of relatives among balance sheet, profit and loss account and digits (numbers) of budgetary control system. "The relationship between the two figures expressed mathematically is called a ratio." – Hingorani, Rramnathans and Grecual. Significance of Ratio: ratios can measure a capacity of the business and also suggest ways to improve ability, significant financial decision can be taken, comparative study of units in same industry is possible, ratio helps to keep effective control over debts and credits, investors too can use ratios to take decision pertaining to investment.

Index Number: Index number is a relative measure. Therefore comparative study of changes in matters with different units becomes possible. Index number is such number that shows comparison of values of variable of given time with the value of same variable of decided time. The changes which can't be measure directly are studied with the help of index number. In other words index number is such number that compares relative change in percentage of any variable for given time period.

Significance of Index Number: economic and commercial positions are known by the index number related with commercial conditions and its study makes planning easy for development, do the decided goals are achieved in business ?

how do we know it without index number ? so index number is said inevitable for business.

.

2   **Chi – Square Test:** Chi Square test is specially used when selected groups show unlikeness from the view point of social and psychological characteristics. It means when data is spread unequally and it is availed only in groups or frequency, x^2 – test is used formula for x^2 –test is:

Chi Square $= \sum (O-E)^2 /E$

Where:

O = Observed value

E = Expected value

In order to test a hypothesis the comparison is made by computing a value of chi-square on the basis of the above formula. If the computed value of chi square is les than the critical value (table value) of chi square at the significance level selected with the appropriate degree of freedom, the null hypothesis is accepted, otherwise it is rejected. (critical value of chi square are obtain from the table of the chi square distribution)

3.   **KRUSKAL WALLIS ONE WAY ANALYSIS OF VARIANCE**
      TEST:

According to James Bradley this is a rank randomization analogue of the observation randomization test……. However the rationale of the Kruskal Wallis one way analysis of variance test has been observed by Jerome Brawerman in these words, it is one way analysis of variance test that employs rank. While ranking the observation all the values are treated as if they belong to one sample. The rank is given from the lowest number to the highest number. As such the lowest number is ranked as No 1 the nest lowest as 2 and so on, until all observations have been ranked. If there happens to be a case of tie that is resolved by giving them the average values of ranks.

The sum of ranks in each sample, the sample, sizes and the total number of observations are used to compute the statistic H where,

$$H = 12 / [N(N+!)j] * [\sum k (Rj)2/nj] - 3 (N-1)$$

Where

N= total number of observations

K= total number of sample

nj= the number of observation in the jth sample

Rj= the sum of the ranks in the jth sample

However if the number of ties is large it will affect the value of H. Consequently, it may be necessary to adjust the value of H by dividing it by the quantity. Null and alternative hypothesis have been tasted on the basis of Kruskal Walis one way analysis of variance test.

Arithmetic Mean: The arithmetic mean is very commonly used in various type of study. It is calculated by adding all values and divided the total by the number of observations. In this study, it is calculated by adding all the indices and dividing it by the total number of years taken.

Standard Deviation: Standard deviation is considered superior to other measures of dispersion because of its merits in mathematically representing the variability. Which is vary important for interpreting statistical data. It may be defined as the root of the mean of squares of the deviations of individual items from the arithmetic mean. The following formula is applied to find out standard deviation.

$$=\sqrt{(\sum d2)/N}$$

Where;

$\sum d2$= square of deviation of items from arithmetic mean

N= Number of items

11 Scope of research

If it is thought only form the view point of research, fertilizer industry and management principles practically can be a separate points of study. Form the view point of overall India, concentrating on any one concept of all the units, study at national level is also possible. Keeping Gujarat sate in center comparative study of corporate units and co-operative units is also possible. Inter unit comparison of units of one forms of organization is also possible. And even from managerial and practical view point, inter comparison between units of presented study is possible.

12. Chapter plan:

Chapter 1. Working Capital Management

Chapter 2. Fertilizer industry in India.

Chapter 3. Research Methodology.

Chapter 4. Analysis of Working Capital Management.

Chapter 5. Analysis of Receivables management

Chapter 6. Analysis of Inventory management

Chapter 7. Analysis of Cash management.

Chapter 8. Analysis of Payables management.

Chapter 9 Conclusions and suggestion.

13. Limitation of study:

It is very difficult to say that how far the working capital trends are related to specific functions of working capital management. Measurement of working capital gives diagnostic indicators but practical reforms package cannot be specific unless through cut scanning is done. Since this study is based on the secondary data derived from annual published reports, its quality depends on quality of such data. This study is limited up to 2005 only as the data of Liberty Phosphate is not published till September 2006.

References:

(1)   Simpson and Kafka : 'Basic Statistics' p. 223.

(2)   Hirsch : 'An Introduction to Modern Statistics', p. 286.

(3)   S.P.Gupta : Statistical Methods, P. E. 14.7.

(4)   John N. Myer : 'Financial Statement Analysis, IV ed. Prentice-Hall, Inc. Englewood Cliffs, New Jersey. Pp. 160-161.

(5)   Wixon, Rufus and Walter G. Kell (ed.) : Accountants' Handbook New York. The Ronald Press Company, 1956, p.32.

(6)   John N. Myer : op. cit. p. 158.

(7)   Harry Gross : Financing Small and Medium Sized Business, Prentice Hall, Inc. Englewood Cliffs, N. J. p. 34.

(8)   James C. Van Horne : Fundamentals of Financial Management, Prentice Hall Inc. Englewood Cliffs, N. J., 1971 p. 29.

Chapter – 4

Analysis of Working Capital

Content

1. Introduction:

2. Analysis of Working Capital Turn over of sample unit.

3. Analysis of Net Working Capital Turn over of Sample Units.

4. Analysis of Net Working Capital Turn over Ratios of the fertilizer companies and Krusal Wallis' one way analysis of variance test.

5. Analysis of Current Ratio of sample units.

6. Analysis of Current Ratios of the fertilizer companies and Kruskal Wallis' one way analysis of variance test.

7. Quick ratio analysis of Sample units.

8. Analysis of Quick Ratios of the Fertilizer Companies and Kruskal Wallis' one way analysis of Variance Test.

1. Introduction:

Shortage of working capital has always been the biggest cause of business failure. Lack of considerable foresight in planning working capital needs of the business has forced even profitable business entities, the so called blue chip companies to the brink of insolvency. Working capital is the warm blood passing through the arteries and vain of the business and sets it ticking. New firm wind up for want of working capital reservoirs. Even gains tumble like pack of cards through the drying up of working capital reservoirs. Liquidity and profitability are the two aspects of paramount importance in a business. Liquidity depends on the profitability of business activities and profitability is hard to achieve without sufficient liquid resources. Both these aspects are closely inter related. Control of working capital and forecasting working capital needs are therefore part and parcel f the overall management of the Business. In this chapter we shall study the vital aspects of working capital for the sample units.

2. Working Capital Turn-over Ratio:

Working capital turn-over ratio means the ratio of sales value to working capital. In other word how many times working capital is converted into sales in one accounting period. The statement of null hypothesis based on chi square test is, **"The working capital turn over indices of the sample units can be represented by the straight line trend based on the lest square method."** The other null hypothesis to be tested is based on Kruskal Wallis one way analysis of variance test. It has been tested to see whether there is any significant difference between working capital ratios of the sample units. The statement of null hypothesis is, **"There is no significant difference between the working capital of the sample units."** The acceptance of the said hypothesis would reveal that the working capital of various sample units is approximately equal. The level of significance used in this study will be at 5 %. Following is the analysis of working capital turn over ratios of the sample units.

- **Working Capital turn over ratio at GNVFC:**

The table no. 4.1 provides the numerical data about Sales Value, Working Capital, Working Capital turn-over ratio, working capital turn-over ratio index and trend value of GNVFC from the year 1996-'97 to 2004-'05 i.e. nine years. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

In reference to the sales value, it is fact that the sales value is moving to the mixed trend. It continuously increases and decreases throughout the study period. Similarly, working capital also increases and decreases constantly during the research period. It can also be said that both the sales value and working capital increase in the last year i.e. 2004-'05. Working capital turn-over ratio means the ratio of sales value to working capital. It comes out to 2.89 for the base year i.e. 1996-'97. Then, it increases in the first initial year and reaches to 3.12. Then, it decreases for two years in a raw and goes down to 2.15 which is the lowest level during the study period. Then, it again increases and goes up to 7.42 in the year 2002-'03 which is the highest level during the study period. Then after it decreases in the end and goes down to 6.23 in the year 2004-'05. The average of working capital turn-over ratio comes out to 4.57 which is higher than the base year ratio. It shows the positive trend.

Now, the working capital turn-over ratio index is supposed to 100 for the base year i.e. 1996-'97. Then, it increases to 107.81 in the year 1997-'98. Then, it decreases for two years constantly and goes down to 74.41 which is the lowest level during the study period. Then after it increases highly for the three years constantly and goes up to 256.59 in the year 2002-'03 which is the highest level during the study period. Then, again it decreases in the end and goes down to 215.59 in the year 2004-'05. So far the analytical point of view is concerned, the working capital turn-over ratio index gives an idea about the fluctuation in working capital turn-over ratio. It works out on an average to 158.19 which is higher than the base year level. It states the positive trend. Trend value is also higher than the base year level.

The overall result of working capital turn-over is determined in reference to the chi-square value, standard deviation and co-efficient of variation. The calculated value of

chi-square comes out to 119.55 while the critical value of chi-square is 7.851. So, the calculated value of chi-square is higher than the critical value. So, it rejects the null hypothesis and accepts the alternative hypothesis. It means, **"There is significant difference between the working capital turn-over ratios of fertilizer companies".** Moreover, the standard deviation is 5492.03 while the co-efficient of variation is 3471.73. So, there is too much variation in the productive indices.

Table No. 4.1

Working capital Turn over ratio of GNVFC: (Rs in Crore)

Year	sales	working	WCTOR	Index	t.v.
1996-97	1171.96	405.44	2.890588	100	66.49
1997-98	1162.01	372.89	3.116227	107.806	89.42
1998-99	1099.29	419.98	2.617482	90.55188	112.34
1999-2000	1153.06	536.11	2.15079	74.406659	135.27
2000-01	1339.39	503.97	2.657678	91.942471	158.19
2001-02	1404.79	201.79	6.961643	240.83831	181.12
2001-03	1377.32	185.7	7.416909	256.58824	204.04
2003-04	1446.84	203.46	7.111177	246.01142	226.97
2004-05	1822.62	292.47	6.231819	215.59	249.89
total	11977.28	3121.81	41.15431	1423.735	1423.74
average	1330.809	346.8678	4.572701	158.19278	158.19

Chi Squ :119.55

SD : 5492

CV : 3471

- **Working Capital turn over ratio at GSFC:**

The table no 4.2 gives the statistical data regarding sales value, working capital, working capital turn-over ratio, working capital turn-over ratio index and trend value in reference to GSFC from the year 1996-'97 to 2004-'05 i.e. nine years

of research period. It also calculates and presents the chi-square value, standard deviation and co-efficient of variation for the same.

By viewing the table, it can be said that sales value is increasing in the last years of the research period but overall it moves in a mixed trend during the study period. While working capital also moves in a mixed trend during the research period but in the year 2002-'03, it goes to negative level. Working capital turn-over ratio means the ratio of sales value to working capital. It comes out to 3.09 for the year 1996-'97 i.e. base year. Then, it increases and reaches to 4.13 in the year 1997-'98. Then, it decreases and goes down to 2.59 in the year 1999-'00. Then again, it increases and goes up to 8.37 in the year 2001-'02 which is the highest level during the study period. Then, it decreases highly and goes down to negative level i.e. 40.27 in the year 2002-'03. Then, it increases in the last two years and reaches to 7.80 in the year 2004-'05. The average of working capital turn-over ratio comes out to 0.001 which is very lower than the base year ratio. It indicates the negative trend.

Then, the working capital turn-over ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it increases to 133.34 in the very next year. Then, it decreases and goes down to 83.87 in the year 1999-'00. Then again, it increases and goes up to 270.64 in the year 2001-'02 which is the highest level during the study period. Then, it decreases highly and goes down to negative level i.e. 1301.64 in the year 2002-'03. Then again, it increases and reaches to 252.25 in the year 2004-'05. As the analytical point of view, working capital turn-over ratio index gives an idea about the variation in working capital turn-over ratio. It comes on an average to 0.038 which is very lower than the base year level. It shows the negative trend. Trend value's average is also lower than the base year level.

The overall result is decided by considering the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 347458.51 while the critical value is 7.851. So, here the critical value is lower than the calculated value of chi-square. So, it permits to allow the acceptance of alternative

hypothesis. It means, **"There is significant difference between the working capital turn-over ratios of fertilizer companies".** Moreover, the standard deviation comes out to 216317.07 while the co-efficient of variation works out to 563885827.82. So, it can be said that there is much-much variation in the productive indices.

Table No. 4.2 Working capital Turn over ratio of GSFC: (Rs in Crore)

Year	sales	working	WCTOR	index	t.v.
1996-97	1760.1	568.9	3.093865	100	114.6004
1997-98	1879.64	455.62	4.125455	133.3431	85.9599
1998-99	1886.41	570.59	3.306069	106.85887	57.3194
1999-2000	1961.27	755.84	2.594822	83.869906	28.6789
2000-01	2051	549.01	3.735815	120.74914	0.0384
2001-02	1954.88	233.47	8.373153	270.63731	-28.6021
2001-03	1840.39	-45.7	-40.2711	-1301.6443	-57.2426
2003-04	2102.49	290.06	7.248466	234.28514	-85.8831
2004-05	2604.87	333.78	7.804152	252.24606	-114.5236
total	18041.05	3711.57	0.010682	0.3452567	0.3453
average	2004.561	412.3967	0.001187	0.0383619	0.0384

Sch Squ : 347

SD : 216

CV : 563

▪ **Working Capital turn over ratio at Liberty:**

The table no. 4.3 presents the mathematical data regarding sales value, working capital, working capital turn-over ratio, working capital turn-over ratio index and trend value in reference to Liberty Co. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

The table shows that sales value is increasing year by year in the initial stage but after it decreases also. So, overall sales value stays in a mixed trend during the study period. While working capital moves in upward and downward trend in the initial years but in the end it moves towards the increasing trend. Working capital turn-over ratio means the ratio of sales value to working capital. It comes out to 2.47 for the year 1996-'97 i.e. base year. Then, it decreases to 2.34 in the very next year i.e. 1997-'98 which is the lowest level during the study period. Then, it increases constantly for three years and goes up to 5.02 in the year 2000-'01. Then, again it decreases to 3.37 in the year 2001-'02. Then after it increases and reaches to 5.61 in 2003-'04 which is the highest level during the research period. In the last year i.e. 2004-'05, it decreases to 3.74. It comes on an average to 3.92 which are higher than the base year ratio. It indicates the positive trend.

Now, the working capital turn-over ratio index is supposed to 100 for the year 1996-'97 i.e. base year. So far the analytical point of view is concerned, it draws the picture about the fluctuation in working capital turn-over ratio. It decreases in the first initial year to 94.60. Then, it increases continuously for three years and goes up to 203.02 in the year 2000-'01. Then, it decreases highly and goes down to 136.48 in the year 2001-'02. Then again, it increases and reaches to 227.22 in the year 2003-'04 which is the highest level during the study period. In the end it decreases to 151.55. It comes on an average to 158.57 which is higher than the base year level. It states the positive trend. The trend value also indicates the upward trend.

The overall result of working capital turn-over is determined by viewing the chi-square value, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 53.02 while the critical value of chi-square is 7.851. So, here the calculated value is higher than the critical. It indicates the acceptance of alternative hypothesis instead of null hypothesis. It means, **"There is significant difference between the working capital turn-over ratios of fertilizer companies".** Moreover, the standard deviation comes out to 1959.93 while the co-efficient of variation works out to 1235.98. So, it can be said that there is much variation in the productive indices.

Table No. 4.3

Working capital Turn over ratio of GSFC: (Rs in Crore)

Year	sales	working	WCTOR	Index	t.v.
1996-97	41.43	16.77	2.470483	100	111.02794
1997-98	47.56	20.35	2.337101	94.600964	122.91429
1998-99	52.22	14.71	3.549966	143.69522	134.80064
1999-2000	67.32	16.99	3.962331	160.38689	146.68699
2000-01	83.56	16.66	5.015606	203.02128	158.57333
2001-02	70.94	21.04	3.371673	136.47829	170.45968
2001-03	66.73	12.85	5.192996	210.20165	182.34603
2003-04	78.87	14.05	5.613523	227.22371	194.23238
2004-05	74.17	19.81	3.744069	151.55209	206.11873
Total	582.8	153.23	35.25775	1427.1601	1427.16
average	64.75556	17.02556	3.917528	158.57334	158.57333

Chi Squ : 53.02

SD :1959

CV : 1235

- **Working Capital turn over ratio at IFFCO:**

The table no. 4.4 provides the numerical information in reference to sales value, working capita, working capital turn-over ratio, working capital turn-over ratio index and trend value of IFFCO Ltd. from the year 1996-'97 to 2004-'05 i.e. research period. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

The table clears that sales value moves in a mixed trend during the study period but in the last years it increases. While the working capital also moves in a mixed trend but it can be said that it decreases in the last years of the study period. Working capital turn-over ratio can be defined as the ratio of sales value to working capital. It works out to 3.81 in 1996-'97 i.e. base year. Then, it decreases slightly and goes down to 3.15 in the very next year. Then, it increases for four years in a raw and goes up to 3.76 in the year

2001-'02. Then again, it decreases marginally and goes down to 3.57 in 2003-'04. Then after in the last year i.e. 2004-'05, it increases to 4.82 which is the highest level during the study period. The average of working capital turn-over ratio comes out to 3.67 which is marginally lower than the base year ratio. It shows the negative trend.

Now, the working capital turn-over ratio index is supposed to 100 for the base year i.e. 1996-'97. Then, it decreases to 82.66 in the very next year. Then, it increases for four years constantly and goes up to 98.59 in the year 2001-'02. Then, again it decreases to 93.69 in the year 2003-'04. Then, it increases to 126.36 in the last year i.e. 2004-'05 which is the highest level during the study period. The reason for considering the ratio index is that it draws the picture about the fluctuation in working capital turn-over ratio. It comes on an average to 96.32 which are lower than the base year level. It indicates the negative trend. Trend values average is also lower than the base year level. So, it also says the negative trend.

The final result is determined by seeing the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 8.62 while the critical value of chi-square is 7.851. So, here the critical value is lower than the calculated value. It clears that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is significant difference between the working capital turn-over ratios of fertilizer companies".** Moreover, the standard deviation comes out to 148.87 while the co-efficient of variation works out to 154.55. So, it can be pointed out that there is some variation in the productive indices.

Table No. 4.4

Working capital Turn over ratio of GSFC: (Rs in Crore)

Year	Sales	Working capital	WCTOR	index	t.v.
1996-97	2266.08	594.18	3.813794	100	84.802433
1997-98	3617.83	1147.64	3.152408	82.658068	87.682
1998-99	4047.83	1241.67	3.259989	85.478884	90.561567
1999-2000	4806.79	1464.9	3.281309	86.037927	93.441133

2000-01	5426.93	1455.78	3.72785	97.746506	96.3207
2001-02	5094.08	1354.8	3.760024	98.590108	99.200267
2001-03	6091.14	1658.02	3.673743	96.327788	102.07983
2003-04	5919.57	1656.69	3.573131	93.689663	104.9594
2004-05	7224.03	1499.07	4.819008	126.35732	107.83897
total	44494.28	12072.75	33.06126	866.88626	866.8863
average	4943.809	1341.417	3.673473	96.320696	96.3207

Chi Squ : 8.62

SD : 148.86

CV : 154.55

3. Analysis of Net Working Capital Turn over of Sample Units:

Net working capital turn-over ratio means the ratio of sales value to net working capital.

- **Net working Capital Analysis of GNVFC:**

The table No 4.5 indicates the statistical data regarding sales value, net working capital, net working capital turn-over ratio, turn-over ratio index and trend value of GNVFC Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

So far the sales value is concerned, it can be said from the table that sales value moves in a mixed trend during the study period but in the last years it increases. While Net Working Capital also moves in a mixed trend during the study period. Net working capital turn-over ratio means the ratio of sales value to net working capital. It comes out to 2.89 for the year 1996-'97 i.e. base year. Then, it increases to 3.12 in the year 1997-'98. Then, it decreases for two years and goes down to 2.15 in the year 1999-'00. Then, it increases for three years constantly and goes up to 7.42 in the year 2002-'03. Then again, it decreases and goes down to 6.23 in the year 2004-'05. It comes on an average to 4.57 which is higher than the base year ratio. It states the positive trend.

Now, Net working capital turn-over ratio index is assumed 100 for the base year i.e. 1996-'97. This ratio index gives an idea about the variation in Net working capital turn-over ratio so that result can be made. It increases to 107.81 in the very next year i.e. 1997-'98. Then, it decreases for two years and goes down to 74.41 in 1999-'00. Then again, it increases and reaches to 256.59 in 2002-'03 which is the highest level during the study period. Then, again it decreases to 215.59 in 2004-'05. It comes on an average to 158.19 which is higher than the base year level. It indicates the positive trend. The trend value also suggests the upward trend.

Then, the overall result is decided by viewing the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 119.55. While the critical value of chi-square is 7.851. So here, the calculated value is higher than the critical value. It suggests the acceptance of alternative hypothesis. It means, "There is significant difference between net working capital turn-over ratios of fertilizer companies". Moreover, the standard deviation comes out to 5492.03 while the co-efficient of variation works out to 3471.73. So, there is much variation in the productive indices.

Table No 4.5
Net working capital analysis of GNVFC: (Rs in crore)

Year	sales	NWC	WCTOR	index	t.v.
1996-97	1171.96	405.44	2.890588	100	66.494044
1997-98	1162.01	372.89	3.116227	107.806	89.418728
1998-99	1099.29	419.98	2.617482	90.55188	112.34341
1999-2000	1153.06	536.11	2.15079	74.406659	135.26809
2000-01	1339.39	503.97	2.657678	91.942471	158.19278
2001-02	1404.79	201.79	6.961643	240.83831	181.11746
2001-03	1377.32	185.7	7.416909	256.58824	204.04214
2003-04	1446.84	203.46	7.111177	246.01142	226.96683
2004-05	1822.62	292.47	6.231819	215.59	249.89151
total	11977.28	3121.81	41.15431	1423.735	1423.735
average	1330.809	346.8678	4.572701	158.19278	158.19278

Chi Squ : 119.55
SD : 549
CV : 347

- **Net working Capital Analysis of GSFC:**

The table no. 4.6 gives the mathematical data of sales value, Net working capital, Net working capital turn-over ratio, ratio index and trend value in reference to GSFC Co. Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

By viewing the sales value, it can be said from the table that in the initial five years sales value is increasing but overall it moves in a mixed trend during the course period. While net working capital constantly moves in a mixed trend for the same. Net working capital turn-over ratio means the ratio of sales value to net working capital. It comes out to 3.09 for the year 1996-'97 i.e. base year. Then, it increases in the first initial year and reaches to 4.13. then, it decreases for two years constantly and goes down to 2.59 in the year 1999-'00 which is the lowest level during the course period. Then, again it increases for three years in a raw and goes up to 8.13 in the year 2002-'03. Then after it decreases and goes down to 4.60 in the last year i.e. 2004-'05. It comes on an average to 4.26 which is higher than the base year ratio. It suggests the positive trend.

Now, Net working capital turn-over ratio index is supposed to 100 in the year 1996-'97 i.e. base year. Then, it increases to 133.34 in the very next year. Then, it decreases for two years and goes down to 83.87 in the year 1999-'00. Then again, it increases highly and goes up to 262.86 in the year 2002-'03. Then, again it decreases in the last two years and goes down to 148.57 in 2004-'05. As the analytical point of view is concerned, this ratio index gives an idea about the fluctuation in net working capital turn-over ratio. The average of this index comes out to 137.78 which is higher than the base year level. It states the positive trend. The trend value also clears the positive trend of ratio.

The overall result is determined by considering the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to

102.82. While the critical value of chi-square is 7.851. So, the calculated value is higher than the critical value of chi-square. It can be said that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is significant difference between net working capital turn-over ratios of fertilizer companies".** Moreover, the standard deviation comes out to 2440.70 while the co-efficient of variation works out to 1771.39. So, there is much variation in the productive indices.

Table No 4.5

Net working capital analysis of GSFC: (Rs in crore)

Year	sales	NMC	WCTOR	index	t.v.
1996-97	1760.1	568.9	3.093865	100	96.197524
1997-98	1879.64	455.62	4.125455	133.3431	106.59434
1998-99	1886.41	570.59	3.306069	106.85887	116.99115
1999-2000	1961.27	755.84	2.594822	83.869906	127.38796
2000-01	2051	549.01	3.735815	120.74914	137.78478
2001-02	1954.88	505.47	3.86745	125.00384	148.18159
2001-03	1840.39	226.3	8.132523	262.85967	158.5784
2003-04	2102.49	427.91	4.913393	158.81084	168.97522
2004-05	2604.87	566.71	4.596478	148.5675	179.37203
total	18041.05	4626.35	38.36587	1240.0629	1240.063
average	2004.561	514.0389	4.262875	137.78476	137.78478

Chi Squ : 102

SD : 2440

CV : 1771

- **Net working Capital Analysis of Liberty:**

The table 4.6 provides the numerical chart in reference to sales value, net working capital, net working capital turn-over ratio, ratio index and trend value of Liberty Ltd. from the year 1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

It is clear from the table that in the initial years, sales value is increasing but overall it moves in a mixed trend during the study period. While net working capital also stays in a mixed trend during the course period. Net working capital turn-over ratio can be defined as the ratio of sales value to net working capital. It works out to 2.47 for the year 1996-'97 i.e. base year. Then, it decreases marginally and goes down to 2.34 in the very next year. Then, it increases for three years constantly and goes up to 5.2 in the year 2000-'01. Then, again it decreases to 3.37 in 2001-'02. Then after it again increases to 5.61 in 2003-'04. In the last year i.e. 2004-'05, it decreases to 3.74. The average of ratio comes out to 3.92 which is higher than the base year ratio. It suggests the upward trend.

Then, Net working capital turn-over ratio index is assumed 100 for the base year i.e. 1996-'97. It is considered significantly because it gives an idea about the variation in Net working capital turn-over ratio. It decreases to 94in 1997-'98. It is the lowest level during the study period. Then, it increases for three years continuously and goes up to 203.02 in 2001. Then, it again decreases to 136.48 in next year. Then after it again increases to 227.22 in 2003-'04. In the last year i.e. 2004-'05, it decreases to 151.55. It comes on an average to 158.57 which is higher than the base year. It states the upward trend. The average of trend value is also higher than the base year level. So, it also indicates the positive trend.

Finally, the overall result is based on the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 53.02 while the critical value of chi-square is 7.851. So, the calculated value is higher than the critical value. In this reference, it can be said that it allows the acceptance of alternative hypothesis instead of null hypothesis. It means, **"There is significant difference between net working capital turn-over ratios of fertilizer companies".** Moreover, the standard deviation comes out to 1959.93 while the co-efficient of variation works out to 1235.98. So, there is much variation in the productive indices.

Table No 4.6

Net working capital analysis of GSFC: (Rs in crore)

Year	sales	NWC	WCTOR	index	t.v.
1996-97	41.43	16.77	2.470483	100	111.02795
1997-98	47.56	20.35	2.337101	94.600964	122.9143
1998-99	52.22	14.71	3.549966	143.69522	134.80065
1999-2000	67.32	16.99	3.962331	160.38689	146.687
2000-01	83.56	16.66	5.015606	203.02128	158.57334
2001-02	70.94	21.04	3.371673	136.47829	170.45969
2001-03	66.73	12.85	5.192996	210.20165	182.34604
2003-04	78.87	14.05	5.613523	227.22371	194.23239
2004-05	74.17	19.81	3.744069	151.55209	206.11874
total	582.8	153.23	35.25775	1427.1601	1427.1601
average	64.75556	17.02556	3.917528	158.57334	158.57334

Chi Squ :53.02

SD : 1959

CV : 1235

- **Net working Capital Analysis of IFFCO:**

The table **No 4.7** displays the statistical information about sales value, Net working capital, net working capital turn-over ratio, ratio index and trend value in reference to IFFCO Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also calculates the chi-square, standard deviation and co-efficient of variation for the same.

It can be pointed out that sales value is increasing in the initial years but overall it moves in a mixed trend during the course period. Similarly, Net working capital also stays in a mixed trend during the study period. Net working capital also stays in a mixed trend during the study period. Net working capital turn-over ratio means the ratio of sales value to net working capital. It comes out to 3.81 in the year 1996-'97 i.e. base year.

Then, it decreases to 3.15 in the first initial year i.e. 1997-'98. Then, it increases for four years in a raw and goes up to 3.76 in the year 2001-'02. Then, it decreases to 3.57 in 2003-'04. In the last year of research period i.e. 2004-'05, it increases to 4.82 which is the highest level during the study period. The average of ratio works out to 3.67 which is marginally lower than the base year ratio. It indicates the negative trend.

Then, Net working capital turn-over ratio index is supposed to 100 for the base year i.e. 1996-'97. Then, it decreases to 82.66 in the very next year. Then, it increases for four years constantly and goes up to 98.59 in 2001-'02. Then, again it decreases to 93.69 in 2003-'04. Then after it increases to 126.36 in the last year i.e. 2004-'05. And it is the highest level during the research period. This ratio index is considered to know the fluctuation in net working capital turn-over ratio. It comes on an average to 96.32, which is marginally lower than the base year level. It proves the negative trend of ratio. The trend value also shows the downward trend.

The overall result is considered regarding the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 8.62 while the critical value of chi-square is 7.851. So here the calculated value is higher than the critical value. It indicates the acceptance of alternative hypothesis. It means, **"There is significant difference between the net working capital turn-over ratios of fertilizer companies."** Moreover, the standard deviation comes out to 148.87 while the co-efficient of variation works out to 154.55. So, it can be said that there is some variation in the productive indices.

Table No 4.7

Net working capital analysis of GSFC: (Rs in crore)

Year	Sales	NWC	WCTOR	index	t.v.
1996-97	2266.08	594.18	3.813794	100	84.802429
1997-98	3617.83	1147.64	3.152408	82.658068	87.681996
1998-99	4047.83	1241.67	3.259989	85.478884	90.561562
1999-2000	4806.79	1464.9	3.281309	86.037927	93.441129
2000-01	5426.93	1455.78	3.72785	97.746506	96.320696

2001-02	5094.08	1354.8	3.760024	98.590108	99.200262
2001-03	6091.14	1658.02	3.673743	96.327788	102.07983
2003-04	5919.57	1656.69	3.573131	93.689663	104.9594
2004-05	7224.03	1499.07	4.819008	126.35732	107.83896
total	44494.28	12072.75	33.06126	866.88626	866.88626
average	4943.809	1341.417	3.673473	96.320696	96.320696

Chi Squ : 8.622

SD : 148

CV : 154

4. **Net Working Capital Turn over Ratios of the fertilizer companies and Krusal Wallis' one way analysis of variance test.** The comparative position of Net Working capital turn over ratios of fertilizer companies have been provided in the table 4.8 along with the application of Kruskal Wallis' one way analysis of variance test on this ratios for the period of the study i.e., 1996-'97 to 2004-'05.

T A B L E NO.4.8

Comparative Net Working Capital Turn over Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test

Year	GNVFC	R1	GSFC	R2	Liberty Phosphate Ltd.	R3	IFFCO	R4
1996-'97	2.89	7	3.09	8	2.47	3	3.81	22
1997-'98	3.12	9	4.13	25	2.34	2	3.15	10
1998-'99	2.62	5	3.31	13	3.55	15	3.26	11
1999-'00	2.15	1	2.59	4	3.96	24	3.28	12
2000-'01	2.66	6	3.74	18.5	5.02	28	3.73	18
2001-'02	6.96	33	3.87	23	3.37	14	3.76	21
2002-'03	7.42	35	8.13	36	5.19	30	3.67	17
2003-'04	7.11	34	4.91	28	5.61	31	3.57	16
2004-'05	6.23	32	4.60	26	3.74	19.5	4.82	27
Total		162		182.5		167.5		154

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)^2}{n_j} \right] - 3(N+1)$$

$$= \frac{12}{36(36+1)} \left[\frac{(162)^2}{9} + \frac{(182.5)^2}{9} + \frac{(167.5)^2}{9} + \frac{(154)^2}{9} \right] - 3(36+1)$$

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$$= \frac{12}{1332} \left[(2916 + 3700.69 + 3117.36 + 2635.11) \right] - 111$$

$$= \quad 111.43 - 111$$

$$= \boxed{0.43}$$

The above table i.e., no. 4.8 provides that the calculated value of H is 0.43 which is lower than the critical value i.e., 7.851. So here the null hypothesis based on Kruskal Wallis' one way analysis of variance test is accepted. It means, **"There is no significant difference between the Net Working Capital turn over ratios of the fertilizer companies.**"

5. Analysis of Current Ratio of sample units: Current Ratio means the ratio of current assets to current liabilities

▪ **Current Ratio analysis of GNVFC:**

The table no.4.9 provides the mathematical data regarding the current assets, current liabilities, current ratio, current ratio index and trend value in reference to GNVFC Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of course period. It also calculates and displays the chi-square value, standard deviation and co-efficient of variation for the same.

It can be said from the table that current assets are increasing in the initial years but then they are decreasing till the end. While current liabilities move in a mixed trend during the study period. Current Ratio means the ratio of current assets to current liabilities. It comes out to 3.05 for the year 1996-'97 i.e. base year. Then, it decreases for two years and goes down to 2.69 in 1998-'99. Then, it increases marginally to 2.71 in the year 1999-'00. Then, again it decreases and increases. In the year 2003-'04, it makes the

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major upset and goes down to 0.80 which is the lowest level during the study period. Then, in the last year i.e., 2004-'05, it again increases to 2.51. The average of current ratio works out to 2.38 which is lower than the base year ratio. So, it states the negative trend. But it is important to note that the average of ratio is higher than the standard ratio i.e. 2:1.

Now, current ratio index is assumed 100 for the base year i.e. 1996-'97. So far the analytical point of view is concerned, current ratio index draws the mathematical chart regarding the fluctuation in current ratio. It decreases for two years in a raw and goes down to 88.36 in 1998-'99. Then, it increases marginally to 88.86 in 1999-'00. Then, again it decreases and again it increases. Then after it decreases highly and goes down to 26.40 in the year 2003-'04 which is the lowest level during the course period. Then, it again increases to 82.35 in the last year i.e. 2004-'05. It is lower than the base year level. It proves the negative trend of current ratio. The trend value also indicates the downward trend.

Finally, the overall result is determined by viewing the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 45.99 while the critical value of chi-square is 7.851. So, here the calculated value is higher than the critical value. So, it indicates to accept the alternative hypothesis instead of null hypothesis. It means, "There is significant difference between the current ratio of fertilizer companies." Moreover, the standard deviation comes out to 546.45 while the co-efficient of variation works out to 700.50. So, it can be noted that there is much variation in the productive indices.

Table No   4.9

Current Ratio analysis of GNVFC (Rs in Crore)

Year	Current Assets	Current Liabilities	CR	index	t.v.
1996-97	10282.6	3374.6	3.047057	100	101.73435
1997-98	12426.9	4380.16	2.837088	93.109432	95.802881
1998-99	14259.35	5296.42	2.692262	88.35643	89.871414
1999-2000	16389.91	6053.15	2.707666	88.861979	83.939948
2000-01	17160.32	6402.05	2.680441	87.968496	78.008481
2001-02	15300.36	5601.12	2.731661	89.649448	72.077014
2001-03	15088.75	10913.06	1.382632	45.376142	66.145548
2003-04	14795.03	18389.44	0.804539	26.403907	60.214081
2004-05	14468.86	5766.19	2.509258	82.350495	54.282614
total	130172.1	66176.19	21.39261	702.07633	702.07633
average	14463.56	7352.91	2.376956	78.008481	78.008481

Chi Squ: 45.9

SD : 546

CV : 700

- **Current Ratio analysis of GSFC:**

The table no. 4.10 shows the numerical data regarding current assets, current liabilities, current ratio, current ratio index and trend value of GSFC Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

It can be said from the table that current assets are increasing in the last years of research period but overall they move in a mixed trend. While current liabilities move constantly in a mixed trend during the course period. Current ratio can be defined as the ratio of current assets to current liabilities. It comes out to 1.93 in the year 1996-'97 i.e.

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base year. Then, it decreases to 1.69 in the very next year i.e. 1997-'98. Then, it increases for two years and goes up to 2.02 in 1999-'00 which is the highest level during the study period. Then again it decreases for three years in a raw and goes down to 1.29 in 2002-'03 which is the lowest level during the research period. Then again it increases and reaches to 1.78 in 2004-'05. The average of current ratio comes out to 1.70 which is lower than the base year ratio. It shows the negative trend. By comparing this average ratio to standard ratio, it also indicates the downward trend because the standard ratio is 2:1.

Now, current ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it decreases to 87.54 in 1997-'98. Then it increases for two years and goes up to 104.66 in 1999-'00. Then again it decreases for three years constantly and goes down to 66.88 in 2002-'03 which is the lowest level during the study period. Then after it improves and reaches to 92.02 in 2004-'05. Current ratio index is considered to know about the fluctuation in current ratio. It comes on an average to 88.33 which is lower than the base year level. It clears the negative trend of current ratio. The trend value also says the downward trend.

The overall result is considered by seeing the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 8.469 while the critical value of chi-square is 7.851. So, here the calculated value is higher than the critical value. It allows to reject the null hypothesis and to accept the alternative hypothesis. It means, **"There is significant difference between the current ratios of fertilizer companies".** Moreover, the standard deviation comes out to 110.79 while the co-efficient of variation works out to 125.43. So, it can be pointed out that there is some variation in the productive indices.

Table No 4.10

Current Ratio analysis of GSFC (Rs in Crore)

Year	Current Assets	Current Liabilities	C Ratio	index	t.v.
1996-97	1180.84	611.94	1.929666	100	96.834186
1997-98	1116.63	661.01	1.689279	87.542535	94.707869
1998-99	1281.75	711.16	1.802337	93.401502	92.581552
1999-2000	1497.17	741.33	2.019573	104.6592	90.455236
2000-01	1349.63	800.62	1.685731	87.358696	88.328919
2001-02	1364.52	859.05	1.588406	82.315064	86.202602
2001-03	1005.33	779.03	1.290489	66.876312	84.076286
2003-04	1193.57	765.66	1.558877	80.784825	81.949969
2004-05	1297.27	730.56	1.77572	92.022142	79.823652
Total	11286.71	6660.36	15.34008	794.96027	794.96027
Average	1254.079	740.04	1.704453	88.328919	88.328919

Chi Squ :8.46

SD : 110.79

CV : 125

- **Current Ratio analysis of Liberty:**

The table no.4.11 presents the statistical information regarding the current assets, current liabilities, current ratio, current ratio index and trend value of Liberty Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also computes and gives the value of chi-square, standard deviation and co-efficient of variation for the same.

By seeing the table, it can be said that in the last four years of research period, current assets are increasing but overall they move in a mixed trend during the course

period. On the other hand, current liabilities stay in a mixed trend during the research period continuously. Current ratio means the ratio of current assets to current liabilities. It comes out to 2.74 for the base year i.e. 1996-'97. Then, it increases to 3.00 in the very next year i.e. 1997-'98. Then, it decreases to 2.31 in 1998-'99. Then, again it increases and decreases. It reaches to 3.53 in the year 2001-'02 which is the highest level during the study period. In the year 2002-'03, it makes upset and goes down to 1.73 which is the lowest level during the course period. Then, in the last two years, it improves better and goes up to 2.54 in 2004-'05. The average of current ratio works out to 2.49 which is lower than the base year ratio. So, it shows the negative trend. But it is also important to say that the average of current ratio is higher than the standard ratio which is 2:1.

Now, current ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it increases to 109.62 in 1997-'98. Then, it decreases slightly and goes down to 84.10 in 1998-'99. Then, again it increases to 88.22 in 1999-'00. Then, again it decreases and increases. In the year 2001-'02, it increases to 128.82 which is the highest level during the study period. Then, it makes a major upset in 2002-'03 and goes down to 63.15 which is the lowest level during the research period. Then after it improves better and goes up to 92.86 in 2004-'05. The current ratio index gives an idea about the variation in current ratio. It comes on an average to 90.86, which is lower than the base year level. It states the negative trend of current ratio. The trend value also says the downward trend.

The overall result is determined by taking in view of chi-square value, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 33.29 while the critical value of chi-square is 7.851. So, here the critical value is lower than the calculated value of chi-square. It allows the rejection of null hypothesis and the acceptance of alternative hypothesis. It means, "There is significant difference between the current ratios of fertilizer companies". Moreover, the standard deviation works out to 371.08 while the co-efficient of variation comes out to 408.39. So, it can be noted that there is some variation in the productive indices.

Table No 4.11

Current Ratio analysis of Liberty (Rs in Crore)

Year	Current Assets	Current Liabilities	Ct Ratio	index	t.v.
1996-97	28.26	10.31	2.741028	100	101.5025
1997-98	31.16	10.37	3.004822	109.62389	98.842664
1998-99	25.98	11.27	2.305235	84.101116	96.182831
1999-2000	28.97	11.98	2.418197	88.222265	93.522998
2000-01	29.29	12.63	2.319082	84.60627	90.863164
2001-02	28.39	8.04	3.531095	128.82373	88.203331
2001-03	30.05	17.36	1.730991	63.151153	85.543498
2003-04	32.86	18.06	1.819491	66.379861	82.883664
2004-05	35.38	13.9	2.545324	92.860188	80.223831
total	270.34	113.92	22.41526	817.76848	817.76848
average	30.03778	12.65778	2.490585	90.863164	90.863164

Chi Squ :33.29

SD : 371

CV : 408

- **Current Ratio analysis of IFFCO:**

The table no. 4.11 displays the mathematical data in reference to current assets, current liabilities, current ratio, current ratio index and trend value of IFFCO Ltd. from the year 1996-'97 to 2004-'05 i.e. research period. It also computes and provides the chi-square value, standard deviation and co-efficient of variation for the same.

It is clear from the table that current assets move in a mixed trend during the course period. Similarly, current liabilities also stay in a mixed trend during the research period. Current ratio means the ratio of current assets to current liabilities. It comes out to 2.03 for the year 1996-'97 i.e. base year. Then, it increases to 2.52 in the very next year

i.e. 1997-'98. Then, it decreases to 2.46 in 1998-'99. Then it increases but not so significantly and goes up to 2.91 in 1999-'00. Then, again it decreases to 2.63 in the year 2002-'03. Then, again it increases to 2.83 in 2003-'04. In the last year i.e. 2004-'05, it decreases to 2.36 which is the lowest level during the study period. The average of current ratio comes out to 2.60 which is higher than the base year ratio. And it is also higher than the standard ratio i.e. 2:1. So, it can be pointed out that there is a positive trend in current ratio.

Now, current ratio index is supposed to 100 for the base year i.e., 1996-'97. Then, it increases to 123.98 in 1997-'98. Then, it decreases slightly and goes down to 121.12 in the year 1998-'99. Then, again it increases to 143.53 in 1999-'00. After 2000-'01, it again decreases and goes down to 129.60 in 2002-'03. Then after it increases to 139.19 in the year 2003-'04. In the last year of study period i.e. 2004-'05, it decreases to 116.08which is the lowest level during the study period. Current ratio index is a one type of financial tool which displays an idea about the fluctuation in current ratio. It comes on an average to 127.85 which is higher than the base year level. It clears the positive trend of current ratio. The trend value also shows the upward trend.

The overall result is decided by taking in view of chi-square value, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 10.99 while the critical value of chi-square is 7.851. So, here the calculated value is higher than the critical value. It indicates the acceptance of alternative hypothesis. It means, "There is significant difference between current ratio of fertilizer companies". Moreover, the standard deviation comes out to 180.77 while the co-efficient of variation works out to 141.40. So, there is some variation in the productive indices.

Table No 4.11

Current Ratio analysis of Liberty (Rs in Crore)

Year	Current Assets	Current Liabilities	Current Ratio	index	t.v.
1996-97	1170.9	576.72	2.030275	100	119.99059
1997-98	1904.12	756.48	2.517079	123.97725	121.95476
1998-99	2092.67	851	2.459072	121.12013	123.91892
1999-2000	2230.27	765.37	2.913976	143.52618	125.88309
2000-01	2217.95	762.17	2.910046	143.33262	127.84726
2001-02	2144.07	789.27	2.716523	133.80073	129.81142
2001-03	2674.42	1016.4	2.631267	129.60152	131.77559
2003-04	2564.02	907.33	2.825896	139.18783	133.73976
2004-05	2603.99	1104.92	2.356723	116.07899	135.70392
total	19602.41	7529.66	23.36086	1150.6253	1150.6253
average	2178.046	836.6289	2.595651	127.84725	127.84726

Chi Squ : 10.99

SD : 180

CV : 141

6.   Analysis of Current Ratios of the fertilizer companies and Kruskal Wallis' one way analysis of variance test. The comparative position of current ratios of fertilizer companies have been given in the table no.4.12 along with the application of Kruskal Wallis' one way analysis of variance test on this ratio for the course period i.e., 1996-'97 to 2004-'05.

T A B L E NO.4.12

Year	GNVFC	R1	GSFC	R2	Liberty Phosphate Ltd.	R3	IFFCO	R4
Comparative Current Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test								
1996-'97	3.05	35	1.93	12	2.74	29	2.03	14
1997-'98	2.84	31	1.69	6.5	3	34	2.52	21
1998-'99	2.69	25	1.80	10	2.31	15	2.46	19
1999-'00	2.71	26	2.02	13	2.42	18	2.91	32.5
2000-'01	2.68	24	1.69	6.5	2.32	16	2.91	32.5
2001-'02	2.73	28	1.59	5	3.53	36	2.72	27
2002-'03	1.38	3	1.29	2	1.73	8	2.63	23
2003-'04	0.80	1	1.56	4	1.82	11	2.83	30
2004-'05	2.51	20	1.78	9	2.55	22	2.36	17
Total		193		68		189		216

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)}{n_j} - 3(N+1) \right]$$

$$= \frac{12}{36(36+1)} \left[\frac{(193)}{9} + \frac{(68)}{9} + \frac{(189)}{9} + \frac{(216)}{9} \right] - 3(36+1)$$

$$= \quad \frac{12 \quad (4138.78 + 513.78 + 3969 + 5184) - 111}{1332}$$

$$= \quad 124.37 - 111$$

$$= \quad \boxed{13.37}$$

The above table no 4.12 clarifies that the calculated value of H is 13.37, which is higher than the critical value i.e., 7.851. So, here the null hypothesis based on Kruskal Wallis' one way analysis of variance test, at 5% level of significance is rejected and the alternative hypothesis is accepted. It means, **"There is significant difference between the current ratios of the fertilizer companies".**

7. **Quick ratio analysis of Sample units:** Quick ratio means "the ratio of Quick Assets to Current Liabilities. It refers the liquid position of finance of the sample units.

   ▪ **Analysis of Quick ratio at GNVFC:**

The table 4.13 shows the numerical data of Quick Assets, Current Liabilities, Quick ratio, Quick ratio index, trend value of GNVFC for the year 1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Quick ratio means "the ratio of Quick Assets to Current Liabilities". In the year 1996-'97, Quick ratio comes out to 2.99. Then, it decreases and goes down to 2.65 in the year 1998-'99. Then, it increases to 2.67 but not so significant in the year 1999-'00. Then, again it decreases to 2.64 in 2000-'01. Then after it increases to 2.69 in 2001-'02. Then it decreases and goes down to 0.80 which is the lowest level during the study period in the year 2003-'04. Then, in the year 2004-'05, it increases to 2.46. The average Quick

ratio works out to 2.34 which is less then the base year ratio. It indicates that liquid position of the company is not maintained during the course of the study.

So far the analytical point of view is concerned, the quick ratio index draws the picture about the variation in Quick ratio. Now, Quick ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it decreases in the first two initial years and, goes down to 88.77 in the year 1998-'99. Then, it increases to 89.29 in 1999-'00. Then, it decreases to 88.36 in 2000-'01. Then after it increases to 90.00 in 2001-'02. Then, suddenly, it decreases and goes down to 26.58 in the year 2003-'04. Then, in the last year of the research period, it increases to 82.40. It shows that company has made significant improvement in the last period. The Quick ratio index comes on an average to 78.25 which is lower than the base year ratio. It points out the negative trend. The trend value of Quick ratio shows an overall downward trend.

This table also shows the chi-square value. The calculated value of chi-square comes out to 45.85 during the research period, while the critical value is 7.815. So, the calculated value is higher than the critical value. So, the null hypothesis is rejected and the alternative hypothesis is accepted. **"There is a significant difference in the quick ratio of the company".** Here, the standard deviation comes out to 23.40 while the co-efficient of variation works out to 29.90. So, there is variation in the productive indices.

Table No   4.13

Analysis of Quick ratio at GNVFC:

Year	Quick Assets	Current Liabilities	QR	QR index	trend
1996-97	10091.79	3374.60	2.99	100.00	101.99
1997-98	12216.52	4380.16	2.79	93.26	96.06
1998-99	14060.19	5296.42	2.65	88.77	90.12
1999-00	16163.40	6053.15	2.67	89.29	84.18
2000-01	16917.22	6402.05	2.64	88.36	78.25
2001-02	15074.59	5601.12	2.69	90.00	72.31
2001-03	14867.50	10913.06	1.36	45.56	66.37

2003-04	14620.02	18389.44	0.80	26.58	60.44
2004-05	14208.11	5766.19	2.46	82.40	54.50
total	128219.34	66176.19	21.06	704.22	704.22
average	14246.59	7352.91	2.34	78.25	78.25

Chi Squ: 45.85

SD : 23.40

CV : 29.90

▪ **Analysis of Quick ratio at GSFC:**

The table 4.14 provides the statistical data of Quick Assets, Current Liabilities, Quick ratio, Quick ratio index and trend value of GSFC from the year 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Quick ratio defines, "The ratio of Quick Assets to Current Liabilities". It comes out to 1.04 for the base year i.e. 1996-'97. Then, it decreases to 0.98 in the very next year which is the lowest level during the research period. Then, it increases to 1.30 in the year 1999-'00. Then after it starts the decreasing trend and goes down to 0.76 in the year 2002-'03. Then, it recovers and increases in the last two years of the research period and reaches to 1.25 in 2004-'05. The average Quick ratio comes out to 1.08 which is higher than the base year ratio. It points out that liquid position of the company is maintained during the study period.

The Quick Ratio index is assumed 100 for the base year i.e. 1996-'97. AS the analytical point of view is related, the Quick ratio index gives the information about the variation in Quick ratio. It decreases in the first initial year and goes down to 93.77. Then, it increases and reaches to 124.49 in the year 1999-'00. Then, it starts the decreasing trend and goes down to 73.20 in the year 2002-'03, which is the lowest level during the study period. Then, it increases to 120.22 in the year 2004-'05. The Quick ratio index comes on average to 103.40 which is higher than the base year ratio. It

indicates the positive trend. The trend value of Quick Ratio shows an overall upward trend.

Here, the calculated value of chi-square comes out to 18.33, while the critical value is 7.815. So, the critical value is lower than the calculated value. So, the null hypothesis is rejected and alternative hypothesis is accepted. It means, **"There is a significant difference in the quick ratio of the company".** Here, the standard deviation comes out to 14.51 while the co-efficient of variation works out to 14.04. So, there is no much variation in the productive indices.

Table No 4.14

Analysis of Quick ratio at GSFC:

Year	Quick Assets	Current Liabilities	QR	QR index	T.V.
1996-97	636.57	611.94	1.04	100.00	103.42
1997-98	644.77	661.01	0.98	93.77	103.42
1998-99	848.20	711.16	1.19	114.66	103.41
1999-2000	960.03	741.33	1.30	124.49	103.41
2000-01	856.20	800.62	1.07	102.80	103.40
2001-02	879.71	859.05	1.02	98.44	103.40
2001-03	593.20	779.03	0.76	73.20	103.40
2003-04	820.76	765.66	1.07	103.05	103.39
2004-05	913.63	730.56	1.25	120.22	103.39
total	7153.07	6660.36	9.68	930.63	930.63
average	794.79	740.04	1.08	103.40	103.40

Chi Squ : 18.33

SD : 14.51

CV : 14.03

- **Analysis of Quick ratio at Liberty:**

The table 4.15 gives the mathematical data of Quick Assets, Current Liabilities, Quick ratio, Quick ratio index and trend value of Liberty Phosphate Ltd. from the year

1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Quick ratio means, "The ratio of Quick Assets to Current Liabilities". It works out to 1.63 for the base year i.e. 1996-'97. Then, it increases in the first initial year and goes up to 1.81 in the year 1997-'98. Then, it decreases to 1.15 in the year 1998-'99. Then after it increases constantly for three years and reaches to 2.73 in the year 2001-'02 which is the highest level during the course period. Then, it decreases for one year and again it increases and reaches to 1.91 in the year 2004-'05. The average Quick ratio works out to 1.59 which is lower than the base year ratio. It may be noted that the liquid position of the company is not maintained during the study period.

The Quick Ratio index is assumed 100 for the base year i.e. 1996-'97. The Quick Ratio index indicates the variation in Quick Ratio during the study period. It increases to 111.01 in the first initial year i.e. 1997-'98. Then, it decreases so much and goes down to 70.43 in the year 1998-'99. Then, it increases constantly for three years and reaches to 167.42 in the year 2001-'02, which is the highest level during the study period. Then, suddenly it decreases to 65.29 in the year 2002-'03. Then, again it recovers and increases to 117.30 in the year 2004-'05.

The Quick ratio index comes on average to 97.43 which is lower than the base year ratio. It indicates the negative trend. The trend value of Quick Ratio shows an overall downward trend.

Here, the calculated value of chi-square works out to 83.22, while the critical value is 7.815. So, the calculated value is higher than the critical value. It means that the null hypothesis is rejected and alternative hypothesis is accepted. It means, **"There is a significant difference in the Quick ratio of the company"**. Here, the standard deviation comes out to 30.10, while the co-efficient of variation works out to 30.89. So, there is no much variation in the productive indices.

Table No 4.15

Analysis of Quick ratio at Liberty:

Year	Quick Assets	Current Liabilities	QR	QR index	T.V.
1996-97	16.82	10.31	1.63	100.00	95.82
1997-98	18.78	10.37	1.81	111.01	96.22
1998-99	12.95	11.27	1.15	70.43	96.63
1999-2000	16.40	11.98	1.37	83.91	97.03
2000-01	18.53	12.63	1.47	89.93	97.43
2001-02	21.96	8.04	2.73	167.42	97.84
2001-03	18.49	17.36	1.07	65.29	98.24
2003-04	21.10	18.06	1.17	71.61	98.65
2004-05	26.60	13.90	1.91	117.30	99.05
total	171.63	113.92	14.31	876.90	876.90
average	19.07	12.66	1.59	97.43	97.43

Chi Squ : 83.22

SD : 30.09

CV : 30.88

- **Analysis of Quick ratio at IFFCO:**

The table no. 4.16 indicates the mathematical data regarding Quick Assets, Current Assets, Current Liabilities, Quick ratio, Quick ratio index and trend value of IFFCO from the year 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

So far the Quick Assets are concerned, it is clear from the table that Quick Assets continuously increase and decrease. Similarly, current liabilities also increase and decrease throughout the research period. Quick ratio means the ratio of Quick Assets to current liabilities. It comes out to 0.94 for the base year i.e. 1996-'97. Then, it increases in the first initial year. Then, it decreases. Again, it increases to 1.65 in the year 2000-'01. Then, it decreases to 1.39 and then, it increases and goes up to 1.70 in the year 2003-'04. Then, in the last year i.e. 2004-'05, it decreases to 1.51. The average of Quick ratio works

out to 1.45 which is higher than the base year ratio. It shows the positive trend of the company.

Then, the Quick ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it increases to 159.66 in the first initial year. Then, it decreases and goes down to 146.68 in the year 1998-'99 which is the lowest level during the study period. Then, it increases constantly for two years and reaches to 175.68 in the year 2000-'01. Then, it decreases. Again, it increases and reaches to 181.36 in the year 2003-'04 which is the highest level during the study period. Then, in the year 2004-'05, it decreases to 161.38. Quick ratio index draws the picture about the variation in Quick ratio. It comes on an average to 154.43 which is higher than the base year level. It shows the positive trend. Trend value is also higher than the base year level.

The overall result of Quick ratio is considered in reference to the value of standard deviation, co-efficient of variation and chi-square value. The calculated value of chi-square comes out to 17.56 while the critical value is 7.851. So, the calculated value is higher than the critical value. So, it allows the acceptance of alternative hypothesis. It means, "There is significant difference between the Quick ratios of fertilizer companies". Moreover, the standard deviation is 484.61 while the co-efficient of variation is 313.80. So, there is much variation in the productive indices.

Table No 4.16

Analysis of Quick ratio at Liberty: (Rs in Crore)

Year	Quick Assets	Current Liabilities	QR	QR index	t.v.
1996-97	540.95	576.72	0.937977	100	132.29
1997-98	1132.85	756.48	1.497528	159.65509	137.82
1998-99	1170.83	851	1.375828	146.6804	143.36
1999-2000	1117.83	765.37	1.460509	155.70843	148.89
2000-01	1255.96	762.17	1.647874	175.68382	154.43
2001-02	1097.15	789.27	1.390082	148.20001	159.97
2001-03	1536.89	1016.4	1.512092	161.20776	165.50
2003-04	1543.46	907.33	1.701101	181.3585	171.04
2004-05	1672.48	1104.92	1.513666	161.37561	176.57
total	11068.4	7529.66	13.03666	1389.8696	1389.87
average	1229.822	836.6289	1.448517	154.42996	154.43

Chi Squ : 17.56

SD : 484

CV : 313

1. Analysis of Quick Ratios of the Fertilizer Companies and Kruskal Wallis' one way analysis of Variance Test:

The comparative position of Quick ratios of fertilizer companies have been given in the following table no 4.17 along with the application of Kruskal Wallis' one way analysis of variance test on this ratio for the research period i.e., 1996-'97 to 2004-'05.

Comparative Quick Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test							
Year	GNVFC	R1	GSFC	R2	Liberty Phosphate Ltd.	R3	IFFCO	R4
1996-'97	2.99	36	1.04	6	1.63	24	0.94	3
1997-'98	2.79	35	0.98	4	1.81	27	1.50	21
1998-'99	2.65	32	1.19	12	1.15	10	1.38	17
1999-'00	2.67	31	1.30	14	1.37	16	1.46	19
2000-'01	2.64	30	1.07	8	1.47	20	1.65	25
2001-'02	2.69	33	1.02	5	2.73	34	1.39	18
2002-'03	1.36	15	0.76	1	1.07	8	1.51	22.5
2003-'04	0.80	2	1.07	8	1.17	11	1.70	26
2004-'05	2.46	29	1.25	13	1.91	28	1.51	22.5
Total		243		71		178		174

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)}{n_j} - 3(N+1) \right]$$

$$= \frac{12}{36(36+1)} \left[\frac{(243)}{9} + \frac{(71)}{9} + \frac{(178)}{9} + \frac{(174)}{9} \right] - 3(36+1)$$

$$= \frac{12 \quad (6561 + 560.11 + 3520.44 + 3364) - 111}{1332}$$

146

=   126.18 - 111

= $\boxed{15.18}$

       The above table no.4.17 interprets that the calculated value of H is 15.18 which is higher than the critical value − 7.851. So, the null hypothesis based on Kruskal Wallis' one way analysis of variance test at 5% level of significance is rejected and the alternative hypothesis is accepted. It means**. "There is significant difference between the Quick ratios of the fertilizer companies".**

References:

(1)   Agrawal N. K., Management of Working Capital, New Delhi : Sterling Publishers Pvt. Ltd. 1983.

(2)   Agrawal N. P., Analysis of Financial Statements, New Delhi : National Publishing House, 1982.

Chapter 5

Analysis of

Receivables Management

Contents:

1. **Introduction**

2. **Meaning of Receivables**

3. **Conceptual Framework**

4. **Cost of Maintaining Receivables**

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   II Executing credit policy

   III Formulating and executing collection policy

9. **Factors affecting to the Receivables Policy**

10. **Determining the Appropriate Receivables Policy**

11. **Monitoring the Receivables Policy**

12. **Evaluation of Credit Development**

13. **Analysis and interpretation of data.**

1. Introduction:

A sound managerial control necessitates proper management of liquid assets and inventory. These assets are a part of working capital of the business. Financial distress can be avoided by an efficient use of financial resources. Receivables result from credit sales. A business unit is required to allow credit sales in order to expand its sales volume. Selling goods only on cash basis is always not possible. Sometimes other units in that line might have established a practice of selling goods on credit basis. Under these circumstances, it is not wise to avoid credit sales. Sales can be affected adversely. In order to increase profitability, increase in sales becomes compulsory. After a certain level of sales the increase in sales will not proportionately increase production costs. The increase in sales will bring in more profits. Thus, receivables constitute a significant portion of current assets of a firm. But, for investment in receivables, a firm has to incur certain costs. Further, there is a risk of bad debts also. It is, therefore necessary to have a proper control and management of receivables.

2. Meaning of Receivables:

Receivables represent amounts owed to the firm as a result of sale of goods or services in the ordinary course of business. These form a part of its current assets and are claims of the firm against its customers. Receivables are also called accounts receivables, trade receivables, customer receivables or book debts. The receivables are carried for the customers. The period of credit and extent of receivables depends upon the credit policy followed by the firm. Investment in receivables serves the purpose of meeting competition and increasing the sales and profits.

3. Conceptual Framework:

When a firm makes an ordinary sale of goods or services and does not receive payment, the firm grants trade credit and creates account receivable, which is collected in the future. The value of these claims is curried on the balance sheet under titles such as accounts receivables, trade receivables or customer receivables. These accounts

receivable represent an extension of credit to customers, allowing them a reasonable period of time in which to pay for the goods, which they have received. Receivables are significant current assets that must be financed on a continuing basis. The financial manager can add value to the company's shares by properly influencing three areas: the company's aggregate investment in receivables, its credit terms and its credit standards.

(1)   Exhibit – 1 shows us that these decision areas are not the exclusive domain of the financial manager, but are influenced

```
                    ┌─────────────────────┐
                    │ Marketing Strategy  │
                    └──────────┬──────────┘
                               ↓
                    ┌─────────────────────┐
                    │   Sales and Market  │
                    │   Share Objectives  │
                    └──────────┬──────────┘
                               ↓
          ┌────────────────────────────────────────┐
          │       Financial Management Input        │
          └────────────────────────────────────────┘
             ↓                    ↓                   ↓
┌──────────────────────┐  ┌──────────────┐  ┌──────────────────┐
│ Aggregate Investment │  │ Credit Terms │  │ Credit Standards │
│ in Accounts          │  └──────┬───────┘  └─────────┬────────┘
│ Receivables          │         ↓                    ↓
└──────────┬───────────┘  ┌──────────────┐  ┌──────────────────┐
           ↓              │ Length of time│  │   Marginally     │
┌──────────────────────┐  │ Customer has  │  │   Acceptable     │
│  Total Investment    │  │ to pay        │  │   Customer       │
└──────────┬───────────┘  └──────┬───────┘  └─────────┬────────┘
           │                     ↓                    │
           │        ┌──────────────────────┐          │
           └───────→│      Maximum         │←─────────┘
                    │ Shareholder Value    │
                    └──────────────────────┘
```
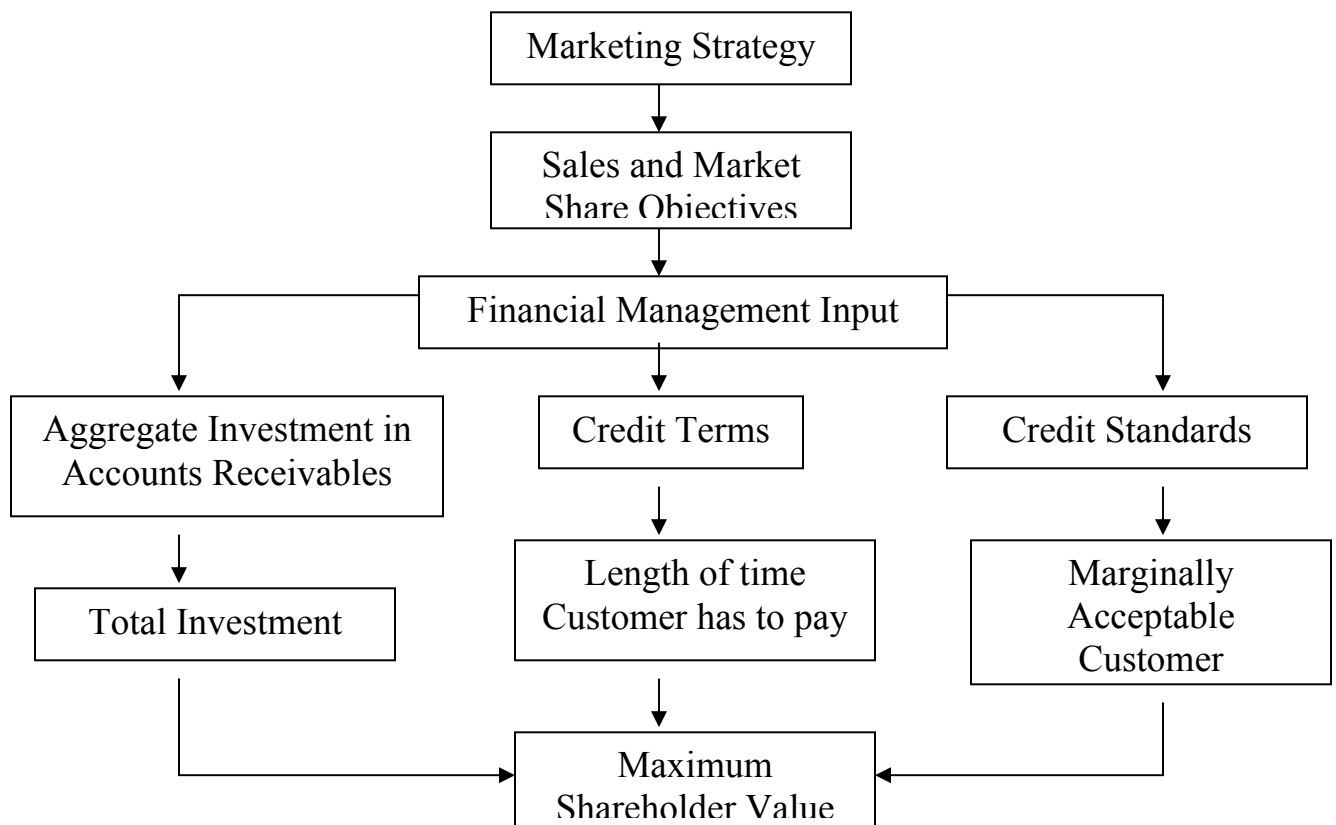
(Source: Working Capital Management, by V.K. Bhalla, Published by J. L. Kumar for Anmol Publications Pvt. Ltd., New Delhi. Pg. No. 243)

by the company's marketing strategy and the corresponding sales and market share objectives. The diagram also indicates the major issues addressed by the financial manager, each with a potential impact on share value. Over investing in receivables can be costly because the investment is typically financed by short – term borrowing and because it may signal acceptance of late – paying customers. If the credit terms (cash

discount and period allowed for payment) are not competitive when compared to other sellers in the same industry or are misaligned with the product line profitability, they can also diminish shareholder value. Setting the credit standard for customers in correctly can erode shareholder value because of lost sales or uncollectible sales.

4.   Trade credit and consumer credit:

Trade can distinguish trade credit and consumer credit. Credit, which occurs when one business sells to another, and consumers credit that, occurs when a business makes a sale to an individual. The distinction becomes important as companies offer different credit terms depending on whether the sale is to an individual or to another company. It has been suggested that trade credit terms are generally more liberal than consumer credit terms. For example, trade credit terms are more likely to include a cash discount and are likely to involve a service charge, which is frequently the case with consumer credit.

Trade credit and consumer credit are distinguished to highlight the fact that the credit terms offered by a company are largely influenced by the environment in which the company operates. The market structure within the industry, the type of product being marketed and the current economic conditions will influence credit terms of the business unit.

▪ Trade credit and bank credit:

A company can offer credit in various forms. An individual purchasing goods on credit from a retailer may opt to charge it to his credit account or alternatively, to enter into a hire purchase agreement. A company can offer trade credit on open account or require a trade bill as documentation of the debt. The most of the credit transactions between companies are made on open account, where there is no formal documentation of the financial claim is transferred and the selling company sends out regular statements to notify its credit customers of their current indebtedness. When a trade bill is prepared to document the financial obligation, the purchasing company gives a promissory note

the selling company to the effect that it will pay a specified amount on a specified future date. An advantage of the trade bill is that it can be converted into cash before the maturity date.

Although a business's customers could get the same funding from banks often those bank loans would come at a greater cost, with less efficiency, and not as quickly. Trade credit offered by businesses differs in some ways from the credit typically offered by banking institutions. Following exhibit – 2 illustrates some of the key differences:

<center>**EXHIBIT – 2**</center>
<center>**Differences between trade credit & bank credit**</center>

Attribute	Trade credit	Bank credit
Length of terms	Relatively short – usually30,60 or 90 days	Longer and often extended and repaid on a seasonal basis.
Security	Usually unsecured somewhat more lenient in extending credit	Higher standards for unsecured loans, otherwise secured.
Amounts involved	Smaller, especially if customer buys for several sources.	Larger, especially for large companies or those dealing with a small number of banks.
Resource transferred	Goods or services	Money
Extent of analysis	Extensive when size of transaction is large involving large credit exposure.	Bank's need for liquidity to meet deposit withdrawals, necessitates in – depth analysis regarding safety and collectibles.

5. Cost of Maintaining Receivables:

Allowing credit to customers means giving of funds for the customers use. The business unit incurs the following costs on maintaining receivables.

- **Capital Costs:** When goods and services are provided on credit then concerns capital is allowed to be used by the customers. The concern must raise funds to finance credit, for the firm must pay it employees, it suppliers and all others who manufactured or distribute the product while waiting for the customer to pay for the product. This time gap means that the firm has to go out end raise funds to meet its payment while waiting for the payment from the gape is to be filled by financing from the funds supplied by shareholders for long term financing and through retained earnings. The concern incurs some cost for collecting funds which finance receivables.

- **Collection Costs:** A proper collection of receivables is essential for receivables management. Money is spent in preparing and mailing reminders, hiring personnel or agencies to get the payment, in acquiring credit information and in generally maintaining and operating a credit department. In some cases legal resource may have to be taken for collecting receivables. All these are collection costs that a business unit is generally required to incur.

- **Delinquency Costs:** The failure of the customer to pay on time adds collection costs above those associated with a normal collection. Delinquency also ties up fund which would be earning money elsewhere, crediting an opportunity cost for any additional time the funds are tied up offer the normal collection period.

- **Default costs (Bad debt losses):** Some customers may fail to may amounts due towards them. The amounts that the customers fail to pay are known as bad debts. In addition to the collection costs, capital costs, and delinquent costs incurred up to this

point, the firm loses the cost of goods sold but not paid for it has to write off the entire sale once it decides the delinquent account has defaulted and is no longer collectable. Though a concern may be able to reduce bad debts through efficient collection machinery but one cannot altogether rule out this cost.

6.   Factors Influencing the Size of Receivables:

A part from sales, a number of other factors also influence the size of receivables. The following factor directly and indirectly affect the size of receivables.

- **Size of credit sales:** The main effect of credit sales results into increase or decrease in the size of receivables. If a concern sells only on cash basis, as in the case of Bata Shoe Company, then there will be no receivables. The higher the part of credit sales out of total sales, figures of receivables will also be more or vice versa.

- **Credit policies:** A firm with tight credit policy will have a low size of receivables while a firm with liberal credit policy will be increasing this figure. The potency with which the concern collects the receivables also affects its receivables. If collections are exhort then even if credit is liberally extended the size of receivables will remain under control. In case receivables remain outstanding for a longer period, there is always a possibility of bad debts.

- **Trade terms:** Trade terms also affects the size of receivables. The period of credit allowed and gates of discount given linked with receivables. The more credit period allowed, receivables will also be more or vice versa. Sometimes trade policies of competitors have to be followed otherwise it becomes difficult to expand the sales. The trade terms once followed cannot be changed without adversely affecting sales opportunities.

- **Expansion plans:** Expansion plans make the concern to rush to the new markets. To attract customers and to catch new market, it will give incentives in the form of credit

facilities. With the lapse of time, the periods of credit can be reduced, as the firm is able to get permanent customers. In the early stages of expansion more credit becomes essential and size of receivables will be more.

- **Relation with profits:** The main objective of following credit policy is to increase sales. When sales increase beyond a certain level the additional costs incurred are less than the increase in revenues. It will be beneficial to increase sales beyond a point because it will bring more profits. The increase in profits will be followed by an increase in the size of receivables or vice versa.

- **Credit collection efforts:** The collection of credit should be streamlined. Periodical reminders should be sending to customers if they fail to pay in time. Inadequate attention towards credit collection may lead the concern to have serious financial problem. Efficient credit collection machinery will reduce the size of receivables. If these efforts are slower then outstanding amounts will be more.

- **Habits of customers:** The paying habits of customers also have a bearing on the size of receivables. The customers may be in the habit of delaying payments even though they are financially sound. The concern should remain in touch with such customers and should make them realize the urgency of their needs.

7.   Force of Receivables:

Planning follows forecasting in each and every field and forecasting of receivables is not an exception. A concern should be clear about its credit policies. How much will be the size of receivables on the basis of present policies ? This is an important estimation, which will help the concern in planning its working capital. Estimations are not always exact but some estimations are possible on the basis of past experience, present credit policies and policies pursued by other concerns. The following factors will help in forecasting receivables.

- **Credit period allowed:** The time period for which credits are allowed is helpful in forecasting. The longer the amounts remain due, the higher will be the size of receivables. The increase in receivables affects two dimensional i.e. it will result in more profits as well as higher cost. The collection expenses and bad debts will also be more. If credit period is less, then the size of receivables will also be less.

- **Effects of cost of goods sold:** Sometimes an increase in sales results in decrease in cost of goods sold. If this is so then sales should be increased to that extent where costs are low. Sates and receivables are directly related i.e. the increase in sales will also increase the amount of receivables. The estimate for sales will enable the estimation of receivables too. This can be explained with the help of an example. Supposing cost of sales is 60 % of the total sales when sales are Rs. 20 lakhs. If sales are increased to Rs. 25 lakhs the cost of sales goes down to 55 % of sales. The concern should raise its sales to Rs. 25 lakhs so that it may be able to earn more profits. The increase in sales may increase the cost of sale to the same old percentage. Under these circumstances it will not be wise to increase sales beyond Rs. 25 lakhs. The receivables will be forecasted when sales figures are estimated.

- **Forecasting expenses:** A number of expenses are associated with the receivable. The expenses are administrative expenses on collection of amounts; cost of funds tied down in receivables, bad debts etc. increase in sales brings more receivables. More receivables bring increase in profit and expenses. Profits are invested in receivables and bring increase in sales. It is like a interrelated cycle. But the cycle runs smoothly only when the cost of the receivables is less then the increase in income. If the costs of receivables are more than the increase in income, further credit sales should not be allowed. On the other hand, if revenue earned by the increase in sales is more than the costs of receivables, then sales should be expanded.

- **Forecasting average collection period and discounts:** The credit collection policies will spell out the time allowed for making payments and the time allowed for availing discounts. If the average collection period is more then the size of receivables will be more. Average collection period is calculated as follows

Average Collection Period

= Trade debtors X no. of working days / Net sales

The average collection period should be kept under control. The number of customer availing discounts should also be determined. If 25 % of customers are not availing discount facility, it means the payments by 30 % customers are over due. Average collection period and discount allowed will also be helpful in forecasting the size of receivables.

- **Average size of receivables:** The determination of average size of receivables will also be helpful in forecasting receivables. Average size of receivables is calculated as:

Average size of receivables = Estimated annual sales X Average   Collection period

8.   Meaning and Objectives of Receivables Management:

Receivables management is the process of making decisions relating to investment in trade debtors. We know that certain investment in receivables is necessary to increase the sales and the profits of a firm. But the same time we also know that investment in this asset involves cost consideration also. And risk of bad debts is always there. Thus the objective of receivables management is to take a sound decision as regards investment in debtors. According to Bolton. S.E., the objective of receivables management is "to promote sales and profit until that point is reached where the return on investment in future funding of receivables is less than the cost of funds raised to finance that additional credit." Receivable management investigates the techniques that a company may employ to determine an optimum credit policy. Very first a company decides whether it should sell goods on credit. An affirmative answer necessitates an evaluation of the credit. Once an optimum credit policy is determined, the financial manager must ascertain the effect is will have on the company's current asset

requirements. This is what receivables management all about. Let's discuss the different dimensions of receivables management.

9.   Dimensions of Receivables Management:

Receivables management involves the careful consideration of the following aspects

1.   Forming of Credit Policy
2.   Executing the Credit Policy
3.   Formulating and Executing Collection Policy

1.   Forming of Credit Policy

A credit policy must be adopted to efficient the receivables management. Credit standards, length of credit period. Cash discount and discount period etc. are the decisions related to a credit policy.

- **Credit Standards:** The volume of sales is affected by the credit policy of a business unit. Increase in profits results from the increase in volume of sales as the credit policy is liberalized. The increased volume of sales involves certain risks too. It will result in enhanced costs and risks of bad debts and delayed receipts. The increased number of customers increases the clerical work of maintaining the additional accounts and collecting of information about the credit worthiness of customers. There remains more bad debt losses due to extension of credit to less worthy customers. Even the customers may take more than normally allowed in making the payments resulting into tying up of additional capital in receivables. On the other hand, extending credit to only credit worthy customers save costs like bad debt losses, collection costs, and investigation costs, etc. the restriction of credit to such customers certainly reduces sales. Volume, thus resulting in reduced profits.

The increased revenue must be matched with additional costs. The credit should be liberalized only to the level where incremental revenue matches the additional costs. The quality of trade accounts should be decided so that credit facilities are extended only up to that level. A trade off between the costs and profitability is the optimum level of investment in receivables. The increased investment in receivables also adversely affects the liquidity of a firm. On the other hand, a tight credit policy increases the liquidity of a firm. Thus, optimum level of investment in receivables is achieved at a point where there is a trade off between cost, profitability and liquidity as depicted in the graph.
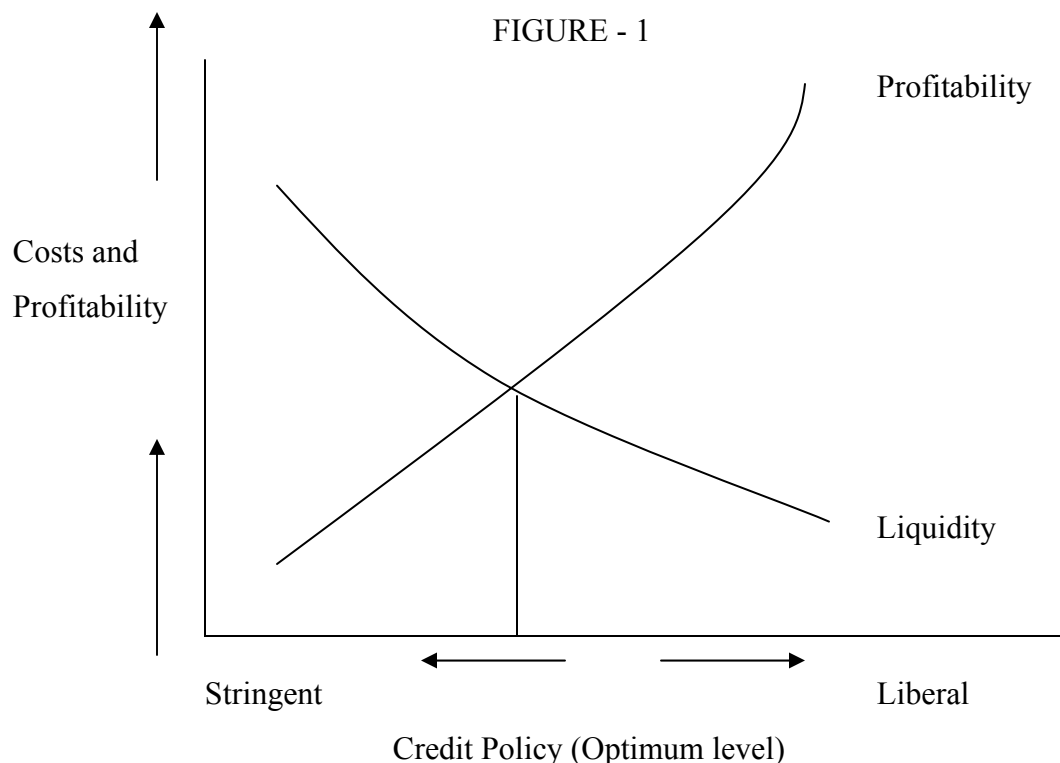
FIGURE - 1

(Source: Management Accounting by R.K. Sharma and Shashi K. Gupta, Published by Kalyani Publishers, New Delhi. Pg. No. 22.15)

- **Length of credit Period:**

Credit terms or length of credit period means the period allowed to the customers for making the payment. The customers regular in payment may also be allowed certain cash discount. There is no binding on fixising

the credit terms. A business unit can fix its own credit terms depending upon its customers of industry act as constraints on credit terms of individual business units. The competitive pressure prevailing in market compels to follow similar credit terms, otherwise customers may feel inclined to purchase from a firm which allows more days for paying credit purchases. Increased credit time holds existing customers with increase in sales and also attracts new customers. The length of credit period and quantum of discount allowed determine the magnitude of investment in receivables.

A firm can increase the length of credit period to increase the volume of sales. The lengthening of this period means blocking of more money in receivables, which could have been invested somewhere else to earn income. It also results in increased cost of debt collection and bad debt losses. If the earnings from additional sales by lengthening credit period are more than the additional costs then the credit terms should be liberalized. The period where additional revenue equates the additional costs is determined and credit should not be extended beyond this period, as the increase in cost will be more than the increase in revenue.

- **Cash discount:** Cash discount is allowed to expedite the collection of receivables. The funds blocked in receivables are released. The additional funds received from expedited collections due to cash discount can be used. The discount allowed carries cost. The earning resulting from released funds and the cost of discount are compared. The discount should be allowed only if its cost is less than the earnings from additional funds. If the funds cannot be profitably employed then discount should not be allowed.

- **Discounting period:** The collection of receivables is influenced by the period allowed for availing the discount. The additional period

allowed for this facility may prompt some more customers to avail discount and make payments. This will result in additional funds released from receivables, which can be used alternatively. At the same time the extending of discount period results in late collection of funds because those who were getting discount and making payments as per earlier schedule also delays their payments e.g. If the firm allowing cash discount far payments within one week now extends if to payments within two weeks. There may be more customers availing discount and paying early but here will be those also who were paying earlier within one week will now pay in two weeks. As a result the collection period increases. Hence, this decision involves matching of the effect on collection period with the increased cost involved with additional customers availing the discount.

2.   Executing Credit Policy:

After formulating the credit policy, its proper execution is very important. The evaluation of credit applications and finding out the credit worthiness of customers should be undertaken.

- **Collecting credit information:** Gathering of credit information about the customers is the first step in implementing credit policy. Adequate information about customer makes the proper analysis possible about the financial position of the customers. This type of investigation carries costs that put certain limitations on it. The cost incurred in collecting this information and benefit from reduced bad debt losses are compared. The credit information certainly help in improving the quality of receivables but the cost of collecting information should not increase the reduction of bad debt losses.

  The sources of credit information will be found out. The sources may be financial statements, credit rating agencies, report from banks, firms record

etc. financial reports of the customer for a number of years are helpful in determining the financial position and profitability position. The balance sheet helps in finding out the short term and long term position of the unit. The income statements show the profitability position. The income figures help in finding out whether it is sufficient to enable the payment of receivables or other business liabilities or not. The creditworthiness of customers can be determined with the help of a proper analysis of financial statements. There are credit rating agencies which can supply information about various concerns. These agencies regularly collect information about business units from various sources and keep this information date. The interpreted information can be collected from these agencies. These agencies provide the information to their subscribers on regular basis. Such agencies are not available in India at present but countries like America have so many agencies in this field.

The bank is also one of the sources for credit information. The banks analyze the financial position of a customer by the information available in their credit departments. The account holders can be helpful in supplying this information. If the customer is at a different place then the banks can collect this information trough its branch at that place and bank may even request the other banks for information about customers having accounts with them. The credit limits allowed, frequency of amounts deposited, etc. may be helpful to know about the customers.

In case of old customers, business's own records can be helpful in knowing the frequency of payments, cash discounts availed, interest paid on over due payments etc. the salesman of the business may also be asked to collect information about the customers.

- **Credit analysis:** After collection the necessary information, the finance manager should analyze it to find out the creditworthiness of potential

customers and also to see whether they satisfy the standards of the concern or not. The credit analysis determines the degree of risk associated with the account, the capacity of the customer to borrow and his ability and willingness to pay.

- **Credit decision:** After analyzing the creditworthiness of the customer, the finance manager has to take a decision whether the credit is to be extended and if yes then up to what level. The creditworthiness of a customer is matched with the credit standards of the company. If customer's credit worthiness is above the credit standards then there is no problem in taking a decision. In the marginal cases only it is difficult to take decisions. In such cases the benefit of extending the credit should be compared to the likely bad debt losses and then a decision should be taken. The customers, below the company's credit standards are not out rightly refused. Rather they should be offered some alternative facilities. A customer may be offered to pay on delivery of goods, invoices may be sent through bank and released after collecting dues or some third party guarantee may be insisted. Such a course may help in retaining the customers at present.

- **Financing investments in receivables and factoring:** Accounts receivables block a part of working capital. Efforts are made to see that funds do not remain tied up in receivables for longer periods. The finance manager should make efforts to get receivables financed so that working capital needs are met in time. The banks provide loan facility against security of receivables. Normally 60 to 80 percent of the amount of receivables is supplied as loans against their security. The quality of receivables determines the amount of loan. The banks accept receivables of reliable parties only. Another method of getting funds against receivables is their outright sale to the bank. The bank credits the amount to the party after deducting discount and collects the money from the customers later. Here too, the bank insists on quality receivables only. The agencies other then banks also can purchase receivables

and pay cash for them that is known as factoring. The factor buys only the accounts acceptable to him and may refuse purchase in certain cases. The factoring may be with or without recourse. If it is without recourse then any bad debt loss is taken up by the factor but if it is with recourse then bad debt losses will be recovered from the seller. The factoring service varies from bill discounting facilities offered by commercial banks to a total take over of administration of the sales ledger and credit control functions.

3.   Formulating and Executing collection Policy:

The collection of amounts from customers is very important. A firm should follow devise procedures when accounts become due after the expiry of credit period. The collection policy is termed as strict and lenient. A strict policy brings more collection having positive and negative effects. This policy will enable early collection of dues and will reduce bad debt losses. The collected money gets an opportunity to be invested or used elsewhere an adds to the profit of the firm. On the other hand a rigorous collection policy will involve increased collection cost. It may also reduce the volume of the sales. Liberal collection policy may direct concern that ultimately causes reduced sales and profits. A lenient policy may increase the debt collection period and more bad debt lasses. A customer not clearing the dues for long may not repeat his order because he will have to pay earlier dues first, thus causing loss of customers. The collection policy should weigh various aspects associated with it, the gains and losses of such policy and its effect on the finances of the concern. Particular steps must be followed for collecting over due amounts. The objective is to collect the dues and not to annoy the customer. The steps should be like (**I**) sending a reminder for payments (**II**) personal request through telephone etc. (**III**) Personal visits to the customers (**IV**) taking help of collecting agencies and (**V**) taking legal action. The last step should be taken only after exhausting all other means because it will have a bad impact on relations with customers. The genuine problems of customers should never be ignored while making collections. The aim should be to make collections and keep amiable relations with customers.

An average collection period and aging schedule is the device to monitor the collection of book debts. The actual average collection period may be compared with the stated collection period to evaluate the efficiency of collection so that necessary corrective action can be taken if the need be. The aging schedule further highlights the debtors according to the age or length of time of the outstanding debtors.

10. Factors in determining receivables policy:

Dimensions of receivables management has indicated the area and activities to be covered. Now, we discuss the two main factors in determine receivables policy and they are costs and benefits associated with accounts receivables.

- **Costs:** Costs facto is discussed before, under the heading ' Cost of Maintaining Receivables.' Let's discuss another one.
-
- **Benefits:** The firm incurs benefits from the accounts receivable policy that must be weighed against the costs in order to determine the profitability of any particular accounts receivable policy. The benefits are the increased sales and profits anticipated because of a more liberal policy.

The benefits and costs of investing in accounts receivables can be illustrated analytically as follows: Let the average unit price be denoted by P, the average unit cost by C, and sales volume by S. Further assume for the sake of simplicity, that the firm possesses linear revenue and cost functions. Now the profit of the firm M is define as the difference between total revenues (TR) and total cost (TC) symbolically.

$$M = TR - TC \qquad .(1)$$

Figure – 2 show the effect of increased investment in accounts receivables. For example, for the firm operating on a cash and carry policy the profit is determined by
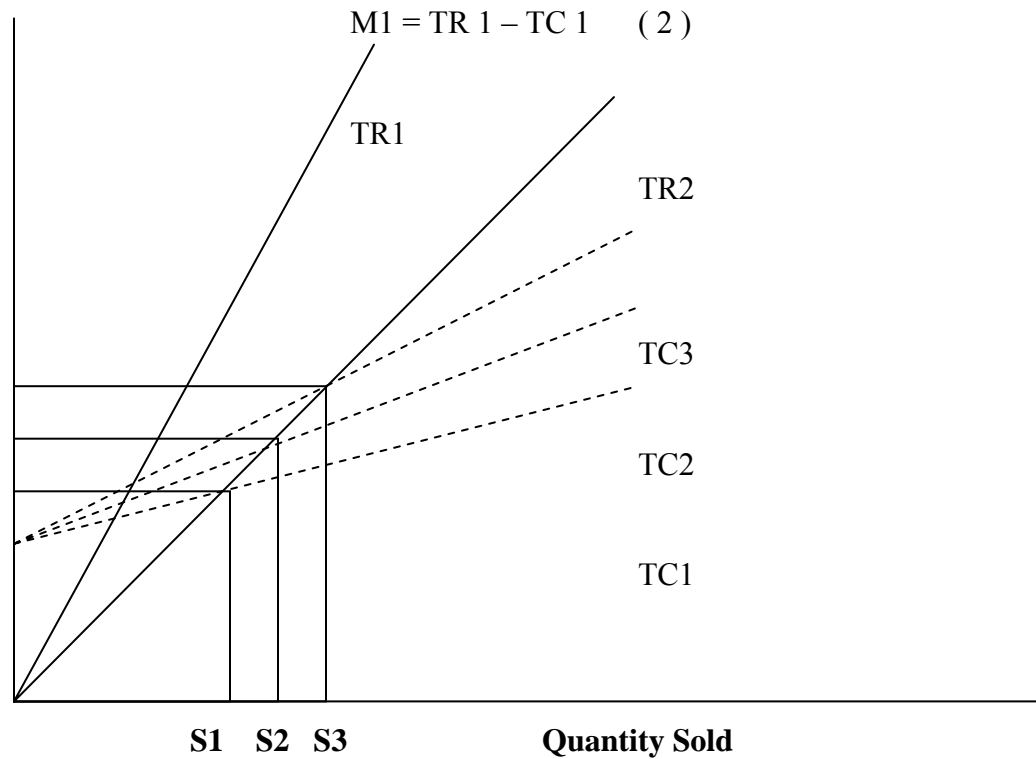
$$M1 = TR\ 1 - TC\ 1 \qquad (\ 2\ )$$

TR1

TR2

TR3

TC3

TC2

TC1

S1   S2   S3   Quantity Sold

The Effects of Increased Investment in Accounts

(Source: Management Accounting by R.K. Sharma and Shashi K. Gupta, Published by Kalyani Publishers, New Delhi. Pg. No. 247)

For the firm that institutes a credit policy and expects no delinquency in accounts receivable, the total cost curve TC1 is likely to shift slightly upwards to TC2, to account for the increase in the collection expenditures necessary to handle the additional account at sales level S2. Thus the profit is now determined by

$$M2\ =\ TR\ 1\ -\ TC\ 2 \qquad (3)$$

However, at some point in time, reality must enter in terms of delinquent collections and bad debts. The effects of these developments are likely to be manifested
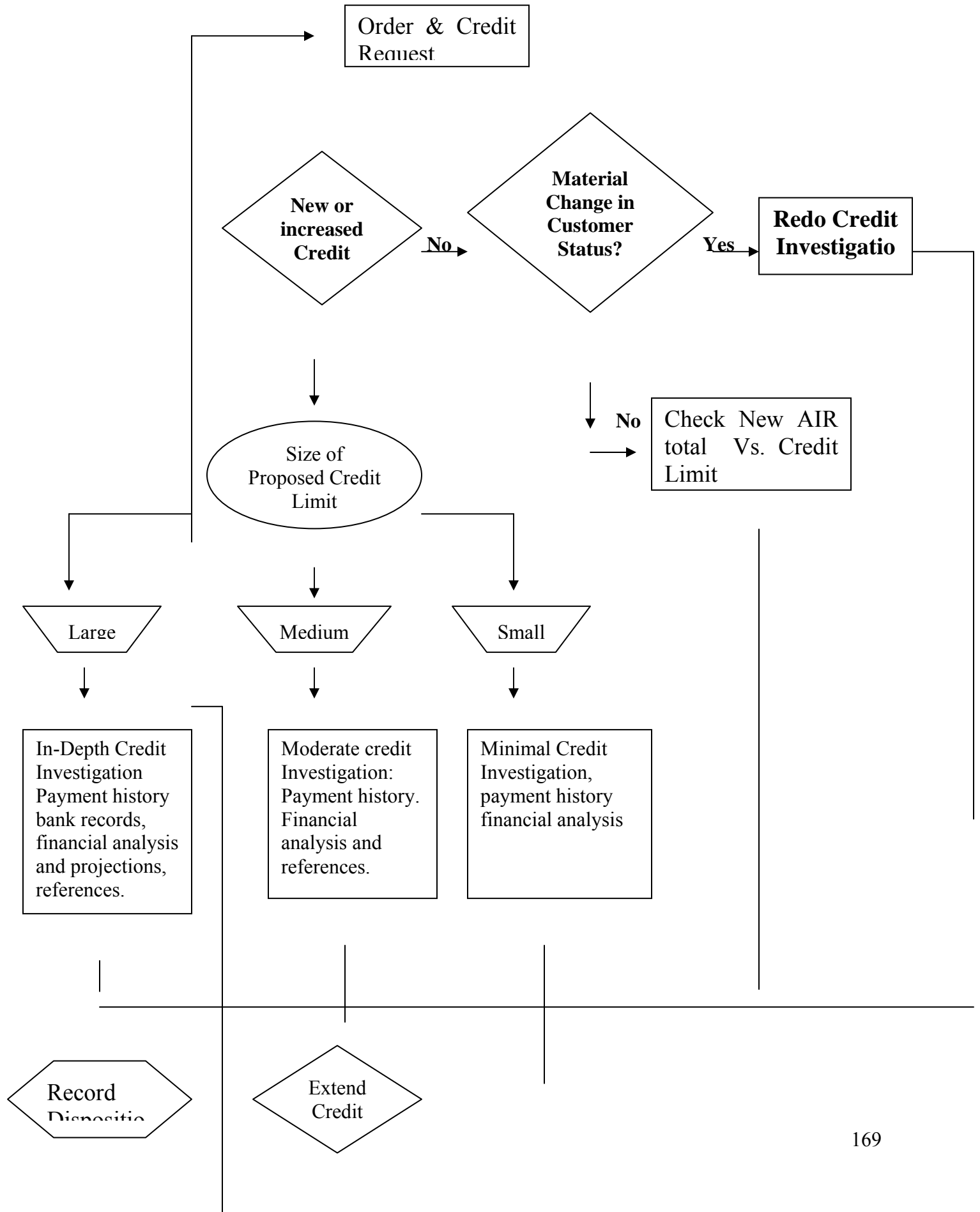
by a downward shift of the total revenue and an upward shift of the total cost functions. Hence the new profit, a sales level S3 is determined by
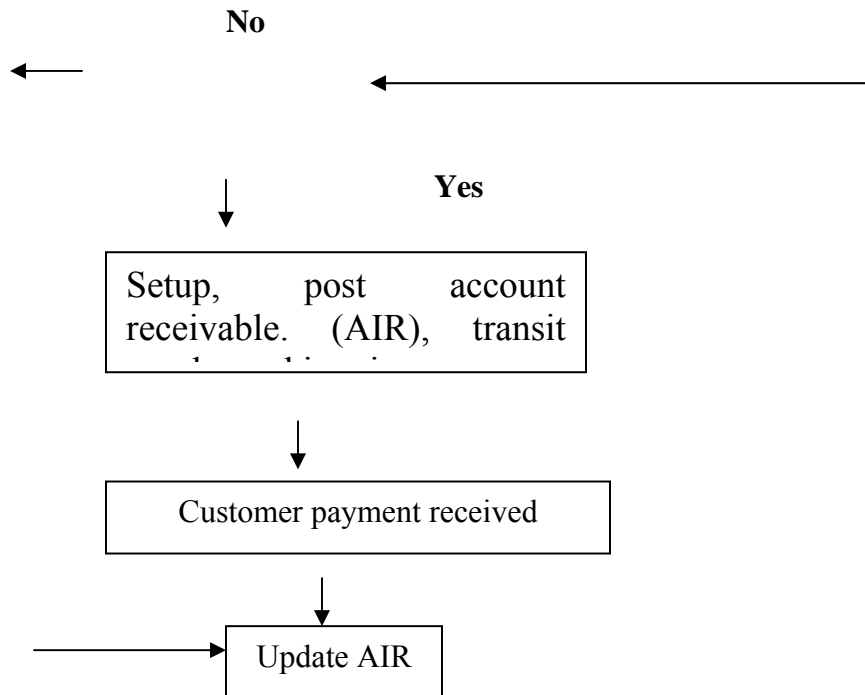
$$M3 \ = \ TR\,2 - TC\,3 \qquad (4)$$

It is obvious that the optimal credit policy is the one that maximizes the objective of the corporation but it is important to notice here that there is twofold effect that, given the same accounts receivables turnover brings additional receivables and there is a slower, average collection period that also increases the funds required to maintain the current receivables policy. Thus the double-edged impact on the increased investment in receivables must be weighed in terms of the opportunity cost of the funds invested and compared to the profitability of the increased sales.

11. Determining the appropriate Receivable Policy:

Once the costs and benefits are known, the management activates its team to find out the method by which the objective of maximizing profits without undue risk or having the return from the extension of credit exceed the cost of capital. Under this heading the relationship between the components of a company's credit policy and the costs and benefits associated with providing credit are discussed. The main aim is to derive a technique which the company can apply in order to determine an optimum credit policy. e can gain a greater appreciation for the credit granting process if we know the sequence of events initiated when a business makes a credit granting process if we know the sequence of events initiated when a business makes a credit sale. The activity flowchart in Exhibit –3 shows a typical credit sequence. Upon receipt of orders from a new customer or from an existing customer within insufficient pre-approved credit, the seller must determine whether to launch a credit investigation of the buyer. If it investigates, the seller might consult various information sources and tailor the depth of investigation to the size of the account. Credit administration is involved in the establishment of credit policy, only with planning, organizing directly and controlling all aspects of the credit function. Credit policy involves credit standards setting credit terms, the company approvals to credit investigation, credit limits and the collection activity. As long as payment are received on timely basis the credit granting process is a continuous flow of alternating orders and payments.

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                              ┌─────────────────┐
                              │ Order & Credit  │
                              │ Request         │
                              └─────────────────┘


        ╱╲                         ╱╲                        ┌──────────────────┐
       ╱  ╲                       ╱  ╲                       │                  │
      ╱ New ╲                    ╱Material╲                  │  Redo Credit     │
     ╱  or    ╲      No         ╱ Change in╲     Yes         │  Investigatio    │
     ╲increased╱ ─────────►     ╲Customer  ╱ ─────────►      │                  │
      ╲ Credit ╱                 ╲Status? ╱                  └──────────────────┘
       ╲      ╱                   ╲      ╱
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                                           No   ┌─────────────────┐
                                                │ Check New AIR   │
         ╱────────────╲                         │ total  Vs.Credit│
        ╱  Size of     ╲                  ─────► │ Limit           │
        │Proposed Credit│                        └─────────────────┘
        ╲  Limit       ╱
         ╲────────────╱


    ┌──────┐         ┌────────┐        ┌───────┐
    │Large │         │ Medium │        │ Small │
    └──────┘         └────────┘        └───────┘


┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│In-Depth Credit│ │Moderate credit│ │Minimal Credit │
│Investigation  │ │Investigation: │ │Investigation, │
│Payment history│ │Payment history│ │payment history│
│bank records,  │ │Financial      │ │financial      │
│financial      │ │analysis and   │ │analysis       │
│analysis and   │ │references.    │ │               │
│projections,   │ │               │ │               │
│references.    │ │               │ │               │
└──────────────┘  └──────────────┘  └──────────────┘


    ╱──────────╲          ╱╲
   ╱ Record     ╲        ╱  ╲
   ╲ Dispositio ╱        ╲Extend╱
    ╲──────────╱         ╱Credit╲
                          ╲    ╱
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169

Yes

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┌─────────────────────────┐
│ Setup,    post   account│
│ receivable.  (AIR),  transit│
└─────────────────────────┘
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```
┌─────────────────────────┐
│ Customer payment received│
└─────────────────────────┘
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┌─────────────┐
│ Update AIR  │
└─────────────┘
```

(Source:Management Accounting by R.K. Sharma and Shashi K. Gupta, Published by Kalyani Publishers, New Delhi, Pg. 248)

- **Analysis of Credit Standards:**

Credit standards followed by a concern have significant influence on sales as trade credit is one of the many factors that influence the demand for a firm's product. The liberal credit terms include certain costs and the enlarged administrative expense and increased probability of bad debt and the cost of additional investment in receivables resulting from increased sales and slow average collection period. On other hand there is also the profitability of additional sales, additional demand for the product and the required return on investments.

Let's make a concept clear with an illustration. Assume a product sells for Rs. 20 a unit of which Rs. 14 represents variable costs before taxes including administrative costs. Current annual sales are Rs. 48,00,000 represented entirely by credit sales and the firm is considering a more liberal extension of credit, which will result in a slowing in the average collection period from one to two months. However, existing customers are not

expected to alter their payment habits. The relaxation in credit side is expected to produce a 25 % increase in sales to Rs. 60,00,000 annually. This Rs. 12,00,000 increase represents 60,000 additional units. Assume that the required rate of return on investment in receivable is 20 % before taxes.

Present value of receivables

= Annual sales / receivables turnover

= Rs. 48,00,000 / 12

= Rs. 4,00,000

New level of receivables

= Rs. 60,00,000 / 6

= Rs. 10,00,000

Additional receivables

= Rs. 6,00,000 (Rs. 10,00,000 - 4,00,000)

Additional investment in receivables

= Rs. 6,00,000 X 0.7

= Rs. 4,20,000

Required return on additional investment

= 0.20 X Rs. 4,20,000

= Rs. 84,000

Profitability on additional sales

= Rs. 6 X 60,000 units

= Rs. 3,60,000

As the profitability on additional sales, (i.e. Rs. 3,60,000) exceeds the required rate on the additional investment (i.e. Rs. 84,000) the firm will be advised to relax is credit standards.

However there are many practical problems in affecting a change in credit policy's particularly in examining the receivables. It is wise to attract probability distributions to the increased demand and to the increased sales in receivables and evaluate a range of possible outcomes. Another assumption is that 60,000 additional units can be produced at a variable cost of Rs. 14 a unit i.e. that plant capacity does not have to be extended. This indicates that the firms should very its credit quality standards in keeping with the level of production and as a capacity is approached, quality standard might be improved. Another assumption is that increases demand, as a function of lowering credit quality standards as well as price and cost figures will remain unchanged.

- **Analysis of credit terms:**

A company's credit terms defines a credit period and cash discount rate where a cash discount is offered. The credit period is the period elapsing between the date when the purchasing company receives its statement of account and the date when payment is due. The cash discount period is the period clasping between the date when the purchasing company receives its statement of account and the date when the cash discount is forgone. The cash discount denotes is forgone. The cash discount denotes the decrease in price for the purchasing company, if it pays within cash discount period. An illustration makes concept easy to understand.

Assume a firm with annual credit sales of Rs. 30,00,000 has an average collection period of 2 months, and the sales terms are net 45 days, with no discount given the annual turnover of receivables are times, so that the average receivable balance is Rs. 5,00,000. If the terms are changed to 2 / 10 net 45, i.e. a 2 % discount is given if the bill is paid before the 10th day after the date of invoice, payment is due by the 45th day, the average collection period is reduced to one month and 50 % of customers take advantage of the 2 % discount. The opportunity cost of the discount to the firm is 0.002 X 0.5 X 3 months or Rs. 30,000 annually. However, the turnover of receivables has improved to 12 times a

year. So the average receivables reduced from Rs. 5,00,000 to Rs. 2,50,000. The firm realizes Rs. 2,50,000 from accelerated collections and if a 20 % rate of return is assumed, the opportunity saving is Rs. 50,000 which is greater than the cost of discount so that the firm should adopt a 3 % discount. If the speeding in collections has not resulted in sufficient opportunity saving to offset the cost of discount, the discount should not be changed.

Other of a cash discount aims to accelerate the flow of cash in to the firm and / or improve its competitive position. The length of the discount period also may affect the collection period but the effect is not so clear as two forces then influence the average collection period. If the credit period is held constant, certain customers are tempted to take the discount where previously they did not do so, a practice that shorten the average collection period. On the other side, customers who have been taking the discount and paying at the end of discount and paying at the end of discount period will now postpone payment until the end of the new discount period, there by lengthening the average collection period. But for practical purposes, the discount period is variable only within a narrow range, for to increase it significantly beyond 10 days would defeat its purpose.

- **Seasonal dating:**

During slack time, the firm sometimes sells without payment for some time to come. Seasonal dating may be employed to stimulate demand from customers who cannot pay until later in the season. The profitability from additional sales should be compared with the required return on the additional investment in receivables to determine whether dating is an appropriate means of stimulating demand. Dating also help to avoid inventory-carrying costs, for if sales are seasonal while production is steady throughout the year, there remain bundles of finished goods inventory during certain time of the year. Storage includes warehousing costs and therefore dating may be profitable. If the warehousing costs add the required rate of return in investment in inventory exceed the required rate of return on additional investment in receivables, it is worthwhile to give dating.

- **Delinquency and default:** Delinquency costs are those expenses associated with that portion of total sales that remain uncollected and they force the company to spend an additional amount per account in an attempt to collect. Delinquent costs can be expressed as follows

$$DC \quad = \quad AC \ (N + N') \ (Ps)\text{.......} \ (5)$$

Where:

DC	=	total delinquency cost
N	=	the number of units sold
N'	=	the number of additional units sold to the customers because of the discount
Ps	=	the percentage of total sales that are not paid

The default cost (FC) also have to be deducted from the delinquency cost which rises when the firm gives up trying to collect on the account and charges the entire cost of the goods sold as an expense. A certain portion of the total sales under the 2 /10 net 45 policies is expected to default. We can express the cost of goods (c) that

$$FC \quad = \quad C \quad (N + N') \quad (Ps)$$

Capital investment in receivables is identical to the capital investment in other assets i.e. a cost of associated with the investment, and the value of sales each rupee sold on terms is to be greater if it is received in the immediate future than it should be if it were received at some later date. That is why, both the cost of time value of funds must be considered when credit policy is being set. Cash discounts directly affect a firm's cost of capital as that may cause it to increase or decrease. For example assume that a firms cost of capital is 1 % per month but its cash discount terms are 2 % cash, net 30 days. If the discount is taken, the firms cost of capital doubles – 24% instead of 12 % and the net worth of the firm suffers. If the cash discount is taken, the present value of the sale will be less then it would have been if the account had been collected at the end of 30 days. A

simple example illustrates this. Assume an article costing Rs. 80 sells for Rs. 100 with term of 2 % cash, net 30 days. If the cash discount is taken, the present value will equal Rs. 100 with terms of 2 % cash, net 30 days. If the cash discount is taken, the present value will equal Rs. 18.

	Rs.
Sale	100
Cash discount 2 %	2
Cash / present value	98
Cost (present value)	80
Present value	18

If the customer does not take the cash discount the present value of the profit is equal to Rs. 19 a gain of Rs. 1 the computation is as follows:

Present value of sale 30 days	Rs. 99
Hence, when cost of capital is 1 %	80
Cost (present value)	19

Since the cost of capital is 1 % and the cash discount is 2 % the firm will have sustained a loss of 1 % (reduction in net worth) if the discount is taken. If the two are equal, it makes no difference to the credit manager whether the discount is taken; however, if the discount is less than the cost of capital and it is taken, the net result will be to raise the present value of the firms net worth.

Delinquency accounts and the length of credit terms directly affect the firms' net worth. Delinquency accounts affect the net worth as an increase in the cash discount, the credit terms or the cost of capital. If a deterioration in net worth is to be avoided in the event of delinquents accounts, management should do one of three things: 1. Eliminate the account by either collecting the account or by eliminating the customer 2. Lower the firm cost of capital 3. Charge the customer an amount equal to the firm cost of capital for the period of the delinquency.

Credit terms vary by industry and even within industries. Differences are connected to product characteristics as well as market structure and market condition. Mostly the credit terms of companies are set based on competitive condition and rarely changed. Analysis of the optimal cash discount concludes

     I   A products variable cost affects the optimal cash discount. The lower a products variable set the higher the possible discount. Companies with lower gross margins are most likely to reduce or eliminate their cash discount.

     II   Logically the cash discount offered should be based on the offering company's cost of funds when the opportunity cost of funds changes, so should the cash discount.

     III   When selling or changing in discount is done, the timing effect of the payments for discount takers and the effect for those not taking the discount both must be considered.

     IV   The size of the cash discount depends on the products price elasticity of demand.

     V   The higher the rate of bad debt losses being experienced, the higher the optimal cash discount percent.

- **Marginal Analysis:** In determining the appropriate accounts receivable policy, these variables will now be analyzed in a decision-making context, which is termed marginal analysis. Marginal analysis follows a systematic comparison between the marginal returns and the marginal costs from a change in the discount period, the risk class of the customer, or the collection process. The change should be accepted if the marginal return from a proposed change in the management of accounts receivables is greater than the marginal costs on additional investment.

The logic behind this approach to credit policy is to examine the incremental or marginal benefits, and costs or required returns associated with any change in the credit policy. If the change promises more benefits than costs, the change should be accepted if, however, the incremental costs are greater than the benefits, the proposed change should be dropped.

- **Evaluating the credit applicant:** After discussing the returns to credit extensions, now let's look at the risks. There are two types of risks in granting credit: the change that this will be a ' slow policy ', tying up unwarranted sums in accounts receivable. The magnitude of these risks depends ultimately on the customer financial strength and willingness to pay. The credit evaluating procedure includes three related steps obtaining information on the applicant analyzing this information to determine the applicants credit worthiness and monitoring the accounts receivable policy.

- **Sources of credit information:** Though a number of sources supply cre3dit information but for some accounts, especially small ones, the cost of collecting it may out weight the potential profitability of the account. Therefore, a firm extending credit has to be satisfied with a limited amount of information on which to base a decision. With the cost, the firm must consider the time it takes to investigate credit applicant. Thus, the amount of information-collected need to be considered both in relation to the time and expenses required. Depending upon these considerations, the credit analyst may use one or more of the following sources of information.

- **Financial statements:** By the financial statements of past few years the firm can analyze the applicant's financial stability, liquidity, debt capacity and profitability, no specific information with respect to past payment patterns is shown on a balance sheet or on an income statement but in sighting into the firm's financial position may indicate the nature of its overall financial management. The willingness of the applicant firm to provide these statements may be indicative of its financial position. Audited financial statements are must for the analysis of credit applicants desiring to make large credit purchases or to be extended lines of credit.

- **Bank reference:** The firm's bank may obtain credit information form the applicants' bank. However, the type of information obtained is most likely to be vague unless the applicant aids the firms in obtaining it. There some limitations such as the credit applicant bank cannot disclose balances, loan balances and so forth, without the consent of the applicant. Typically, an estimate of the firms cash balance is provided. For instance, it may be found that a firm maintains a high five-figure balance.

- **Trade checking:** Credit information frequently is exchanged among companies selling to the same customer. Credit people in particular area, through various credit organizations, become a closely-knit group. A company can ask other suppliers about their experiences with an account. Useful information involves the length of time they have had the account, the maximum credit is extended, the amount of the line of credit, and whether payment are prompt or slow.

- **Credit bureaus:** In the advanced countries the services of credit bureaus are required to get comprehensive and correct information about the applicant. These credit bureaus specialize in consolidating the experiences of other firms with the applicant. Credit bureaus collect a history of the applicants credit payment performance as reported by the credit-granting firms. In India, there is urgent need to develop such organizations as the bank checking and trade checking may furnish vague and biased credit information.

In addition to these external sources of credit information, a firma may try to complete its own information. When a customer desiring credit terms approaches a firm, the firms; credit department typically begins the credit evaluation process by requiring the credit applicant to fill up various forms involving financial and credit information and credit references. Working from the credit application, the firm then obtains additional credit information from other sources. If the applicant is extended credit by the same firm, it will have its own historical information on the applicant payment patterns. Alternatively, if the credit request is large enough, it may send a credit department

employees to visit personally with the credit applicant and gives as much financial information as possible.

- **Credit analysis and decision:** Having collected credit information, the firm must make a credit analysis of the applicant and determine if the company falls about or below the minimum quality standard. How does the financial manager evaluate the risk of extending credit to any particular applicant ? what standards exist for extending credit ?

- **Traditional standards:**

    In the traditional approach the credit analyst of the credit-granting firm assesses the creditworthiness of the applicant. Creditworthiness is a concept related to the positive and negative aspects of granting credit to the applicant. These aspects involves the applicants business history, the manner in which the applicant makes payments to other trade suppliers, the profitability of the products that the applicant wants to purchase, the applicant's financial position and so forth. Here, the critical evaluation of the borrower's projected cash budget and most recent statement of cash flows are instrumental. The general economy and industry environment, as well as reason for loan request, comprise the conditions. The synthesis of all collected information and to reach a judgment regarding the applicants credit worthiness is the job of credit analyst. To perform this synthesis, it is useful to have some mechanism for organizing the information that has been collected. A traditional way of organizing this information is by characterizing the applicant along five dimensions. And they are called the five Cs of Credit capital, character, collateral, capacity and conditions. These are discusses as under.

- **Capital:**

    The evaluation of the applicant capital means an analysis of the applicant firms financial position. What are the applicant firms' financial strengths? what are its weaknesses ? Overall, is it stronger or weaker than other firms that the seller believes are creditworthy?

The capital dimension of the applicant is analyzed depending upon the data obtained from his financial statements. The useful procedure is to perform an extensive ratio analysis, comparing the applicants financial ratios to ratios for the applicants industry and performing trend analysis of the applicants ratios over time.

It is not easy to assess the financial position of the applicant from a morass of ratio data. To aid in this process, some credit analysts choose. To emphasize a few of the financial aspects of the applicant and de-emphasize others. Mostly, analysts focus on the applicant firms aggregate liquidity position and its total dept position. The current ratio, the quick ratio, the total debt to total equity and total debt to total asset ratio, it is the order of measuring the ratios. Analysts emphasize these ratios because the seller wishes to know the likelihood of payment from the applicant, how long it will take to receive the payment, and what is likely to happen if the applicant defaults. Ratios that measure aggregate liquidity assess the relative amounts of current assets and current debt and thus the funds received and disbursed s a part of the applicants working capital cycle. As problems within the working capital cycle are a major cause of default, measures of aggregate liquidity are related to the applicants ability to pay.

- **Character:** In order to make payments to trade suppliers, the applicant must have both the funds to pay the debts and the willingness to pay the debts. The capital dimension includes the former, while the character dimension includes the latter. In assessing character, the credit analyst considers all the information that relates to willingness to pay be the applicants management. What is the applicant's history of payments to the trade? Has the firm defaulted to other trade suppliers? Does the applicant's management make a good faith effort to honor debts as they come due? Information in these areas bears on the analyst's assessment of the applicants' character.

- **Collateral:** If the applicant experiences financial difficult, it may be forced to liquidate. In such a situation, the recoveries to trade creditors depend on   1. The

recoveries on assets   2. The amount of debt owed by the firm and 3. The extent to which these debts are secured. If the firm liquidates, the recoveries on assets that are security for debt go tot the holders of that secured debt. i.e. the secured creditors get paid first form the revenues of selling the assets that have been granted to them as security. And it is very difficult for trade creditors to obtain secured position, this means that the recoveries to trade creditors are significantly lower when the applicant has financed by using secured borrowings. The applicants financial statements, the applicants bank. Credit reports on the applicant, direct conversations with the applicant etc are the sources of gleaning the information on the secured borrowings of the applicant. More existing secured financing means lower creditworthiness from the trade creditors standpoint.

- **Capacity:** This dimension has two aspects: management's capacity to run the business and the applicant forms plant capacity. Management's capacity to run the business refers to the competency of the management personnel in the applicant's operations. The managers running the applicant business, the number of years that the applicant has been in business and so forth, assess any information relevant to this capacity involving personal impressions, the history of success or failure. The better is management's capacity to run the firm, the lower is the chance of default. Physical capacity means the value and technology of the applicant's production or service facilities. Accounting conventions can point an unrealistic picture of the value of such assets, particularly if the technology of the applicant's industry is subject to rapid change. The more up-to-date and well maintained are the applicants facilities, the more likely that the applicant will be able to stay in business and to take advantage of business upturns.

- **Conditions:** The economic conditions in applicants industry and in the economy in general directly affect. If there is a good deal of foreign and domestic competition in the applicants industry, the possibility of failure and default to trade creditors is larger, since profit margins are likely to be lower. Failures are

more likely to occur, if the economy in general is undergoing a contraction than during an expansionary period.

Once the credit analyst has gathered information on these dimensions of the marginal credit applicant and information on the profitability of the product to be purchased, the traditional approach requires that all this information by analyzed and synthesized. Judgment on the overall creditworthiness of the applicant is to be made by this process. Unfortunately, there are some difficulties endemic to this traditional analysis methodology that calls its usefulness into substantial question.

- **Problems with the traditional approach:**

    The traditional judgmental approach to credit granting decisions on marginal accounts is very flexible. In the process of synthesis, any and all of the special features that may affect the desirability of he applicant as a customer can be taken into account. Set against this flexibility is several substantial disadvantages inherent in this decision methodology.

- **No analytic framework:** Most financial decision methods begin with a basic analysis technique, such as net present value. It is then up to the financial analyst to make the necessary estimations to execute the technique. And, there is no such analytic framework in the traditional credit analysis methodology. The analyst is to make a judgment with available guidelines on what the appropriate criteria for that judgment should be. Given the large amount of information encompassed in the five Cs and the lack of specific evaluation criteria. This judgment is not easy to make. Consequently, the traditional analysis method is very difficult to execute effectively.

- **No link to shareholder wealth maximization:** Today, in most financial decision methods the analyst starts with a technique that is theoretically and empirically linked to shareholder wealth maximization e.g. it is known that shareholders value cash flows, so techniques such as net present value concentrate on the evaluation of these flows. The traditional credit granting decision technique lacks such an explicit link to

the creation of shareholder wealth, so there is no necessity that decisions based on this technique will be consistent with that goal.

- **No consistency of analysis:** Because the synthesis process is almost totally judgmental, the results it produces can be inconsistent. The same analyst considering the same applicant on different days may reach different decisions, as two different analysts considering the same applicant. Such an inconsistency gives the impression to those outside of the credit department that decision are being made in an arbitrary fashion. This type of method can cause friction between the credit and other departments of the firm.

- **Difficult for the inexperienced analyst to execute:** With the lapse of time, a credit analyst, through trial and error, becomes experienced at assessing the strengths and weaknesses of applicants, but any judgments may be biased by analyst's experience. e.g. if the analyst grants credit to several applicants having below – average with respect to a particular ratio and these applicants then default, the analyst will tend to be biased against applicants with such ratios in the future even if the default of these applicants was an aberration, and the particular ratio involved was not truly related to the default. The longer an analyst continues with the traditional method, the larger will be the sample of applicants analyzed and the less will be the likelihood of such bias.

It will be costly to the selling firm to generate wrong decisions through experience. Inexperienced analysts may make numerous costly errors. Credit will be granted to applicants that are not of advantage to the firm, and it will not be granted to many firms that would be advantageous customers.

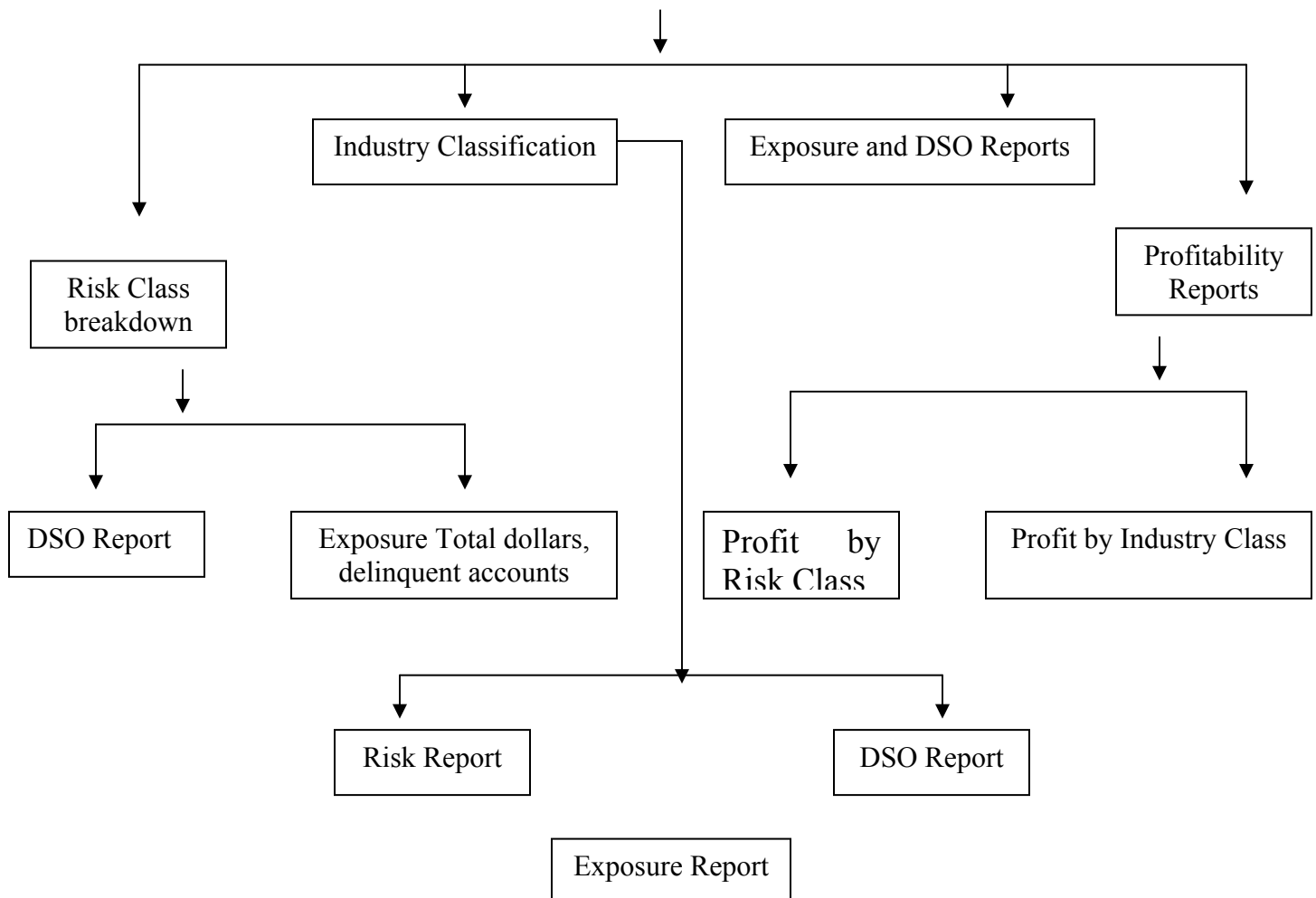## 12. Monitoring the Accounts Receivables Policy:

Once credit has been extended, the finance manager's job is to collect the funds. This necessitates effort to collect individual slow pay accounts and the use of control procedures to detect changes in the overall collection experience. A combination of two

events makes change in account receivable i.e. a change in sales with the same collection experience and a change in the collection experience itself. Naturally it is important for management to differentiate, between these events, for a worsening collection experience ultimately involves unwarranted increases in receivables and bad debt losses. Exhibit – 6 shows a typical assets viable portfolio monitoring system of a company. It exemplifies how the days sales outstanding (DSO) and aging schedule measures might be integrated into a overall receivables analysis.

EXHIBIT – 6

A typical Accounts Receivable Portfolio Monitoring System

Automated Accounts Receivables

```
                        Automated Accounts Receivables
                                     │
        ┌────────────────┬───────────┴──────────────┬──────────────────┐
        │                │                            │                  │
        │      ┌─────────────────────┐    ┌──────────────────────┐       │
        │      │ Industry            │    │ Exposure and DSO     │       │
        │      │ Classification      │    │ Reports              │       │
        │      └─────────────────────┘    └──────────────────────┘       │
        │                │                                                │
        ▼                │                                        ┌──────────────┐
 ┌──────────────┐        │                                        │ Profitability│
 │ Risk Class   │        │                                        │ Reports      │
 │ breakdown    │        │                                        └──────────────┘
 └──────────────┘        │                                                │
        │                │                               ┌────────────────┴────────────────┐
  ┌─────┴──────┐         │                               │                                 │
  ▼            ▼         │                               ▼                                 ▼
┌──────────┐ ┌──────────────────┐          ┌─────────────────┐          ┌──────────────────────────┐
│DSO Report│ │ Exposure Total   │          │ Profit     by   │          │ Profit by Industry Class │
│          │ │ dollars,         │          │ Risk Class      │          │                          │
│          │ │ delinquent       │          └─────────────────┘          └──────────────────────────┘
│          │ │ accounts         │
└──────────┘ └──────────────────┘
                  │              │
         ┌────────┴──────┬───────┴────────┐
         ▼               │                ▼
   ┌──────────────┐      │         ┌──────────────┐
   │ Risk Report  │      │         │ DSO Report   │
   └──────────────┘      │         └──────────────┘
                ┌────────┴────────┐
                │ Exposure Report │
                └─────────────────┘
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(Source: Working Capital Management by V.K. Bhalla. Published by Anmol Publication Private Ltd, New Delhi. Pg. No. 281)

13.   Evaluation of the Credit Department:

Our discussion of credit administration is concluded with the often-overlooked topic of performance appraisal. Frequently credit departments and credit administrators are evaluated primarily according to their bad-debt losses the lower the losses, the better the perceived performance. It should be natural, however, that this approach is not consistent with the goals of maximizing firm profits, or value. Thus, if the evaluation of a credit manager is solely based on the bad-debt losses, he can optimize his observed performance by accepting only the very best credit applicants. Such conservative policy undoubtedly generate lower bad-debt losses, however, in process it also eliminates a large number of potentially good accounts. The more logical approach to evaluate credit department performance accepts a certain amount of bad debts as necessary to effective operations and attempts to look at the profit side of the ledger as well. This includes looking at such yardsticks as the growth in the credit sales and the number of credit request rejected, in addition to the more traditional bad debt losses, collection periods and again schedules.

14.   Analyses and Interpretation of Data:

Two hypothesis have been tested in this study. One, hypothesis based on Chi-square test is to understand interplant working capital direction and growth / efficiency. The statement of null hypothesis is, "The debtors turn over indices of the sample units can be represented by the straight line trend based on the lest square method." The other null hypothesis to be tested is based on Kruskal Wallis one way analysis of variance test. It has been tested to see whether there is any significant difference between working capital ratios of the sample units. The statement of null hypothesis is, "There is no significant difference between the debtors turn over ratio of the sample units." The acceptance of the said hypothesis would reveal that the working capital of various sample units is approximately equal. The level of significance used in this study will be at 5 %.

The table no 5.1 shows the numerical picture about Sales, Debtors, Debtors Turn-over ratio, Debtors turn-over ratio index and trend value of GNVFC from the period

1996-'97 to 2004-'05 i.e. nine years of research period. It also computes and gives the chi-square value, standard deviation and co-efficient of variation for the same.

Sales Debtors Turn-over Ratio means, "The ratio of Sales to Debtors". It comes out to 7.38 for the base year i.e. 1996-'97. Then, it decreases for three years constantly and goes down to 4.64 in the year 1999-'00 which is the lowest level during the course period. Then, it increases in the very next year i.e. 2000-'01 and goes up to 5.68. Then again, it decreases to 5.42 in the year 2001-'02. Then again, it increases for two years continuously and reaches to 7.91 in the year 2003-'04 that is the highest level during the study period. Then, it decreases to 6.29 in the year 2004-'05. So, after viewing the above figures, it can be said that the Sales-Debtors ratio stays in a mixed trend during the study period but in the last year it moves to decreasing trend. The average of Sales-Debtors Turn-over ratio works out to 6.01, which is lower than the base year ratio. Then, Sales-Debtors Turn-over ratio index is supposed to 100 for the base year i.e. 1996-'97. Then, it decreases in the first initial three years and goes down to 62.93 in the year 1999-'00. Then, it recovers and reaches to 76.94 in the year 2000-'01. Then again, it decreases and goes down to 73.42 in the year 2001-'02. Then again, it increases high for two years continuously and reaches to 107.15 in the year 2003-'04. Then again, it decreases to 85.28 in the year 2004-'05. So, in the end, it moves to downward trend. Sales-Debtors turn-over ratio index states the statistical information about the variation in Sales-Debtors Turn-over ratio. It comes on an average to 81.39, which is lower than the base year ratio.

Here, the calculated value of chi-square works out to 20.70. On the other hand, the critical value of chi-square is 7.815. So, the critical value is lower than the calculated value. It indicates that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Sales-Debtors turn-over ratio of the company".** Moreover, the standard deviation comes out to 13.81 while the co-efficient of variation works out to 16.97. So, it can be stated that there is variation in the productive indices.

Table No- 5.1 (Rs in Crore) Debtors turn over ratio

Year	Sales	Debtors	DTR	index	T.V.
1996-97	1171.96	158.79	7.38	100.00	77.98
1997-98	1162.01	190.06	6.11	82.84	78.83
1998-99	1099.29	227.97	4.82	65.33	79.69
1999-00	1153.06	248.25	4.64	62.93	80.54
2000-01	1339.39	235.87	5.68	76.94	81.39
2001-02	1404.79	259.26	5.42	73.42	82.24
2001-03	1377.32	237.42	5.80	78.60	83.09
2003-04	1446.84	182.95	7.91	107.15	83.94
2004-05	1822.62	289.59	6.29	85.28	84.79
Total	11977.28	2030.16	54.06	732.49	732.49
Average	1330.81	225.57	6.01	81.39	81.39

Chi square : 20.70

SD : 13.81

CV : 16.97

The table no 5.2 indicates the statistical data of Sales, Debtors, Sales-Debtors turn-over ratio, Sales-Debtors Turn-over ratio index and trend value in reference to **GSFC** from the period 1996-'97 to 2004-'05 i.e. nine years. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Sales-Debtors turn-over ratio is defines as, "The ratio of Sales to Debtors". It works out to 6.14 for the year 1996-'97 i.e. base year. Then, it decreases continuously for three years and goes down to 3.15 in the year 1999-'00. Then, it increases to 3.62 in the year 2000-'01. Then again, it decreases to 3.55 in the year 2001-'02. Then again, it increases and reaches to 5.95 in the year 2002-'03. Then after it decreases to 3.94 in the year 2003-'04. Then again, it increases to 4.43 in the last year i.e. 2004-'05. So, from the above figures, it can be said that Sales-Debtors Turn-over ratio stays in a mixed trend

during the study period, but in the last year, it moves to upward trend. The average of ratio comes out to 4.48, which is lower than the base year ratio.

The Sales-Debtors turnover index, which is assumed 100 for the base year i.e. 1996-'97. It decreases high constantly in the first initial three years and goes down to 51.29 in the year 1999-'00 which is the lowest level during the research period. Then, it increases in the very next year but not so significantly and reaches to 59.01. Then again, it decreases to 57.82 in the year 2001-'02. Then, suddenly it jumps high and goes up to 96.98 in the year 2002-'03 that is the highest level during the research period. Then again, it decreases to 64.22 in the year 2003-'04. Then again, it increases to 72.28 in the last year i.e. 2004-'05. So, far the analysis is concerned, the Sales-Debtors Turn-over ratio index states an idea about the fluctuation in Sales-Debtors Turn-over ratio. It comes on an average to 72.98 which is lower than the base year ratio.

Here, the calculated value of chi-square comes out to 36.56 while the critical value of chi-square is 7.815. So, the calculated value is higher than the critical value of chi-square. It clears that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Sales-Debtors Turn-over ratio of the company".** Moreover, the standard deviation comes out to 18.10 while the co-efficient of variation works out to 24.81. So, it can be interpreted that there is much variation in the productive indices.

Table No -   5.2

(Rs in Crore) Debtors turn over ratio

Year	Sales	Debtors	DTR	index	T.V.
1996-97	1760.10	286.87	6.14	100.00	81.21
1997-98	1879.64	321.40	5.85	95.32	79.15
1998-99	1886.41	513.43	3.67	59.88	77.09
1999-2000	1961.27	623.26	3.15	51.29	75.04
2000-01	2051.00	566.53	3.62	59.01	72.98
2001-02	1954.88	551.02	3.55	57.82	70.92

2001-03	1840.39	309.29	5.95	96.98	68.86
2003-04	2102.49	533.57	3.94	64.22	66.81
2004-05	2604.87	587.40	4.43	72.28	64.75
total	18041.05	4292.77	40.30	656.80	656.80
average	2004.56	476.97	4.48	72.98	72.98

Chi square : 36.56

SD : 18.10

CV : 24.80

The table no 5.3 shows the mathematical data of Sales, Debtors, Sales-Debtors Turn-over ratio, Sales-Debtors Turn-over ratio index and trend value of **Liberty Phosphate Ltd.** from the period 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Sales-Debtors turnover ratio means, "The ratio of Sales to Debtors". It comes out to 3.43 for the year 1996-'97 i.e. base year. Then, it decreases slightly to 3.42 in the very next year, i.e. 1997-'98. Then, it increases high and goes up to 7.51 in the year 1998-'99 which is the highest level during the study period. Then, it decreases to 6.03 in the year 1999-'00. Then again, it increases but not so significantly and reaches to 6.09 in the year 2000-'01. Then again, it decreases to 4.14 in the year 2001-'02. Then again, it increases to 4.82 in the year 2002-'03. Then after it recovers again and reaches to 5.76 in the year 2003-'04. Then again, it decreases to 4.63 in the last year i.e. 2004-'05. So, after seeing the above figures, it can be said that the ratio stays in a mixed trend during the study period but in the last year, it moves to decreasing trend. The average of ratio comes out to 5.09 that are higher than the base year ratio.

Then, Sales-Debtors Turn-over ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it decreases slightly to 99.78 in the very next year i.e. 1997-'98. Then, suddenly it increases high and goes up to 219.26 in the year 1998-'99 which is the highest level during the study period. Then, it decreases to 176.03 in the year 1999-'00.

Then again, it increases slightly to 177.60 in the year 2000-'01. Then again, it decreases to 120.71 in the year 2001-'02. Then after it increases for two years constantly and reaches to 168.00 in the year 2003-'04. Then again, it decreases to 135.11 in the last year i.e. 2004-'05. As the analytical point of view is concerned, the Sales-Debtors Turn-over ratio index gives an idea about the variation in Sales-Debtors Turn-over ratio. The ratio index comes on an average to 148.58, which is higher than the base year ratio.

Here, the calculated value of chi-square comes out to 85.84. On the other hand, the critical value of chi-square is 7.815. So, the calculated value of chi-square is higher than the critical value. It clarifies that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Sales-Debtors Turn-over ratio of the company".** Moreover, the standard deviation comes out to 37.61 while the co-efficient of variation works out to 25.31. So, there is much variation in the productive indices.

Table No-5.3
(Rs in Crore) Debtors turn over ratio

Year	Sales	Debtors	DTO	index	T.V.
1996-97	41.43	12.09	3.43	100.00	139.73
1997-98	47.56	13.91	3.42	99.78	141.94
1998-99	52.22	6.95	7.51	219.26	144.15
1999-2000	67.32	11.16	6.03	176.03	146.37
2000-01	83.56	13.73	6.09	177.60	148.58
2001-02	70.94	17.15	4.14	120.71	150.79
2001-03	66.73	13.84	4.82	140.70	153.00
2003-04	78.87	13.70	5.76	168.00	155.21
2004-05	74.17	16.02	4.63	135.11	157.42
Total	582.80	118.55	45.82	1337.18	1337.18
Average	64.76	13.17	5.09	148.58	148.58

Chi Square : 85.84

SD : 37.61

CV: 25.31

The table no 5.4 displays the numerical data of Sales, Debtors, Sales-Debtors Turn-over ratio, Sales-Debtors turn-over ratio index and trend value in reference to **IFFCO** from the period 1996-'97 to 2004-'05. It also computes the other data such as chi-square value, standard deviation and co-efficient of variation for the same.

Sales-Debtors turnover ratio means, "The ratio of Sales to Debtors". It works out to 15.58 for the base year i.e. 1996-'97. It shows the increasing trend from the beginning years. It increases to 21.08 in the year 1998-'99. Suddenly, it decreases high for five years constantly and goes down to 12.61 in the year 2003-'04 which is the lowest level during the study period. Then, it increases high and reaches to 22.26 in the year 2004-'05 that is the highest level during the course period. From the above figures, it can be said that after very much up and down, Sales-Debtors Turn-over ratio moves towards the increasing trend in the last year. The average of ratio works out to 17.10, which is higher than the base year ratio.

Then, Sales-Debtors Turn-over ratio index is supposed to 100 for the base year i.e. 1996-'97. Then, it increases in the first initial two years and goes up to 135.36 in the year 1998-'99. Then, the ratio index suddenly decreases high for five years continuously and goes down to 80.96 in the year 2003-'04, which is the lowest level during the study period. Then, in the last year i.e. 2004-'05, it increases and reaches to 142.89 which is the highest level during the course period. From the analytical point of view, the Sales-Debtors Turn-over ratio index draws the numerical picture about the variation in Sales-Debtors Turn-over ratio. The ratio index comes on an average to 109.78 that are higher than the base year ratio.

Here, the calculated value of chi-square comes out to 32.82. On the other hand, the critical value of chi-square is 7.815. So, the calculated value of chi-square is higher than the critical value. So, it points out that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Sales-Debtors turnover ratio of the company".** Moreover, the standard deviation comes out

to 19.97 while the co-efficient of variation works out to 18.19. So, there is some variation in the productive indices.

Table No- 5.4 (Rs in Crore) Debtors turn over ratio

Year	Sales	Debtors	DTO	index	T.V.
1996-97	2266.08	145.49	15.58	100.00	113.71
1997-98	3617.83	201.09	17.99	115.51	112.73
1998-99	4047.83	191.99	21.08	135.36	111.75
1999-2000	4806.79	263.26	18.26	117.23	110.76
2000-01	5426.93	303.74	17.87	114.71	109.78
2001-02	5094.08	338.53	15.05	96.61	108.80
2001-03	6091.14	461.28	13.20	84.78	107.82
2003-04	5919.57	469.46	12.61	80.96	106.84
2004-05	7224.03	324.60	22.26	142.89	105.86
total	44494.28	2699.44	153.89	988.04	988.05
average	4943.81	299.94	17.10	109.78	109.78

Chi square : 32.82

SD : 19.97

CV : 18.18

The table no. 5.5 provides the statistical data of Sales, Debtors, Debtors recovery days, Debtors recovery days' index and trend value of **GNVFC** from the period 1996-'97 to 2004-'05. It also computes the chi-square value, the standard deviation and the co-efficient of variation for the same.

Debtors' recovery days comes out to 49.45 days for the base year i.e. 1996-'97. Then, these days increase for constant three years and go up to 78.58 days in the year 1999-'00. So, it can be said that during this period, the credit policy kept liberal. Then, these days decrease and go down to 64.28 days in the year 2000-'01. Then again, these

days increase to 67.36 days in the year 2001-'02. Then after these days decrease for two years in a raw and go down to 46.15 days which is the lowest level during the study period. It can be said that the credit policy is maintained strongly during this year. Then again, these days increase to 57.99 days in the last year i.e. 2004-'05. The average of Debtors recovery days comes out to 62.46 days that are higher than the base year days. So over all, it can be said that the credit policy of the company is liberal during the course period. It indicates the negative trend.

Now, Debtors recovery days index is assumed 100 for the base year i.e. 1996-'97. Then, this index increases continuously for three years and reaches to 158.90 which is highest level during the study period. Then, it decreases to 129.97 in the year 2000-'01. Then again, it increases to 136.21 in the year 2001-'02. Then after it decreases constantly for two years and goes down to 93.33 in the year 2003-'04. Then, in the year 2004-'05, it again increases to 117.27. Debtors' recovery days' index comes on an average to 126.30 which is higher than the base year level. From the analytical point of view, Debtors recovery days' index indicates the level of credit policy of the company. Overall, it can be said that the credit policy has stayed liberal during the research period. It indicates the negative trend. The trend value also shows the downward trend.

Here, the calculated value of chi-square comes out to 28.62. On the other hand, the critical value of chi-square is 7.815. So, the calculated value is higher than the critical value. So, it clarifies that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Debtors' recovery days' level of the company".** Moreover, the standard deviation comes out to 20.50 while the co-efficient of variation works out to 16.23. So, there is much variation in the productive indices.

Table No – 5.5   (Rs in Crore) Debtors recovery days

Year	Sales	Debtors	days	index	T.V.
1996-97	1171.96	158.79	49.45	100.00	132.13
1997-98	1162.01	190.06	59.70	120.72	130.67
1998-99	1099.29	227.97	75.69	153.06	129.21
1999-2000	1153.06	248.25	78.58	158.90	127.76
2000-01	1339.39	235.87	64.28	129.97	126.30
2001-02	1404.79	259.26	67.36	136.21	124.84
2001-03	1377.32	237.42	62.92	127.22	123.38
2003-04	1446.84	182.95	46.15	93.33	121.92
2004-05	1822.62	289.59	57.99	117.27	120.47
total	11977.28	2030.16	562.14	1136.68	1136.68
average	1330.81	225.57	62.46	126.30	126.30

Chi Squ : 28.62

SD : 20.50

CV : 16.23

The table no. 5.6 shows the mathematical date of Sales, Debtors, Debtors recovery days, Debtors recovery days index and trend value of **GSFC** from the period 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and the co-efficient for the same.

Debtors' recovery days work out to 59.49 days for the year 1996-'97 i.e. base year. Then these days increase constantly for three years and go up to 115.99 in the year 1999-'00 which is the highest level during the study period. From these figures, it can be said that the credit policy kept liberal during this period. Then, these days decrease to 100.82 in the very next year i.e. 2000-'01. Then again, these days increase to 102.88 in the year 2001-'02. Then after suddenly, these days decrease high and go down to 61.34 days level in the year 2002-'03. It can be analyzed that the credit policy of the company

is maintained strongly during this year. Then again, these days increase to 92.63 days in the year 2003-'04. Then again, these days decrease to 82.31 days in the last year i.e. 2004-'05. So, it can be said that in the end, trend moves in a downward. The average of Debtors recovery days comes out to 86.36 that are higher than the base year day's level. So overall, it can be said that the credit policy of the company is liberal during the course period. It indicates the negative trend.

Now, Debtors recovery days' index shows the level of credit policy of the company. It is assumed 100 for the base year i.e. 1996-'97. Then, this index increases constantly in the first initial three years and goes up to 194.98 in the year 1999-'00 which is almost double for the base year and the highest level during the study period. Then, this index decreases to 169.48 in the year 2000-'01. Then again, this index increases to 172.94 in the year 2001-'02. Then, this index suddenly decreases high and goes down to 103.11 in the year 2002-'03. Then after this index increases to 155.71 in the year 2003-'04. Then again, this index decreases to 138.36 in the year 2004-'05 i.e. last year. Debtors' recovery days' index comes on an average to 145.16 that is higher than the base year level. From the above figures, it can be said that the credit policy has stayed liberal during the study period. The trend value also shows the negative trend.

Here, the calculated value of chi-square comes out to 66.29. On the other hand, the critical value of chi-square is 7.815. So, the calculated value is higher than the critical value. So, it points out that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, "There is a significant difference in Debtors recovery days' level of the company". Moreover, the standard deviation comes out to 33.18 while the co-efficient of variation works out to 22.85. So, there is much variation in the productive indices.

Table No – 5.6 (Rs. In Crore) Debtors recovery days

Year	Sales	Debtors	days	index	T.V.
1996-97	1760.10	286.87	59.49	100.00	134.76
1997-98	1879.64	321.40	62.41	104.91	137.36
1998-99	1886.41	513.43	99.34	166.99	139.96
1999-2000	1961.27	623.26	115.99	194.98	142.56
2000-01	2051.00	566.53	100.82	169.48	145.16
2001-02	1954.88	551.02	102.88	172.94	147.76
2001-03	1840.39	309.29	61.34	103.11	150.36
2003-04	2102.49	533.57	92.63	155.71	152.96
2004-05	2604.87	587.40	82.31	138.36	155.57
total	18041.05	4292.77	777.22	1306.48	1306.48
average	2004.56	476.97	86.36	145.16	145.16

Chi Square : 66.29

SD : 33.18

CV : 22.85

The table no. 5.7 provides the numerical picture of Sales, Debtors, Debtors recovery days, Debtors recovery day's index and trend value of **Liberty Phosphate Ltd**. from the period 1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Debtors' recovery days work out to 106.51 for the year 1996-'97 i.e. base year. Then, these days increase marginally in the very next year and reach to 106.75. Then, suddenly these days decrease high and go down to 48.58 days in the year 1998-'99. In this reference, it can be said that the credit policy is maintained strongly during this year. Then, these days again increase to 60.51 in the year 1999-'00. Then, they again decrease to 59.97 in the year 2000-'01. Then after they increase to 88.24 in the year 2001-'02. Then after they decrease for two years constantly and go down to 63.40 days in the year 2003-'04. Then, in the last year, they again increase to 78.84 days. So, it can be said that

the trend moves in upward in the end. The average of Debtors recovery days comes out to 76.50 that is lower than the base year level. So, from the above figures, it can be pointed out that the credit policy of the company is strong during the research period. It shows the positive trend.

Then, Debtors recovery days index is assumed 100 for the base year i.e. 1996-'97. Then, it increases slightly to 100.22 in the very next year i.e. 1997-'98. Then, dramatically, it decreases very high and goes down to 45.61 in the year 1998-'99. Then, again it increases to 56.81 in the year 1999-'00. Then, it decreases again to 56.31 in the year 2000-'01. Then after it increases to 82.84 in the year 2001-'02. Then again, it decreases and goes down to 59.52 in the year 2003-'04. And finally, in the last year of the study period, it increases to 74.02 in the year 2004-'05. So overall, the index moves in a mixed trend during the study period. Debtors' recovery days' index gives an idea about the level of credit policy in the company. It comes on an average to 71.82 which is lower than the base year level. From the above scenario, it can be noted that the credit policy of the company has stayed strong and controlled during the study period. The trend value also shows the positive trend.

Here, the calculated value of chi-square works out to 35.38. On the other hand, the critical value is 7.815. So, the calculated value of chi-square is higher than the critical value. It indicates that the null hypothesis is rejected and the alternative hypothesis is accepted. It means. **"There is a significant difference in Debtors recovery days' level of the company".** Moreover, the standard deviation comes out to 18.35 while the co-efficient of variation works out to 25.56. So, it interprets that there is much variation in the productive indices.

Liberty Phosphate Ltd (Curr: Rs in Cr.) Debtors recovery days

Year	Sales	Debtors	days	index	T.V.
1996-97	41.43	12.09	106.51	100.00	81.76
1997-98	47.56	13.91	106.75	100.22	79.28
1998-99	52.22	6.95	48.58	45.61	76.79
1999-2000	67.32	11.16	60.51	56.81	74.31
2000-01	83.56	13.73	59.97	56.31	71.82
2001-02	70.94	17.15	88.24	82.84	69.34
2001-03	66.73	13.84	75.70	71.07	66.85
2003-04	78.87	13.70	63.40	59.52	64.37
2004-05	74.17	16.02	78.84	74.02	61.88
total	582.80	118.55	688.51	646.40	646.40
average	64.76	13.17	76.50	71.82	71.82

Chi squ. : 35.38

SD : 18.35

CV : 25.55

The table no. 5.8 displays the figures of Sales, Debtors, Debtors recovery days, Debtors recovery days' index and trend value in reference to **IFFCO** from the year 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Debtors' recovery days come out to 23.43 days for the year 1996-'97 i.e. base year. Then, these days decrease in the first initial two years and go down to 17.31 in the year 1998-'99. It means that the credit policy kept strong and controlled during this year. Then, these days suddenly increase high fir five years continuously and go up to 28.95 in the year 2003-'04. It is the highest level during the study period. Then, in the last year i.e. 2004-'05, these days decrease high and go down to 16.40 days that is the lowest level during the study period. So, it can be said that the trend moves in downward in the end

but during the study period, it fluctuates continuously and reaches to highest level and lowest level also. The average of Debtors recovery days comes out to 22.08 that is lower than the base year level. So, it can be said that the credit policy of the company is maintained strongly during the course period,

Then, Debtors recovery days index is supposed to 100 for the base year i.e. 1996-'97. Then, it decreases in the first initial two years and goes down to 73.88 in the year 1998-'99. Then, it suddenly increases constantly for five years and reaches to 123.52 in the year 2003-'04. Then after it surprisingly decreases to 69.99 in the year 2004-'05. So far the analytical point of view is concerned, Debtors recovery days' index gives an idea about the level of the credit policy of the company. It works on an average to 94.21 that is lower than the base year level. From the above statistical picture, it can be said that the credit policy of the company has stayed controlled and strong during the course period. The trend value also indicated the positive trend.

Here, the calculated value of chi-square comes out to 26.44. On the other hand, the critical value of chi-square is 7.815. So, it can be interpreted that the critical value is lower than the calculated value. It states that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Debtors recovery days**"level of the company". Moreover, the standard deviation comes out to 17.42 while the co-efficient of variation works out to 18.49. So, it can be said that there is some variation in the productive indices.

Table No. -   5.8

(Rs. In crore)Debtors recovery days at IFFCO

Year	Sales	Debtors	days	index	T.V.
1996-97	2266.08	145.49	23.43	100.00	87.73
1997-98	3617.83	201.09	20.29	86.57	89.35
1998-99	4047.83	191.99	17.31	73.88	90.97
1999-2000	4806.79	263.26	19.99	85.30	92.59
2000-01	5426.93	303.74	20.43	87.17	94.21
2001-02	5094.08	338.53	24.26	103.51	95.83

2001-03	6091.14	461.28	27.64	117.95	97.45
2003-04	5919.57	469.46	28.95	123.52	99.07
2004-05	7224.03	324.60	16.40	69.99	100.69
total	44494.28	2699.44	198.70	847.90	847.90
average	4943.81	299.94	22.08	94.21	94.21

Chi Square: 26.44

SD : 17.42

CV : 18.48

The table no. 5.9 shows the figures in reference to Debtors, Current Assets, Debtors-Current Assets ratio, Debtors-Current Assets ratio index and trend value of **GNVFC** from the period 1996-'97 to 2004-'05. It also calculates other statistics such as chi-square value, standard deviation and co-efficient of variation for the same.

Debtors-Current Assets ratio means, "The ratio of Debtors to Current Assets". It gives the information about the Debtors in comparison to total Current Assets. It comes out to 27.65 for the year 1996-'97 i.e. base year. Them, it increases in first two initial years and goes up to 31.12 in the year 1998-'99. Then, it decreases for two years constantly and goes down to 27.71 in the year 2000-'01. Then, again, it increases to 32.14 in the year 2001-'02 which is the highest level during the study period. Then after it decreases high and goes down to 19.20 in the year 2003-'04 which is the lowest level during the study period. Then again, it increases to 25.09 in the year 2004-'05. So, in the last year, trend moves to increasing level. Debtors to Current Assets ratio works on an average to 27.67 which is marginally higher than the base year ratio.

Now, Debtors to Current Assets ratio index is supposed to 100 for the base year i.e. 1996-'97. Then, it increases and reaches to 112.56 in the year 1998-'99. Then, it decreases for two years continuously and goes down to 100.23 in the year 2000-'01.Then, it increases to 116.24 in the year 2001-'02 which is the highest level during the course period. Then, again, it decreases high and goes down to 69.45 in the year 2003-'04 which

is the lowest level during the research period. Then after it increases to 90.74 in the year 2004-'05. This ratio index gives an idea about the variation in Debtors to Current Assets ratio. It comes on an average to 100.06 that are higher than the base year ratio.

Here, the calculated value of chi-square comes out to 11.78. On the other hand, the critical value is 7.815. So, it analyses that the calculated value is higher than the critical value. It means that the null hypothesis is rejected and the alternative hypothesis is accepted. It indicates, **"There is a significant difference in Debtors to Current Assets ratio of the company".** Moreover, the standard deviation comes out to 12.95 while the co-efficient of variation works out to 12.94. So, it can be pointed that there is marginally variation in the productive indices.

Table No.- 5.9

(Rs in crore) Debtors as % of Current Assets at GNVFC

Year	Debtors	CA	Ratio	index	T.V.
1996-97	158.79	574.32	27.65	100.00	110.00
1997-98	190.06	673.56	28.22	102.06	107.51
1998-99	227.97	732.53	31.12	112.56	105.03
1999-2000	248.25	831.74	29.85	107.95	102.55
2000-01	235.87	851.18	27.71	100.23	100.06
2001-02	259.26	806.73	32.14	116.24	97.58
2001-03	237.42	847.41	28.02	101.33	95.09
2003-04	182.95	952.79	19.20	69.45	92.61
2004-05	289.59	1154.28	25.09	90.74	90.13
total	2030.16	7424.54	248.99	900.56	900.56
average	225.57	824.95	27.67	100.06	100.06

Chi Squ : 11.78

SD : 12.95

CV :12.94

The table no. 5.9 gives the numerical data of Debtors, Current Assets, Debtors to Current Assets ratio, Debtors to Current Assets ratio index and trend value in respect of **GSFC** from the year 1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Debtors to Current Assets ratio can be defined as, "The ratio of Debtors to Current Assets". It states the part of Debtors in comparison to total Current Assets. It comes out to 24.29 in the year 1996-'97 i.e. base year. Then, it increases high constantly for four years and goes up to 41.98 in the year 2000-'01 which is the highest level during the research period. Then, it decreases high for two years in a raw and goes down to 25.80 in the year 2002-'03. Then again, it increases to 38.77 in the last year i.e. 2004-'05. So, in the end, the ratio moves in an increasing trend. The average of ratio works out to 34.66 that are higher than the base year ratio.

Then, Debtors to Current Assets ratio index is assumed 100 for the year 1996-'97 i.e. base year. This ratio index gives an outline about the variation in Debtors to Current Assets ratio. It increases in the beginning years and goes up to 172.79 in the year 2000-'01. It is the highest level during the study period. Then, it decreases high in the next two years and goes down to 106.19 in the year 2002-'03 which is the lowest level during the study period. Then again, it increases in the last two years and goes up to 159.59 in the year 2004-'05. So, it can be said that the ratio index moves towards the increasing trend in the end. It comes on an average to 142.68 that are higher than the base year ratio.

Here, the calculated value of chi-square comes out to 40.86. On the other hand, the critical value of chi-square is 7.815. So, it can be noted that the calculated value is higher than the critical value. It indicates that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, "There is a significant difference in Debtors to Current Assets ratio of the company". Moreover, the standard deviation comes out to 26.38 while the co-efficient of variation works out to 18.49. So, there is much variation in the productive indices.

Table No. – 5.10
(Rs in crore) Debtors as % of Current Assets at GSFC

Year	Debtors	CA	Ratio	index	T.V.
1996-97	286.87	1180.84	24.29	100.00	130.98
1997-98	321.40	1116.63	28.78	118.48	133.91
1998-99	513.43	1281.75	40.06	164.89	136.83
1999-2000	623.26	1497.17	41.63	171.36	139.75
2000-01	566.53	1349.63	41.98	172.79	142.68
2001-02	551.02	1558.13	35.36	145.57	145.60
2001-03	309.29	1198.94	25.80	106.19	148.52
2003-04	533.57	1512.33	35.28	145.23	151.45
2004-05	587.40	1515.06	38.77	159.59	154.37
total	4292.77	12210.48	311.95	1284.09	1284.09
average	476.97	1356.72	34.66	142.68	142.68

Chi Squ : 40.86

SD : 26.38

CV : 18.48

The table no. 5.11 presents the statistical data of Debtors, Current Assets, Debtors to Current Assets ratio, Debtors to Current Assets ratio index and trend value in respect of **Liberty Phosphate Ltd.** from the period 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Debtors to Current Assets ratio can be interpreted as, "The ratio of Debtors to Current Assets". It discloses the information of Debtors in comparison to total Current Assets. It works out to 47.96 for the year 1996-'97 i.e. base year. Then, it decreases high in the first initial two years and goes down to 26.75 in the year 1998-'99. It is the lowest level during the study period. Then, suddenly it increases for constant three years and goes up to 58.98 in the year 2001-'02 which is the highest level during the course period. Then again, it decreases and goes down to 41.34 in the year 2003-'04. Then after it

increases to 44.91 in the last year i.e. 2004-'05. The average of Debtors to Current Assets ratio comes out to 43.98 that is lower than the base year ratio.

Then, Debtors to Current Assets ratio index is supposed to 100 for the year 1996-'97 i.e. base year. Then, it shows the decreasing trend in the beginning years and goes down to 55.78 in the year 1998-'99. It is the lowest level and reaches to almost half level from the base year level. Then, it increases continuously for three years and reaches to 122.97 in the year 2001-'02. Then again, it decreases to 86.20 in the year 2003-'04. In the last year i.e. 2004-'05, it increases to 93.65. So, in the end, the trend moves towards the increasing trend. It comes on an average to 91.70, which is lower than the base year level. It gives an idea about the variation in Debtors to Current Assets ratio.

Here, the calculated value of chi-square comes out to 27.11. On the other hand, the critical value of chi-square is 7.815. So, here the calculated value of chi-square is higher than the critical value. It can be analyzed that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in Debtors to Current Assets ratio of the company".** Moreover, the standard deviation comes out to 16.84 while the co-efficient of variation works out to 18.37. So, it can be said that there is marginally variation in the productive indices.

Table No.- 5.11

(Rs in crore) Debtors as % of Current Assets at Liberty:

Year	Debtors	CA	ratio	index	T.V.	CHI-SQR	SD	CV
1996-97	12.09	25.21	47.96	100.00	86.63	2.06	68.90	
1997-98	13.91	31.16	44.64	93.08	87.89	0.31	1.92	
1998-99	6.95	25.98	26.75	55.78	89.16	12.50	1290.06	
1999-2000	11.16	28.97	38.52	80.33	90.43	1.13	129.32	
2000-01	13.73	29.29	46.88	97.75	91.70	0.40	36.56	
2001-02	17.15	29.08	58.98	122.97	92.97	9.69	978.17	
2001-03	13.84	30.21	45.81	95.53	94.24	0.02	14.66	

2003-04	13.70	33.14	41.34	86.20	95.50	0.91	30.23	
2004-05	16.02	35.67	44.91	93.65	96.77	0.10	3.80	
total	118.55	268.71	395.79	825.29	825.29	27.11	2553.63	
average	13.17	29.86	43.98	91.70	91.70	3.01	16.84	18.36926

Chi Squ : 27.11

SD : 16.84

CV : 18.36

The table no. 5.12 provides the mathematical figures about Debtors, Current Assets, Debtors to Current Assets ratio, Debtors to Current Assets ratio index and trend value of **IFFCO** from the period 1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Debtors to Current Assets ratio can be analyzed as, "The ratio of Debtors to Current Assets". It states the information about the part of Debtors in comparison to total Current Assets. It comes out to 12.43 for the base year i.e. 1996-'97. Then, it decreases in the first initial two years and goes down to 9.17 in the year 1998-'99. It is the lowest level during the course period. Then, suddenly, it increases constantly for five years and reaches to 18.31 in the year 2003-'04 that is the highest level during the research period. Then, in the last year i.e. 2004-'05, it decreases to 12.47. So, in the end, the ratio moves to decreasing trend. The average of Debtors to Current Assets ratio comes out to 13.50 that are higher than the base ratio.

Now, Debtors to Current Assets ratio index is assumed 100 for the base year i.e. 1996-'97. So far the analytical point of view is concerned; it shows the fluctuations in Debtors to Current Assets ratio. It sows mixed trends during the period of the study. Trend value is also showing the maxed trends. Here, the calculated value of chi-square comes out to 661. On the other hand, the critical value of chi-square is 7.815. So, here the calculated value of chi-square is higher than the critical value. It can be analyzed that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is**

a significant difference in Debtors to Current Assets ratio of the company". Moreover, the standard deviation comes out to 273.03 while the co-efficient of variation works out to 131.38. So, it can be said that there is marginally variation in the productive indices.

<div align="center">

Table No.- 5.12

(Rs in crore) Debtors as % of Current Assets at IFFCO:

</div>

Year	Debtors	CA	ratio	index	T.V.
1996-97	145.49	1170.90	12.43	100.00	-40.41
1997-98	201.09	1904.12	10.56	73.84	21.64
1998-99	191.99	2092.67	9.17	95.00	83.69
1999-2000	263.26	2230.27	11.80	110.21	145.75
2000-01	303.74	2217.95	13.69	127.07	207.80
2001-02	338.53	2144.07	15.79	138.81	269.85
2001-03	461.28	2674.42	17.25	147.35	331.91
2003-04	469.46	2564.02	18.31	100.32	393.96
2004-05	324.60	2603.99	12.47	977.60	456.01
total	2699.44	19602.41	121.47	1870.20	1870.20
average	299.94	2178.05	13.50	207.80	207.80

Chi saq: 661.26

SD : 273.03

CV : 131.38

Debtors' Turn over ratios of the fertilizer companies and Kruskal Wallis' one way analysis of variance test.

The comparative position of Debtors' Turn over ratios of fertilizer companies have been provided in table no.5.13 along with the application of Kruskal Wallis' one way analysis of variance test on this ratio for the course period i.e., 1996-'97 to 2004-'05.

T A B L E NO.5.13

Comparative Debtors' Turn over Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test								
Year	GNVFC	R1	GSFC	R2	Liberty Phosphate Ltd.	R3	IFFCO	R4
1996-'97	7.38	25	6.14	23	3.43	3	15.58	31
1997-'98	6.11	22	5.85	18	3.42	2	17.99	33
1998-'99	4.82	12.5	3.67	6	7.51	26	21.08	35
1999-'00	4.64	11	3.15	1	6.03	20	18.26	34
2000-'01	5.68	15	3.62	5	6.09	21	17.87	32
2001-'02	5.42	14	3.55	4	4.14	8	15.05	30
2002-'03	5.80	17	5.95	19	4.82	12.5	13.20	29
2003-'04	7.91	27	3.94	7	5.76	16	12.61	28
2004-'05	6.29	24	4.43	9	4.63	10	22.26	36
Total		167.5		92		118.5		288

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)}{n_j} - 3(N+1) \right]$$

$$= \frac{12}{(36+1)} \left[\frac{(167.5)}{9} + \frac{(92)}{9} + \frac{(118.5)}{9} + \frac{(288)}{9} \right] - 3(36+1) \qquad = \frac{}{36}$$

$$= \frac{12}{1332} (3117.36 + 940.44 + 1560.25 + 9216) - 111$$

$$= 133.64 - 111$$

$$= \boxed{22.64}$$

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The abovementioned table no.5.13 states that the calculated value of H is 22.64, which is higher than the critical value i.e., 7.851. So here the null hypothesis based on Kruskal Wallis' one way analysis of variance test is rejected and the alternative hypothesis is accepted. It means, **"There is significant difference between the debtors' turn over ratios of fertilizer companies".**

References:

(1)   Emerson O. Henk : "Introduction Accounting", Petrocelli/Charter, 1st ed., New York 1974, p. 74.

(2)   Robert N. Anthony : Management Accounting, op. cit, p. 45.

(3)   Prasanna Chandra : Financial Management, op. cit., p. 291.

(4)   Harry Gross : Financing for small amd Medium Sized Business, op. cit., p. 80.

(5)   Joseph L. Wood : "Credit and Collections" in Doris Lillian (ed.), Business Finance Hand book, Prentice—Hall, New York, 1953, p. 243.

(6)   James C. Van Horne : Fundamentals of Financial Management, Prentice Hall of India Pvt. Ltd., New Delhi, III ed., 1978, p. 115.

(7)   Vyas J. N. : Financing an Industrial, N. K. Vyas Family Trust, Ahmedabad, 1983, p. 174.

(8)   Harry Gross : op. cit., p. 84.

(9)   Beckman, Theodore N. : Credits and Collections Management and Theory, Mc.Graw Hill, New York, 1962 Ed., pp. 605—622.

(10)   Ibid, p. 208.

(11)   Greig, Cuhtbert : Commercial Credits and Accounts Collection – the Furniture Record, London, 1952, pp. 26—27.

(12)   Beckman, Thedore N. : op. cit., p. 212.

(13)   Greig, Cuthbert : op. cit., p. 26.

(14)   Ettinger, Richard P., and Golieb, David E. : Credits and Collections, Prentice – Hall, New York, III ed., second printing, 1950, pp. 9—22.

(15)   James C. Van Horne : 'Fundamentals of Financial Management' op. cit., pp. 116—117.

(16)   Johnson, R. W. : "More Scope for Credit Managers", Harvard Business Review, Boston, U.S.A., Nov. December, 1961, pp. 118—119.

(17)   Harry Gross : op. cit., pp. 82—83.

(18)   For a discussion of credit decision making by Simulation, see Roger, L. Sission and Norman L. Statland, "The Future of computers in credit management", credit and financial management, 65 (November 1983), pp. 40—44.

(19)   M. H. Walters, Secretary I.C.W.A., London : "The Profitable Use of Capital in Industry" : III impression, May 1966, p. 49.

(20)   W. G. Lewellen and R. W. Johnson : Better ways to monitor Accounts Receivable", Harvard Business Review, (May-June 1972), pp. 102—109.

(21)   B. R. Stone, "The Payments Pattern Approach to the forecasting and control of Accounts Receivable", Financial Management, (Autumm) 1975, pp. 65—82.

(22)   Walker and Baughn : op. cit., p. 196.

(23)   Johnson R. W. : Financial Managament, Allyn and Bacon, Boston, secong edition, 1962, pp. 584—585.

(24)   Kent, Raymond P. : Corporate Financial Management, Richard D. Irwin, Illinois, 1960 Ed., p. 183.

(25)   Jerome B. Cohen and Sidney M. Robbins : The Financial Manager, Harper and Row, New York and John Weather Hill, Inc., Tokyo, 1966, p. 460.

(26)   For methods to evaluate liquidity and risk aspects of receivables control separately, see Lewis P. Freitas, "Monitoring Accounts Receivable", Management Accounting, (September, 1973), pp. 18—21.

(27)   Beckman, op. cit., p. 429.

(28)   Robert N. Anthony, op. cit., p. 301.

(29)   The Rajasthan State Tanneries Ltd., (RST); 12[th] Annual Report, 1983—84, p. 36.

Chapter 6

Inventory Management

Contents

1. Introduction

The director of a very big company was asked once, " Sir, how your company is able to increase its profit year after year when other companies find the same very though?" The director laughed and answered, "Because, we plug our cost leaks before they become cost holes." The reply is reply interestingly true. Plugging small leaks can increase the productivity and profitability of the company. There are numbers of areas in which cost leaks exist and one such major one is in the area of materials and that is inventory. Smooth running of business activities depends on the inventory needed by the enterprise as it links between production and distribution processes. There is generally, a time lag between the recognition of a need and its fulfillment. The greater the time lag, the higher the need for inventory. The constituents of inventory occupy the most significant part of working capital in most of the business concerns. Thus, inventory control becomes essential. The purpose of inventory managements is to ensure availability of materials in sufficient quantity as and when required and also to minimize investment in inventories. A major problem with managing inventory is that the demand and supply is uncertain. The other factors affecting inventories are uncertainty due to possible equipment breakdowns and labor difficulties. Because of these possibilities, inventory acts as a shock absorber between product demand and product supply. If product demand is greater than expected, inventory can be depleted without losing sales until production can be stepped up enough to select the unexpected demand. However, inventory is not easy to manage as it crosses so many lines of responsibility. The purchasing manger is responsible for supplies avoiding shortage and to purchase in bulk in order to take benefit of quantity discounts. The production manager is responsible for smooth production and wants to have enough raw materials and work in process inventory on hand to avoid disruption in the production process. The marketing manager is responsible for selling and for running a proper stock of finished goods. The financial manager is concerned about achieving an appropriate overall rate of return. Funds invested in inventory are idle and do not earn a return. The impact of the inventory management on the cash cycle of the unit is discussed under the chapter.

2.Meaning:

Dictionary meaning of inventory is, "Inventory is stock of goods, or a list of goods". While according to accounting language it may mean stock of finished goods only. In manufacturing concern it may mean raw materials, work in progress and stores etc. 'inventory meant differently by different authors for different purposes.' In short inventory represents aggregate of those items which are either hold for sale in the ordinary course of business or are in the process of production for sale or are yet to be utilized in the production of goods and services. To understand the exact meaning of the word 'inventory' we may study it from the usage side from the side of point of entry' in the operations i.e. types of inventory.

2. Type of inventory:

Inventory can be classified broidery in to the following ways.

Raw Material: It is that basic un-fabricated materials which have undergone no conversion whatsoever since its receipt from the suppliers. It may include different types of item in accordance with the type of the concern. It is required to carry out production without any interruption. The amount of raw material needed is determined by the rate of consumption and the time required for replenishing the supplies, availability of raw materials and government regulations etc.

Finished Parts: Certain finished parts are purchased which the supplier designs according to the buyer's need. Such finished parts are also called works made parts.

Work in Progress: It comprises of items or materials in partially completed condition of production. Raw materials charge into work in progress after first production operation and remains in that classification until they change to finished goods. Thus work in progress is the stage of stocks that are in between raw materials and finished goods. The quantum of work in progress depends upon the time taken in the production process. The

greater the time taken in production, the more will be the amount of work – in – progress.

Consumables: Consumables are the materials which is necessary for the smooth running of the manufacturing process. These materials do not directly enter in the production but they act as catalysts. Generally, consumable stores do not create any supply problem and form a small part of production cost then also they cannot be ignored. The fuel oil is indirect but important consumable.

Finished Goods: These are the final products ready to ship. Products when leave work – in – progress classification enter into the finished goods classification. The stock of finished goods provides butter between production and market. Maintained inventory ensures proper supply of goods to customers. Concerns, which do not wait for the orders require more finished goods inventory than that the concern, depend and wait for specific orders.

Spares: Spares are also a part of inventory. It is different form raw materials, consumables & finished goods, spares include heavy machinery and also other parts like belts, bearings, o-rings, baskets, springs, hydraulic pipes, pulleys, gears, worm wheels, worm shafts, couplings etc. the stocking policies of spares are different from industry to industry. Some industries like transport will require more spares than the other concerns. All decisions about spares are based on the financial cost of inventory on spares and the costs that may arise due to their non-availability.

3. Motive for holding inventory:

Funds remain block in inventories and its storage expenses add into the cost. But at the same time it is necessary for the smooth running of the production process. In the absence of inventories a firm will have to make purchases as soon as it receives orders. It will mean loss of time and delay in execution of orders, which sometimes may cause loss of customers and business. To over come such cost a firm needs to maintain inventories. Economists have established three motives for holding inventories, the transaction

motive, the precautionary motive and the. Speculative motive. In addition, there may be contractual reason for holding some inventories.

Transaction Motive: The transaction motive facilitates continuous and uninterrupted production and timely execution of sales orders. A firm must have enough finished goods to cope with receiving orders. And also must have idea about the future demand so final products can be produced and proper stock of raw materials can be maintained. For example a woolen clothes-manufacturing firm should keep its godown full with stick before winter season starts.

Precautionary Motive: The precautionary motive facilitates the holding of inventories for meeting the unpredictable changes in demand and supplies of materials. Uncertainly is always and irresistible so precaution is better than cure. For example a woolen clothes manufacturing firm purchases raw material when it is needed. Certain disease spread in animals created scarcity of woolen raw material and a firm cannot get raw material in needed quantity. Ultimately a firm has to suffer loss in form of decrease in sales due to improper supply.

Speculative Motive: The speculative motive includes to keep inventories for taking advantage of price fluctuations scoring in re-ordering costs and quantity discounts etc. it might entice a firm to purchase a larger quantity of materials than normal in anticipation of making abnormal profits. For example in above woolen clothes manufacturing firm a firm changes its purchase policy as soon as it knows about the scarcity of raw material and it can enjoy its normal production without any disturbance. Advance purchases of raw materials in inflationary times are one form of speculative behavior.

Contractual Requirements: Occasionally it may be necessary to carry a certain level of inventory to meet a contractual agreement. Some manufacturers require dealers to maintain a specified level of inventory in order to be the sole representative in a particular territory. Thus we have seven reasons given below of holding inventories.

To Economize Manufacturing Cost: A certain amount of fixed cost incurs irrespective of the quantity of production. Manufacturing goods, it purchased on day-to-day basis, it would be impractical and un economical. Therefore the firm may order beyond the immediate needs of the company to distribute fixed cost over a large number of units. Even bulk purchase offers discount benefits. The buyer therefore may buy quantities beyond the current requirements to take advantage of the price discounts.

To Cope with Changing Market Conditions: Inventory provides strength to the firm to exist against the changing market conditions. Inventories are created when large quantities of items are purchased and stocked in anticipation of their non-availability in future or in anticipation of spurt in their prices.

To Satisfy Demand: If goods and material are available when it is needed there is no need for the inventories. No firm can obtain the items that it needs, whether purchased or manufactured, within zero time bags. It takes some time whether few days or weeks to make items available for the purpose. That is why the unit has to maintain sufficient inventory to ensure their smooth outflow for assembly.

To Prevent Contingencies: Sometimes non-availability of a single item may disturb the whole production process. It may result in repetition of operations, non available item has to acquire from another assembly or the complete operation has to be stopped contingencies may arise when the rate of consumption is more than the estimated usage of rate or when there is delay in delivery. To overcome such contingencies, certain extra stock called safety stock, is maintained. This forms a fixed portion of inventories.

To Stabilize Production: Production follows customers need and products are produced to meet customers order. At the same time it also true that no firm can receive a continuous stream of orders. Usually orders and the shipment of orders are subjected to fluctuations. In case of seasonal products the order fluctuation rate is very high. The question arises how should the peaks and valleys of the demand be satisfied? No, it is not wise to adopt policy of " hiring and firing " people to adjust the fluctuations in business

volume. This method is quite impractical and costly. The alternate method a rational approach would be to produce at a uniform rate throughout the year. The inventory will increase gradually and reach at peak before the season after which the products will start moving to the market and inventory will decline.

To Prevent loss of Sale: If the customers match the stock of finished goods with the orders, the changes of loss in sale can be decreased. Orders are executed as it is placed the need for maintaining the finished goods inventory all wins still greater importance when the products are competitive. The failure of the company to make such products available immediately may result in loss of sale of even the loss of customer.

To satisfy other Business Constraints: Business constraints like supplier's condition of minimum quantity government regulations, seasonal availability, make the company to buy quantities more than the current requirements and lock-up its productive capital.

4. Cost and risk of holding inventory

The cost of holding inventory is to be deducted from the product before finding the amount of net profit. Ability to quantify and develop rigorous models of most managerial problems is dependent on the determination of the behavior of relevant costs, and it is risky too. The various costs and risks involved in holding inventories are as under.

Cost of Capital: One part of the business fund remains block in holding inventories. The firm has therefore to arrange for additional funds to meet the cost of inventories. Funds may be acquired from outsiders or inside the firm. Either funds blocked in holding inventory is availed form inside sources or from outside sources, the firm incurs a cost. In case of outside sources in form of interest payable and in case of inside sources in form of opportunity cost. Thus holding inventory is capital cost as maintaining of inventories results in blocking of the firms financial resources.

Ordering Costs: Every time an order is placed for stock replenishment certain costs are involved. Depending upon the type of item, the ordering cost may vary. The cost of ordering includes.

- Paper work costs, typing, printing and dispatching an order.
- Carriage costs, telephone, telex and postal expenses.
- Checking and inspection of received order and handling of the stores costs.
- The salaries, wages and allowances of purchase staff etc.

Certain costs remain the same regardless of the size of the lot purchased or requisitioned. A large segment of the total costs of the ordering function are fixed. So it is not correct to derive the figure by simply dividing the total cost of the ordering operation by the average number of orders processed.

Storage Costs: Storage cost involves all the costs of holding items in inventory for a given period of time. The storage costs include.
- Carrying and handling costs
- Insurance
- Taxes
- The costs of the funds invested in inventories.
- Obsolescence and deterioration costs.

Carrying and holding costs include the godown costs. If a firm owns the godown , the opportunity cost adds in storage costs and if a firm does not own the godown, the rent of godown adds in storage costs. Insurance of the inventory is the another element of caring cost against losses due to there fire or natural disaster personal property taxes and business taxes required by local and state governments on the value of its inventories are payable by a company. The cost of funds invested I inventories is measured by the required rate of return on these funds.

Stock out Costs: Stock out costs are incurred whenever a business is unable to fill orders because the demand for an item is greater than the amount currently available in inventory. Unavailability of inventory fails the company to fulfill its orders in time and it may result in the immediate loss of profits if customers decide to purchase the product

from a competitor and in potential long-term losses if customers decide to order from other companies in the future.

Risk of Price Decline: The risk of decline in the price of holding inventories is always there. The reasons of decline in price may be increase in market supplies, competition or general depression in the market.

Risk of Obsolescence: Inventories are valuable only if they can be sold. The inventories may become obsolete due to improved technology, changes in requirements, change in customers tastes etc. the existing product becomes levis salable due to such changes.

Risk of Deterioration in Quality: The quality of the materials may also deteriorate while the inventories are kept in stores. Changes in the physical quality of the inventories such s spoilage and breakage deteriorate the quality of the product.

5. Inventory management

Investment in inventory consists a very big part of the total investment in concerns specially concerns engaged in manufacturing, wholesale and retail trade. Sometimes the amount invested in inventory is more than in other assets. In India a study of 29 major industries has revealed that the average cost of materials is 64 paise and the cost of labor and overheads is 36 paise in a rupee. In some industries about 90 percent part of working capital is invested in inventories. In such cases the management of inventory becomes compulsory. It is also necessary for every business unit to give proper attention to inventory management. Inventory management involves a proper planning of purchasing handling storing and accounting. An efficient system of inventory management will determine.

- What to purchase?
- How much to purchase?
- From where to purchase?
- Where to store?

The inventory management deals with the proper stocking. It means the inventory management is to keep the stock in such a way that neither there is over stocking nor under stocking. The over stocking mean decrease in liquidity and wastage of other assets, on the other hand, under stocking results in delayed supply and decrease in sales and also may lose customers forever. The investments in inventory should be kept in reasonable limits.

6. Objectives of inventory management:

The main objects of inventory management are operational and financial. The operational objectives deal with the material and spares available in sufficient quantity so that work is not disrupted for want of inventory. While the financial objectives deal with invested fund in inventories i.e. investments in inventories should not remain idle and minimum working capital should be locked in it. The following are the objectives of inventory management.

Continuity of productive operations: To ensure continuous supply of materials spares and finished goods so that production should not suffer at any time and the customers demand should also be met. Every attempt should be made to ensure continuity of productive operations through an uniform flow of materials and eliminate the possibility of stock-outs.

Maintaining proper stocking: Maintaining proper stocking means to avoid over stocking and under stocking of inventory. Because both the conditions are unfavorable for the smooth running of production process and the business.

Effective use of capital: The investment in inventories should be kept at minimum consistent with the operating sales and financial requirements of the firm. In short it aims to maintain investments in inventories at the optimum level as required by the operational and sales activities.

Cost reduction: Inventory holds a good portion of invested capital. So it becomes one of the main objects of the inventory management to keep material cost under control so that they contribute in reducing cost of production and overall costs.

Reduction in administrative workload: Administrative workload on the purchasing, receiving, inspections, stores, accounts and other related departments should be berets minimum.

Satisfaction of the customers: Adequate stock of the finished goods should be maintained to meet customers demand. Satisfaction of the customers ensures the customers in future and also increase the future or new customers.

Economy in purchasing: To eliminate duplication in ordering or replenishing stock. This is possible with the help of centralizing purchases. The inventory management enables a firm to gain economy in purchasing through quantity buying and favorable market.

Reduction of loss: Inventory management aims to minimize losses through deterioration pilferage, wastage and damages. Inbuilt checks should be provided to weed out obsolete and non-moving items periodically and automatically.

Practical system: It is inventory management who selects the practical system to ensure right quality goods at reasonable prices. Suitable quality standards will ensure proper quality of stock. The price analysis, the cost analysis and value analysis will ensure payment of proper prices.

Balancing stock and book records: No inventory control system can work if there are discrepancies between physical stock and book balance. Stock record reconciled periodically with physical balance. Thus, inventory management ensures perpetual inventory control so that materials shown in stock ledgers should be actually lying in the stores.

Administrative transparency: The management of inventory should be simple, easy to operate and devoid of tedious calculations. It is to facilitate furnishing of date for short term, long term planning and control of inventory.

7. Symptoms of poor inventory management:

iv.   Odd production with frequent layoffs and overtime working.

v.   Inventory investment and sales volume ration is not maintained.

vi.   Irregular production to meet sales targets.

vii.   Higher down time of the machines due to non availability of spares.

viii.   Inflationary market condition shows continuous increase in value of the obsolescent and dormant stocks.

ix.   Machines cant be utilized maximum due to frequent shortage of materials.

x.   Frequent receipt of materials increases administrative work.

xi.   It also increases transportation charges

xii.   Frequent failures in delivery commitments.

xiii.   Posting of buyers at the vendor's plants to expedite supplies.

xiv.   Frequent complaints from suppliers regarding revision of schedules placed on them.

xv.   Ultimately poor inventory management results in decrease in profit or loss.

8.   Techniques for inventory efficiency

VARIETY REDUCTION: Variety reduction is the voluntary elimination of unnecessary variety and formulating and applying rules to regulate variety. Management requires lot of control on items purchased by keeping cheque books locked in strong safes and has to keep a note of the serial number of the cheques to prevent forgery or misuse. Rarely attention is paid to what to stock and what not to stock and undue variety causes leakage of the companies bank balance. Variety reduction includes elimination of unnecessary variety, control of variety and concentration of effort on selected range of product.

Advantages of variety reduction

Decrease in manufacturing cost Variety reduction has the greatest impact on the production. Diversity of products and components usually entails small production runs associated with heavy setup costs and visa-versa

Reduction in inventory investment. More variety in stock demands more investment in inventory. Investment in inventory depends to a greater extent on the number of items and number in turn can be reduced through variety reduction. The reduction in inventory investment results firstly due to reduction in reorder quantity and secondly due to reduction in safely stock.

Savings in purchase cost. Controlled variety purchase ultimately results in saved purchased cost. Standardization of raw materials bought out components and supplies enables bulk purchases, which is decidedly the easiest way of securing competitive prices.

Savings in direct labor cost, Lesser variety implies greater expertise of workers resulting from the need to work on limit machines for longer periods. According to the theory of learning curve, a worker learns as he works, and the more often he repeats an operation, the more efficient he becomes; with the result that direct labor cost per unit declines."

Better machine utilization, Longer production runs , made possible duet to reduced variety, result in better machine utilization.

Effective production planning and control. When the range of items is reduced, production planning and control activities view material control, process planning, tools control; scheduling, dispatching and progressing get simplified.

Line of Balance (LOB): The basic problem in a batch production is the control of work in progress as it is usual practice to let the work proceed in discrete steps, form one operation to the next, after the work is completed at each stage. Generally, the

assembly does not start until all parts are completed. The method though tends to minimize setup cost but greatly influences stocks and capital lack-up due to varying work content of different components, imbalances in manufacturing times and formation of queues between the machines. The line of balance technique is evolved to overcome this difficulty and provide an effective instrument for co-ordination among the key activities of a large number of departments. Line of balance is a device for planning and monitoring progress of an order, project or a program by a target date. It facilitates a control mechanism to establish an orderly flow of batches of materials, components and sub-assembles through a sequence of unconnected workstations and thereby ensuring that balanced sets of parts and sub assemblies are available in right quantities of the right time.

Steps to be followed in LOB technique

- An objective chart is prepared
- Listing of activities and technological relationships.
- Preparation of a network diagram.
- Determination of stage lead time.
- Plan of operation chart is made.
- Progress chart is made
- Making of a line-of-balance to determine required progress of work
- Actual progress of work is recorded.
- Analyzing performance and taking corrective actions.

- **SALES FORECASTING**: Technologically and administratively modern production is complex. Not only the basic inputs-men, machines and materials are expensive, there are usual all sorts of restrictions. Therefore the planning of production activity is essential so that resources are put to their best use and maximum possible profit is achieved. Planning tends to meet customers order at the least cost. This can order at the least cost. Changing the inventory of raw materials can do this. Work – in – progress and finished goods. They most be made in line with expected future sale i.e. sales forecast. A large number of activities depend upon projection of future sales.

The forecasting means the projection based on past data. Past data through is factual yet rarely it is free form errors. But year for casting is not guesswork. It is an inference based on large mass of data on past performance. Forecasting is a very difficult task. Different methods like synthetic for casts, analytical estimates, use of economic indicators, statically approach, measurement of secular trend are used in sales for casting.

Sales fore casting is an art. A good fore casting method should be characterized by simplicity i.e. the method should be simple to use and easy to understand, accuracy i.e. the method must produce i.e. the method must produce reliable forecasts failing which the company could land into financial troubles, economy i.e. the cost to generate the forecast should be as small as possible and stability i.e. the method selected should be such that expected future changes are kept at minimum.

- **MATERIAL REQUIREMENT PLANNING (MRP)**: Material requirement planning is the scientific technique for planning the ordering and usage of materials at various levels of production and for monitoring the stocks during these transactions. Therefore material requirements planning are both inventory control and scheduling technique. MRP is based on the concept of independent and dependent demand. The demand for the products is considered independent since orders may not necessarily related to others in terms of customers and quantity, but once sales needs are either known or forecasted, the quantity of raw materials and components required to make up the products can be calculated depending upon the manufacturing schedules. This dependent demand condition is served by MRP.

    Steps to be followed in MRP technique
- Determine the aggregate needs of finished products.
- Determine the net need of finished products.
- Develop a master production schedule.
- Explode the bill of materials and determine gross needs.
- Screen out B and C category of items.

- Determine the net needs of items.

- Adjust requirement for scrap allowance.

- Schedule planned orders.

- Explode the next level

- Aggregate needs and determine order quantities.

- Write and place the planned orders.

- Maintain the schedules.

- **JUST IN TIME (JIT):** Just – in – time approach was first developed by the Toyota Motor Company in the 1950. JIT inventory management systems are part of a manufacturing approach that seeks to reduce the company's operating cycle and associated costs by eliminating wasteful procedures. JIT inventory systems are based on the idea that all required inventory items should be supplied to the production process at exactly the right time and in exactly the right quantities. Therefore JIT is not just an inventory control or inventory reduction technique, but it is a philosophy or an approach to productivity that is applicable to all facets of the manufacturing process including material

JIT approach, when applied systematically facilitates reduction in manufacturing lead time, defect free production, lower inventory investment, greater conformance to delivery commitments, lesser cost of production, faster response to market needs, and improved moral of the work force. The just – in – time approach works best for companies engaged in repetitive manufacturing operations. A key part of just – in – time systems is the replacement of production in large batches with a continuous flow of smaller quantities. The company following JIT system requires close co-ordination between a company and its suppliers, because any disruption in the flow of parts and materials from the supplier can result costly production delays and lost sales.

- **SIMULATION**: Many inventory control problems either do not lent themselves to a mathematical treatment or its analysis is very laborious. To analysis such problems, simulation is the only answer. Simulation method is relatively simple. It is especially

useful where uncertainties of data would produce calculations of great and sometimes of impossible complexity. In simple words simulation is the method of solving decision making problems by designing, constructing and manipulating a model of a real system, it is impact the process of experimenting on a model of the real system.

Steps to be followed in simulation:

- Identify input variable, collect data on each variable and present it in event frequency table.
- Find a cumulative percentage probability distribution in the table.
- Assign blocks of tag numbers.
- Design work data sheet
- Select an appropriate method of generating the required random numbers.
- Using the method selected in step – 5 generate "n" random numbers match these to the block of tag numbers assigned to the events in step – 3 and thereby simulate the expected value of the events of the input variable.
- Process the simulated data into the form that generates the required information.
- Summarize data and interpret results.

- **COMPUTERISATION OF INVENTORY MANAGEMENT:** It is difficult to find a field without computer. The traditional methods do not serve the purpose as quick availability of data according to the needs cannot be made available. Computers on the other hand helps in great measure to quickly process the information in accordance with the needs of the various level of the management. So, the need of computer cannot be ignored.

    Steps in computerization
- Analyze n existing manual system.
- Define the objectives of the system
- Constitute a project team
- Collect data for preliminary system design
- Develop a conceptual design

- List down alternatives.

- Prepare a project report

- Design the necessary system

- Train employees

- Install the system

- Audit output reports

- Rehabilitate employees affected by the introduction of the computerized system.

- **CONTOL SYSTEM OF INVENTORY MANGEMENT**:

Effective inventory management requires an effective control system for inventories. Inventory management deals not only in solution of liquidity but also increases profits and causes substantial reduction in the working capital of the concern. Following are the important inventory management control systems.

Explosion Process: In this system production requirements are based directly on the sales forecast. Needed raw material are listed for various products. To determine overall material requirements, each sub assembly or part on the list of materials is extended or multiplied by the planned number of finished products. This gives the total requirement for each time listed. The explosion process yet can be simplified it electronic programmed equipment is available. After the production level is set. Cards are punched to initiate a manufacturing order for each product.

Past Usage Methods: This system relies on past usage rather than on sales forecast to determine particular item was used at a rate of hundred units per month during the past year or during some other representative period it is likely to be used at the same rate in future. If the production role is expected to be changed than in the past period, the past usage figure many be altered accordingly by an application of a factor that represents the anticipated percentage of change. In general the past usage method is not so effective in determination of the inventory stock. Changes in product mix or product pattern may adversely affect the results of the past usage method. In addition, it does not sufficient account of shifting production levels.

Value Volume Analysis: It is somewhat the combination of above two methods. Value volume analysis determines which inventory accounts should be controlled by the explosion method and which should be controlled by the past usage method. In value volume analysis its unit to find the annual activity for the item multiplies the number of each item used in the past year. This is an important system, because those items with a high level of activity must be more closely controlled than the ones with relatively low activity levels. Requirement of high activity level is determined by explosion method while low activity level requirement is determined by the past usage system.

Determination of Stock Levels: Inventory level on extreme points is detrimental to the firm. It means it the inventory level is too high it will be unnecessary tic-up of capital and if the inventory level is too little, the firm will face frequent stock-outs involving heavy ordering cost. So optimum inventory level is to be maintain 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 various stock levels are discussed as such.

Minimum Level: Minimum level represents that smallest quantity of inventory which have to be maintained in hand at all times. It stocks decrease this minimum level, the work will stop due to shortage of materials. Minimum stock level is determined on relying upon the following factors.

Lead Time: Raw material get changed after some process into final product or salable product and then it is executed. This time taken in processing the order and then executing it is known as lead-time. It is necessary to maintain some inventory during this period.

Rate of Consumption: Rate of consumption is the average consumption of materials in the factory. The rate of consumption will be decided on the basis of past experience and production plans.

Nature of Material: It material is required for special orders of the customers then minimum stock will not be required to be maintained for such materials. Minimum stock level can be calculated with the help of following formula.

Minimum Stock Level= Replenishment level – (Normal Consumption * Normal Replenishment period)

Replenishment Level: When the quantity of materials reaches at a certain figure then fresh order is sent to get materials again. The order is sent before the stock reach minimum level. Replenishment level is fixed between minimum level and maximum level. Lead-time, rate of consumption, maximum quantity of materials required on any day are taken into account while fixing the replenishment level. Replenishment level is fixed with the following formula.

Replenishment Level= Maximum Consumption * Maximum Replenishment period

Maximum Level: It is the boundary which a firm should not exceed its stocks. It a firm crosses the maximum level limit then it will be overstocking. A firm should avoid overstocking as it results in the unnecessary blocking of funds, higher material cost and ultimately decrease in profit. Maximum stock level depends on the following factors:

- Available capital for the Purchase of materials
- At any point of time the maximum requirement of materials
- Available space for storing the materials
- Consumption rate during lead time
- Maintaining cost of store
- Chances of fluctuations in prices
- Nature of materials. Perishable materials can not be stored for long
- Availability of materials. If the availability of the material is seasonal then they will have to be stored for the rest of the period.

- Government policies. Sometimes, government fixes the maximum quantity of materials which a firm can store. Thus the maximum level is limited by the limit fixed by the government.
- Charging fashion and tastes of customer affect the maximum customer affect the maximum level.

Maximum Stock Level = Replenishment Level + Replenishment Quantity – (Minimum   Consumption * Minimum Replenishment Period)

Danger Level: It is the boundary beyond which materials should not fall in any case. If the stock crosses the danger level then immediate steps should be taken to re-order the stocks even if more cost is incurred in arranging the materials. If the materials are not available immediately there is a possibility of stoppage of work. Formula for the determination of danger level is

Danger Level = Average Consumption * Maximum Replenishment Period for emergency purchases.

Average Stock Level: The average stock level is calculated as such.

Average Stock Level = Minimum Stock Level + ½ of Replenishment Quantity

Determination of Safety Stock: Safety stock is a buffer to meet some unanticipated increase in usage. Requirement of inventory can not be perfectly forecasted. It may fluctuate over a time period. The demand for material may change and delivery of inventory may also be delayed and in such situation the firm can face a stock-out problem. The stock-out affects the smooth running of the process. In order to save a firm against stock-out crisis due to usage. Fluctuations, firms maintain some margin of safety stock. The fundamental problem is to decide the quantity stock of safety level. Two costs are considered in the determination of the safety stock i.e. opportunity cost of stock-out and the storage costs. Formula for the safety stock is

Safety Stock = (Maximum Usage Rate – Average Usage Rate) * Lead Time

Ordering system of Inventory: The basic problem of inventory is to decide the replenish point. This point indicates when an order should be placed. The following three things help to determine the replenish point help to determine he replenish point.

- Average consumption rate
- Duration of lead time and
- Economic order quantity

- **There are three prevalent systems of ordering and a concern can choose any one of these**
  1. Economic Order Quantity System (EOQ)
  2. Fixed Period Order System
  3. Single Order and Scheduled delivery System.

  - Economic Order Quantity (EOQ): There are two basic questions relating to inventory management.
  1. What should be the size of the purchase?
  2. At what level should the purchase be made?

  The quantity to be purchased should neither be small nor big because costs of procurement and carrying materials are very high. Economic order quantity is the size of the lot to be purchased which is economically variable. Economic order quantity the quantity of materials which can be purchased at minimum costs. Generally, economic order quantity is the point at which inventory carrying costs are equal to order costs. There are two major costs associated with any order quantity procurement cost and inventory carrying cost.

  - Procurement Costs: These are the costs that are associated with the purchasing or ordering of materials. These costs include

- Paper work, costs, typing, printing and dispatching an order.

- Carriage Costs, telephone , telex and postal expenses.

- Checking and inspection of received order and handling the stores costs.

- The salaries, wages and allowances of purchase staff etc.

These costs are known as buying costs and will arise only when some purchases are made.

The procurement costs or ordering costs are totaled up for the year and then divided by the number of orders placed each year. The planning commission of India has estimated these costs between Rs. 10 to Rs. 20 per order.

Carrying Costs: Carrying costs are the costs for holding the inventories. These costs will be incurred if inventories are not carried. These costs include, carrying and handling costs i.e. the cost of capital invested in inventories. An interest will be paid on the amount of capital locked-up in inventories, cost of storage, which could have been used for other purposes, obsolescence, and deterioration cost. The materials may deteriorate with passage of time. The loss of obsolescence arises when the materials in stock are not usable because of change in process, insurance cost and taxes, cost of spoilage in handling of materials. The planning commission of India had estimated these costs between 15 percent to 20 percent of total costs. The longer the material kept in stocks, the costlier it becomes by 20 percent every year.

EOQ Model under ideal condition: EOQ Model under ideal condition assumes that both demand and lead times are constant and known with certainty. Thus, this model eliminates the need to consider stock outs.

Assumptions

- Annual demand for the item is known.

- Annual demand is stationary throughout the year.

- Seasonal fluctuations are ignored.

- Lead-time is zero for replenishing inventories.

- A firm need not to maintain additional inventories, safety stock etc.

Figure (a) Relationship between order size and inventory balance.

Order Quantity

Average Inventor = Q/2

Inventory Level

Q

O

t1   t2   t3
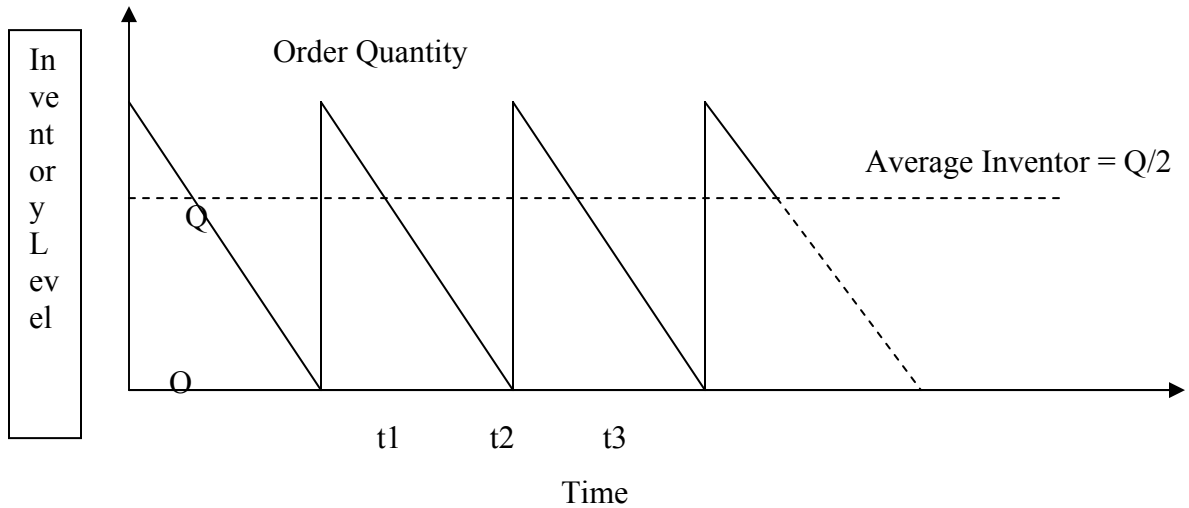
Time

The ideal EOQ Model yields the saw toothed inventory pattern shown in figure - (a).

- Vertical Lines at the points O, t1, t2, and t3 in time represent the instantaneous replenishment of the item by the amount of the order quantity Q.

- The negatively sloped lines between the replenishment points represent the use the item.

- Average inventory is equal to one-half of the order quantity, (Q / 2) because the inventory level varies between O and the order quantity Q.

- Total carrying cost is equal to carrying cost per unit multiplied by average inventory [C(Q / 2)]

- Total ordering cost is equal to the cost of an order multiplied by the number of order [R (D / Q)]

- Total Cost (TC) is the sum of Total carrying cost and total ordering cost.

$$TC = C (Q / 2) + R (D / Q)$$

Where

C =   Cost of carrying one unit for a year.

Q =   Number of units ordered.

R = Cost of placing one order.

D = Number of units to be used during a year

TC = Total Cost

EOQ Model: The ordering and carrying costs have an inverse relationship. The ordering cost goes up with the increase in number of orders placed. On the other hand carrying costs go down per unit with the increase in number of units, purchased stored. It is shown in figure (b).

Figure (b)   The EOQ is associated with the lowest total of carrying cost and ordering cost.

EOQ
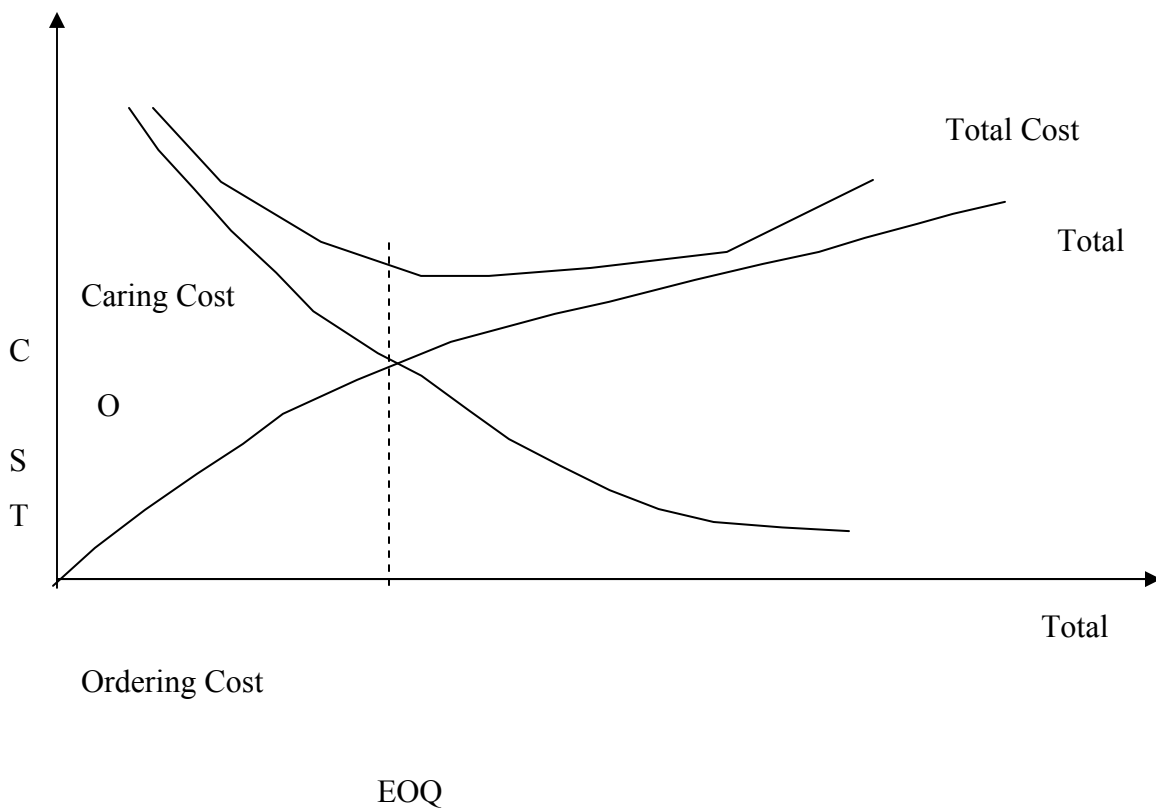
(Source: Working Capital Management, V.K. Bhalla, Published by Anmol Publications Pvt. Ltd. New Delhi, Pg – 360)

In figure (b)

- vertical axis and horizontal axis represent cost and order quantity respectively.

- Order quantity increases as we move to the right.

- For very small order quantities the total ordering cost is extremely high

- As the order size increases total ordering cost declines in curvilinear fashion.

- Total carrying cost is virtually zero when the orders are small and frequent. But it increases linearly as the order size and inventory rise.

- The net effect of these two costs is to cause total cost to decline over a certain range and then increases.

- The EOQ is the order quantity that coincides with the minimum total cost.

This EOQ Model too has certain assumptions. They are as follows

- The supply of goods is satisfactory.

- The quantity to be purchased by the concern is certain.

- The prices of goods are stable.

When the above conditions are satisfied, economic order quantity can be calculated with the help of the following formula.

$$EOQ = \sqrt{2RD/C}$$

Where

R = Cost of Placing one order

D = Number of units to be used during a year

C = Cost of carrying one unit for a year

EOQ = Economic order quantity

- **ABC** Analysis: One of the most widely accepted concepts of inventory management is ABC Analysis. The maintaining appropriate control according to the potential savings associated with a proper level of such control. The ABC Analysis is a means of categorizing inventoried items into three classes 'A', 'B', and 'C' according to the potential amount to be controlled.

'A' represent the most important items, generally consists of 15 to 25 percent of inventory items and accounts for 60 to 75 percent of annual usage value.

'B' represent items of moderate importance generally consists of 20 to 30 percent of inventory items and accounts for 20 to 30 percent of annual usage value.

'C' represents items of least significance, generally consists of 40 to 60 percent of inventory items and accounts for 10 to 15 percent of annual usage value. In addition to annual rupees usage, several factors need to be considered in developing criteria for classifying items into 'A', 'B' and 'C' categories. In this regard a truth table can be used to facilitate the classification process. A typical truth table is shown below. The questions included in such a table and the parameter associated with the questions, will vary according to the specific inventory being analyzed.

"Truth" Table for ABC Classification

Sr. No.	Questions	Yes Answers	Part number				
			1	2	3	4	5
1.	Is annual usage more than Rs. 10,000 ?	A	1	0	0	0	0
2.	Is annual usage between Rs. 1000 and Rs. 10,000 ?	B	0	1	0	0	0
3.	Is annual usage less than Rs. 1,000 ?	C	0	0	1	1	1
4.	Is the unit cost over Rs. 100 ?	B	1	0	0	0	0
5.	Does the physical nature of the item cause special storage problems ?	B	0	0	0	0	1
6.	Would a stock out result in excessive costs ?	B	0	0	0	1	0
	Classification		A	B	C	B	B

In this table six questions are asked regarding each inventory items. A 'yes' answer is indicated by one in the appropriate column under the part number, a 'no' answer is reflected by a zero. The column next to the question provides the key to the classification by indicating the inventory class associated with a 'yes' answer to each question. When there is more than one 'yes' answer per item, the highest classification is used. In a typical inventory basic raw materials, such as sheet steel, bar stock etc, and inventoried sub-assemblies are found in the 'A' category. Small metal stamping with moderate usage are frequently 'B' items, while 'C' items are typically hardware items such as small nuts, bolts and screws.

A-B-C analysis helps to decide how much attention should be paid to what items. More concentration should be given to category 'A' items since greatest monitory advantage will come by controlling these items. The control of 'C' items may be relaxed and these stocks may be purchased for the year. A little more attention should be given to category 'B' items and their purchase should be undertaken at quarterly or half – yearly intervals.

An example showing advantages of A-B-C analysis :Suppose three items X,Y,Z have been used and their consumption is Rs. 1,20,000 Rs, 12, 000 and Rs. 1,200 respectively. Let us presume that A-B-C analysis is not done and annual orders are 12 in number. Each item will be ordered 4 times and average inventory will be

Item	Annual Consumption (Rs.)	No. of Orders	Average Working Inventory (Rs.)
X	1,20,000	4	30,000
Y	12,000	4	3,000
Z	1,00	4	300
Total	1,33,000	12	33,300

Suppose A-B-C analysis is followed and number of order will be according to the importance of the items. If the number of orders are 8, 3 and 1 for items X,Y,Z respectively then the average inventory will be as follows.

Item	Annual Consumption (Rs.)	No. of Order	Average Working Inventory (Rs.)
X	1,20,000	8	15,000
Y	12,000	3	4,000
Z	1,200	1	1200
Total	1,33,200	12	20,200

When A-B-C analysis was not followed the average inventory was Rs. 33,300 and after following A-B-C analysis the average inventory came down to Rs. 20,200. average value of inventory is nearly 1 ½ times in the earlier situation, than as compared to the second situation.

- VED Analysis: The VED analysis is used generally for spare parts. The requirements and urgency of spare parts is different from that of materials. VED analysis represents classification of items based on criticality. The analysis classifies the items into three groups called Vital Essential and Desirable. Vital category includes those items for want of which production would come to halt. Essential category includes items whose stock outs cost is very high. And Desirable category include those items which do not cause any immediate loss of production or their stock out cost is nominal. VED analysis is carried out for 'C' category items. Stock out of which can cause heavy production loss. An item may be Vital for a number of reasons namely.

  - Serious production losses occur.
  - Lead-time for purchase is very large.
  - It is non-standard item and is purchased to buyers design.
  - The sources of supply are only one and are located far off from the buyers plant.
    ABC and VED classification can be combined to advantage.

- **XYZ Analysis:** XYZ analysis is based on value of the stocks on hand i.e. inventory investment. Items whose inventory value are high are called X items white those whose inventory values are low are called Z items. And Y items are those that have

moderate inventory stocks. Usually X-Y-Z analysis is used in conjunction with ABC analysis. XYZ analysis when combined with ABC analysis is used as follows:

Class of items	A	B	C
X	Efforts to be made reduce stocks to Z category	Efforts to be made to converts them to Y category	Steps to be taken to dispose off surplus stocks.
Y	Efforts to be made convert these to Z category	❖	Control may be further tightened
Z	❖	Stock levels may be received twice a year	❖

- **HML** Analysis: The HML classification is similar to ABC classification, but in this case instead of the assumption value of item, the unit value of the item is considered. The items under analysis are classified into three groups that are called 'High', 'Medium' and 'Low'. For classification, the items are listed in the descending order of their unit price. By the management it is cut-off into three groups. For example, the management may decide that all items of unit price about Rs. &00 will be 'H' category, those with unit price between Rs. 100 to &00 will be of 'M' category and those having unit price below Rs. 100 will be of '1' category.

  - Fixes the storage and security requirements.
  - Controls consumption at the departmental head level.
  - Decides the frequency of stock verification.
  - Controls purchases according to the levels.
  - Delegate authorities to different buyers to make petty cash purchase.

- **SDE** Analysis: It should not be over locked that inventory levels are also dependent on the source a scare item with a long lead time will have a higher safety stock for the same consumption level. The SDE analysis is the system where classification is done on the basis of general availability and the source of suppliers.

SED analysis is based on the following procurement problems.

- non-availability
- Scarcity
- Longer lead time
- Geographical location of suppliers and
- Reliability of suppliers

SDE indicates three groups named **'Scare', 'Difficult' and 'Easy'**.

'Scare' classification includes of items, which are in short supply, imported or canalized through government agencies. Such items are best to procure once a year.

'Difficult' classification includes of items, which are available indigenously but are not easy to procure. Also items from long distance and for which reliable sources do not exist fall in to this category. Suppliers of such items require several months of advance notice. 'Easy' classification comprises of items, which are reality available. Items produced locally and where supply exceeds demand fall into this group.

The purchase department to decide on the method of buying and to fix responsibility of buyers employs SDE analysis.

- G-NG-LF / GOLF Analysis:

G-NG-LF / GOLF analysis is system where classification is done on the basis of general availability and the source of suppliers. This analysis like SDE analysis based on the nature of the suppliers which determine quality, lead time, terms of payment, continuity or otherwise of supply and administrative work involved. The four groups classified by the G-NG-LF analysis are

'G' group covers items procured form government suppliers such as the STC, the MMTC and the public sector undertakings.

'NG' (O in GOLF analysis) covers items procured from Non-government (or Ordinary) suppliers.

'L' group covers items bought form local suppliers.

'F' group contain those items which purchased from foreign suppliers.

Transaction with 'G' group suppliers involves long lead time and payments in advance or against delivery. While transactions with 'NG' suppliers involve moderate delivery time and availability of credit usually in the range of 30 to 60 days. The items bought from 'L' group suppliers are paid in cash or purchase is made on blanket orders. Purchase from 'F' group suppliers involves a little bit long process to be followed.

- S-OS Analysis: Raw materials, specially agricultural inputs are generally classified by the S-Os system since the prices during the season would generally be lower S-OS analysis classifies the items into two groups S i.e. seasonal and OS i.e. off seasonal. The analysis identifies items which are

    - Seasonal and are available for a particular period.
    - Seasonal but are available throughout the year.
    - Non-seasonal items whose quantity is decided on different considerations.

- FSN Analysis: Movement analysis forms the basis to FSN classification and the items are classification and the items are classified according to their assumption pattern. If there is a rapid change in technology, this classification will have to be up dated more often. In FSN analysis F,S and N denotes Fast moving, slow moving and Non-moving respectively. To conduct the analysis, the last date of receipt or the last date issue whichever is later is taken into account and the period, usually in terms of number of months that has elapsed since the last movement is recorded.

    Advantages of FSN analysis are follows:
    - Active items can be found and inspected regularly.
    - Less moving items can be identified whose stocks are higher than their consumption rate.
    - Non-moving items that actually have blocked productive capital unnecessary are reviewed to decide on disposal action to deplete their stocks.

- **Inventory Turnover Rations:** Inventory turnover ratios are calculated to ensure an efficient use of inventories. An efficient use of inventor ensures the minimum funds requirement and blocking of minimum funds in inventory. The inventory turnover ration is also known as stock velocity. It is calculated as sales divided by average inventory or cost of goods sold divided by average inventory cost. Inventory conversion period may also be calculated to find the average time taken for clearing the stocks. In mathematical expression.

Inventory Turnover Ratio:

= Cost of Goods Sold / Average Inventory at Cost

= Net Sales / Average Inventory

Inventory Conversion Period :

= Days in a year / Inventory Turnover Ratio

(3) **Aging Schedule of Inventories**

Aging Schedule of Inventories

Item Name / Code	Age Classification	Date of Acquisition	Amount Rs.	% age to Total
001	0-15 days	June 25,2000	30,000	15
002	16-30 days	June 10, 2000	60,000	30
003	31-45 days	May 20, 2000	50,000	25
004	46-60 days	May 5,2000	40,000	20
005	61 and above	April 12,2000	20,000	10

Classification of inventories according to the period (age) of their holding helps in identifying slow moving inventories thereby helping in effective control and management of inventories. Aging inventory of a firm is shown in above table.

▪ **Classification and codification of inventory:** Inventory includes raw material, work – in – progress, finished goods, consumable, spares etc. all these items again can be classified in sub-classes. The raw materials used may be of 3-4 types, finished goods may also be of more than one type, spares may be of a number of types and so on. The proper classification is essential for proper recording and control. Classified inventories are given numbers or code for the separate identification of each item. Lack of proper classification also loads to reduction in production. The inventories can be grouped either according to their nature or according to their use. Generally materials are grouped according to their nature such as construction materials consumable stocks, spare lubricants etc. After the grouping of the materials, they are given codes. Such coding may be done alphabetically or numerically. Generally latter method is used for coding. In numerical method two or three digits numbers are assigned to the category of material in that class. In the same class to show different quality decimals are used for example, a firm has two categories of items divided into 15 groups. In main category and subcategory two numbers will be used and then decimals will be used to the quality etc. if mobile oil is to be coded, two digits will be used in the category i.e. lubricant oil say 13, two digits will be used for mobile oil say 65 and one digit may be used after decimal for the quality of mobile oil say 2. The code of mobile oil will be 1365.2 . The classification and codification of inventories enables the introduction of mechanized accounting. Secrecy of description also can be maintained. It also helps the prompt issue of stores.

▪ **Inventory Reports:** An effective inventory control is possible only when management is well informed about the latest stock position of different items. Usually preparing periodical reports can do it. Such reports should include all necessary information for managerial action. On the basis of these reports management takes corrective action whenever necessary. Regularly made reports make management clear about the conditions and show proper way to which it should be stepped.

▪ **Valuation of Inventories:** The value of materials has a direct effect on the income of a firm, so it is necessary that a pricing material method should be such that it gives a realistic value of stock. In determining valuation method to use, consideration is given to the size and turnover of inventories, the price outlook, tax laws and prevailing practices in the market. While the expert in different areas play important roles in evaluating the implication of different procedures from the viewpoint of their specialties, the financial managers influence will be felt particularly in establishing underlying policies.   The balance sheet and the income statement both are affected significantly by the evaluation of inventory. Initially, the inventory valuation influences the current assets, the total assets, the ratio between current assets and current liabilities and the retained earnings. In the later the inventory evaluation may influence the cost of goods sold and the net profits. "Cost price or market price whichever is less" is the traditional method of valuation of material and is no longer the only method. Different methods value different closing values and it leaves a scope for window dressing. It management is interested to show les profits then it can select such a method which will show less sock or vice-versa. To safeguard public interest the Government of India has instituted statutory controls to prevent frequent change of material valuation methods. A firm will have to use a particular valuation method for at least three years and any changes there from must be approved by the Board.

Following are the methods for pricing materials. :

▪ **AVERAGE COST METHOD**: Cost of an individual item has no significance. There is no any prescribed method to be followed for the valuation of the inventory. For determining the valuation of inventories, consistency from year to year is of prime importance and for this using average costs rather than specifically identified. In averaging the entire group of items is considered as single entity and when particular items are separated they are treated as merely a appropriate part of the whole. In average cost method of pricing all materials in

stock are so mixed that a price based on all lots is formed. Average cost are of two types.

1. Simple average cost
2. Weighted average cost

1. Simple Average Cost: In simple average method the prices of all cots in stock are averaged and the materials are issued on that average price.

This method is too simple to be good result giving method. The total cost of materials is not observed in this method.

Weighted Average Method: in weighted average method purchase of each type of material in stock are taken together and an average price completed. If the prices fluctuate considerably, many calculations will be involved. It is usual to calculate a new average after each delivery. The pricing book of issued and the stores ledger will require frequent amendment. So after fresh purchase, the quantity will be added to the earlier balance quantity and material cost will be added to the earlier cost. The changed total cost divided by the number of units in stock after the purchase gives a fresh price. A new price is calculated where even a fresh purchase is made.

The weighted average price method recovers the whole cost of materials. This method is suitable when price fluctuations are frequent because it smoothes out fluctuations by taking into account total cost and total quantity of materials.

▪ BASE STOCK METHOD: Under the base stock method the minimum quantity of raw materials or other goods without which management considers the operations cannot be continued, except for limited periods, is treated as being a fixed assets subject to constant renewal. The cost of the original stock is to be carried forward for the base quantity. If a quantity of stocks increases the base stock limit at the end of any period. The excess will be carried at its identified cost. This is considered a temporary condition. If a quantity of stocks decreases the base stock limit at the end of

any period, this condition is similarly considered temporary. To avoid the inflation of income of the period during which the base stock was deflected a reserve is set up equal to the excess of the replacement cost over the amount at which the goods wood have been includes in the base stock inventory. This method is a dependent method. It is used along with some other methods such as FIFO, LIFO. Average price method etc. after maintaining the base quantity in stock, the issues is priced at one of the methods mentioned above. This method aims to issue materials at current prices. This aim will be achieved only when LIFO method of pricing the materials is used.

- **FIRST IN FIRST OUT (FIFO) METHOD:** Under FIFO method, cost is computed on the assumption that goods sold or consumed are those which have been longest on hand and that those remaining the stock present the latest purchases or production.

Items received first are issued first. The materials are issued in chronological order and the recently received materials remain in stock. Whenever material is issued the store keeper will use the price of the first lot and then of the second and third lot and so on. When the quantity of the first, second lot is exhausted.

This method is suitable when prices are falling because material issues will be priced at earlier figures while costs of replacement will be low. On the other hand, when prices are rising then materials will be issued at lower prices and replacement costs will be higher. This method is useful for materials that are subject to obsolescence or deterioration.

- **LAST IN FIRST OUT (LIFO) METHOD:** Under LIFO method, cost is computed on the assumption that good sold or consumed are those that have been received recently. As a consequence of this assumption the stock to be carried forward as the inventory are considered as of they were those earliest acquired or made. The result at the LIFO method is to change current revenues with amounts approximating current replacement costs. Last in fist out method is suitable during rising prices because goods will be issued from the latest received lots at prices which are closely related to current market prices. The current costs will also be

matched with current income. This method shows low profits because of increased charge to production and closing stock figures will also be low as they will be valued at earlier prices. The taxable liability will also be low thus enabling the concern to retain more money in the business.

- **STANDARD PRICE METHOD:** In standard price method price of materials are fixed in advance depending upon market conditions, usages rate, handling facilities, storage facilities etc. price of these materials are considered standard irrespective of its actual price or purchase price. For example materials is fixed at Rs. 6 per unit. Two lots of materials of 12000 units and 15000 units were purchased at Rs. 5.42 and Rs. 6.20 per unit. Every issue of materials will be priced at Rs. Per unit, without taking into consideration the prices at which these were purchased. The cost price of materials and the price charged to production differs from each other. The difference between these two prices will be transferred to "Purchase Price Variance Account". The standard price charged determines the profits or loss incurred from issue of materials.

- **MARKET PRICE METHOD:** In market price method the prices charged to production are determined depending upon the latest market prices. The market prices may either be replacement prices or realizable prices. For the materials kept in stock for use in production, the replacement prices are used while realizable prices are used for the goods kept for resale. Here also the actual purchase price of material differs the price of issued material. Every issue is made at the replacement price of that day. At it reflects the latest price charged to production, it is to check on the efficiency of the purchasing department.

It is not easy to follow market price policy as it becomes difficult to select the market price because; different prices prevail in different markets. There may a chance of selecting the method blazed by human. The charging of more or less prices than the price actually paid will bring in the element of profit or loss that is unnecessary.

13. ANALYSES AND INTERPRETATION OF DATA:

The table no 6.1 shows the numerical data of sales amount, stock, stock turnover ratio, stock turnover ratio index and trend value of GNVFC from the period 1996-'97 to 2004-'05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Stock turnover ratio means, "The ratio of sales amount to stock". It comes out to 6.14 for the base year i.e. 1996-97. Then, it decreases continuously for three years and goes down to 5.09 in the year 1999-00. Then, it starts the increasing trend from the year 2000-01 and reaches to 8.27 in the year 2003-04, which is the highest level during the research period. Then, it decreases in the year 2004-05 and goes down to 6.99. The average stock turnover ratio comes out to 6.17, which is higher than base year ratio. It clears that liquid position of the company is maintained during the study period.

The stock turnover ratio index is assumed 100 for the base year i.e. 1996-'97. The stock turnover ratio index clears the picture about the variation in stock turnover ratio. It decreases constantly for three years and goes down to 82.88 in the year 1999-'00. Then, it increases continuously for four years and reaches to 134.60 in the year 2003-'04. Then, in the last year of the study period, it decreases to 113.80. So, in the end, it indicates the decreasing trend. The stock turnover ratio index comes on an average to 100.38 that is higher than the base year ratio. It points out the positive trend. The trend value of stock turnover ratio shows an overall upward trend.

Here, the calculated value of chi-square comes out to 10.94. On the other hand, the critical value is 7.815. So, the calculated value is higher than the critical value. It means that the null hypothesis is rejected and alternative hypothesis is accepted. It means, "There is a significant difference in the stock turn-over ratio of the company". Here, the standard deviation works out to 14.88 while the co-efficient of variation comes out to 14.82. So, there is no much variation in the productive indices.

Table No. - 6.1   Stock Turn over Ratio of GNVFC (Rs. In Crore)

Year	Sales	Stock	STR	index	T.V.
1996-97	1171.96	190.81	6.14	100.00	85.01
1997-98	1162.01	210.38	5.52	89.93	88.85
1998-99	1099.29	199.16	5.52	89.87	92.69
1999-2000	1153.06	226.51	5.09	82.88	96.54
2000-01	1339.39	243.10	5.51	89.70	100.38
2001-02	1404.79	225.77	6.22	101.31	104.23
2001-03	1377.32	221.25	6.23	101.35	108.07
2003-04	1446.84	175.01	8.27	134.60	111.91
2004-05	1822.62	260.75	6.99	113.80	115.76
total	11977.28	1952.74	55.49	903.44	903.44
average	1330.81	216.97	6.17	100.38	100.38

Chi Square : 10.94

SD : 14.88

CV :14.82

The table no 6.2 provides the statistical data of sales amount, stock, stock turnover ratio, stock turnover ratio index and trend value of GSFC from the period 1996-97 to 2004-05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Stock turnover ratio means, "The ratio of sales amount to stock". It works out to 3.23 for the base year i.e. 1996-97. Then, it increases in the first two initial years and reaches to 4.35 in the year 1998-'99. Then, it decreases to 3.65 in the year 1999-'00. Then again, it increases to 4.16 in the year 2000-'01. Then again it decreases to 4.03. Then it increases constantly for three years and goes up to 6.79 in the year 2004-05. The average stock turnover ratio comes out to 4.48, which is higher than the base year ratio. It shows that the liquid position of the company is maintained during the study period.

Now, the stock turnover ratio index is assumed 100 for the base year i.e. 1996-97. The stock turnover ratio index gives the picture about the variation in stock turnover ratio. It increases in the first two initial years and goes up to 134.55 in the year 1998-99. Then, it decreases for one year and goes down to 112.91 in the year 1999-00. Then, it increases to 128.53 in the year 2000-01. Then again, it decreases to 124.69. Then after it increases constantly for three years and reaches to 209.96 in the year 2004-05 which the highest level during the study period. The stock turnover ratio index comes on an average to 138.48, which is higher than the base year ratio. It indicates the positive trend. The trend value of stock turnover ratio shows an overall upward trend.

Here, the calculated value of chi-square comes out to 19.09 while the critical value comes out to 7.815. So, the calculated value is higher than the critical value. It means that the null hypothesis is rejected and alternative hypothesis is accepted. It means, "There is a significant difference in the stock turn-over ratio of the company". Here, the standard deviation comes out to 31.75 while the co-efficient of variation works out to 22.93. So, there is a variation in the productive indices.

Table No. -   6.2 Stock Turn over Ratio of GSFC (Rs. In Crore)

Year	sales	Stock	STR	index	T.V.
1996-97	1760.10	544.27	3.23	100.00	97.65
1997-98	1879.64	471.86	3.98	123.18	107.86
1998-99	1886.41	433.55	4.35	134.55	118.07
1999-2000	1961.27	537.14	3.65	112.91	128.27
2000-01	2051.00	493.43	4.16	128.53	138.48
2001-02	1954.88	484.81	4.03	124.69	148.68
2001-03	1840.39	412.13	4.47	138.09	158.89
2003-04	2102.49	372.81	5.64	174.39	169.09
2004-05	2604.87	383.64	6.79	209.96	179.30
total	18041.05	4133.64	40.30	1246.30	1246.30
average	2004.56	459.29	4.48	138.48	138.48

Chi squ : 19.09

SD : 31.75

CV : 22.92

The table 6.3 displays the mathematical data of sales amount, stock, stock turnover ratio, stock turnover ratio index and trend value of Liberty Phosphate Ltd. from the period 1996-97 to 2004-05. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

Stock turnover ratio can be defined as "The ratio of sales amount to stock". It comes out to 3.67 for the year 1996-97 i.e. base years. It starts the increasing trend from the initial years. It increases constantly for five years. It increases high from 3.67 in the year 1996-97 to 11.03 in the year 2001-02. Then, it decreases to 5.77 in the year 2002-03. Then again, it increases and goes up to 8.45 in the year 2004-05. The average stock turnover ratio comes out to 6.29, which is higher than the base year ratio. It interprets that the liquid position of the company is maintained during the research period.

Then, stock turnover ratio index is assumed 100 for the base year i.e. 1996-'97. The stock turnover ratio index gives the idea about the variation in stock turnover ratio. It also increases continuously for five years same as stock turnover ratio. It increases high from 100.00 in the year 1996-97 to 300.38 in the year 2001-02. This is the highest level during the study period. Then, it decreases and goes down to 157.17 in the year 2002-03. Then, again it increases and reaches to 230.00 in the year 2004-05. So, it indicates that the company has made essential improvement in the last three years. The stock turnover ratio index comes on an average to 171.23, which is higher than the base year ratio. It points out the positive trend. The trend value also indicates the upward trend.

Here, the calculated value of chi-square comes out to 103.64 while the critical value comes out to 7.815. So, the calculated value is higher than the critical value. It means that the null hypothesis is rejected and alternative hypothesis is accepted. It means, "There is a significant difference in the stock turn-over ratio of the company". Here, the standard deviation comes out to 63.33 while the co-efficient of variation works out to 36.98. So, it indicates that there is much variation in the productive indices.

Table No. -   6.3 Stock Turn over Ratio of Liberty (Rs. In Crore)

Year	Sales	Stock	STR	index	T.V.
1996-97	41.43	11.28	3.67	100.00	104.26
1997-98	47.56	12.38	3.84	104.60	121.00
1998-99	52.22	13.03	4.01	109.12	137.75
1999-2000	67.32	12.57	5.36	145.82	154.49
2000-01	83.56	10.76	7.77	211.44	171.23
2001-02	70.94	6.43	11.03	300.38	187.98
2001-03	66.73	11.56	5.77	157.17	204.72
2003-04	78.87	11.76	6.71	182.60	221.47
2004-05	74.17	8.78	8.45	230.00	238.21
total	582.80	98.55	56.60	1541.11	1541.11
average	64.76	10.95	6.29	171.23	171.23

Chi-Squ : 103.64

SD : 63.33

CV : 36.98

The table no.6.4 gives the numerical data of sales amount, stock, stock turnover ratio, stock turn-over ratio index and trend value in reference to IFFCO from the period 1996-97 to 2004-05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Stock turnover ratio means, "The ratio of sales amount to stock". It comes out to 3.60 for the year 1996-97 i.e. the base year. It increases in the first initial year and reaches to 4.69 in the year 1997-98. Then, it decreases for two years and goes down to 4.32 in the year 1999-00. This is the lowest level during the study period. Then, it increases to 5.64 in the year 2000-01. Then again, it decreases to 4.87 in the year 2001-02. Then it increase constantly for three years and reaches to 7.76 in the year 2004-05. This is the highest level during the study period. So, it can be said that from the year 1996-97 to 2001-02 it moves in a mixed trend but in the last period it moves in a increasing trend. The average stock turnover ratio works out to 5.16, which is higher than the base year ratio. It clears that the liquid position of the company is maintained during the course period.

Now, stock turnover ratio index is assumed 100 for the base year i.e. 1996-97. Stock turnover ratio index clarifies the picture about the variation in stock turnover ratio. It increases in the first initial year and reaches to 130.40. Then, it decreases for two years and goes down to 120.12 in the year 1999-00, which is the lowest level during the study period. Then again, it increases to 156.82 in the year 2000-01. Then, it decreases to 135.26 in the year 2001-02. Then after it increases constantly for three years. It increases from 135.26 in the year 2001-02 to 215.59 in the year 2004-05. It indicates the positive trend during the study period. The trend value also shows the upward trend.

Here, the calculated value of chi-square comes out to 15.24 while the critical value of chi-square works out to 7.815. So, the calculated value is higher than the critical value. It means that the null hypothesis is rejected and alternative hypothesis is accepted. It means. There is a significant difference in the stock turn-over ratio of the company". Moreover, the standard deviation comes out to 31.37 while the co-efficient of variation works out to 21.88. So, it indicates that there is much variation in the productive indices.

Table No. - 6.4   Stock Turn over Ratio of IFFCO (Rs. In Crore)

Year	Amount	Stock	STR	index	T.V.
1996-97	2266.08	629.95	3.60	100.00	101.80
1997-98	3617.83	771.27	4.69	130.40	112.19
1998-99	4047.83	921.84	4.39	122.07	122.59
1999-2000	4806.79	1112.44	4.32	120.12	132.98
2000-01	5426.93	961.99	5.64	156.82	143.37
2001-02	5094.08	1046.92	4.87	135.26	153.77
2001-03	6091.14	1137.53	5.35	148.86	164.16
2003-04	5919.57	1020.56	5.80	161.24	174.55
2004-05	7224.03	931.51	7.76	215.59	184.95
total	44494.28	8534.01	46.42	1290.36	1290.36
average	4943.81	948.22	5.16	143.37	143.37

Chi-Squ : 15.24

SD : 31.37

CV : 21.87

The table no. 6.5 displays the mathematical data of Current Assets, stock (inventory), Inventory to Current Assets ratio, Inventory to Current Assets ratio index and

trend value in reference to GNVFC from the period 1996-'97 to 2004-'05 i.e. nine years. It also computes and shows the chi-square value, standard deviation and co-efficient of variation for the same.

Percentage of Inventory to Current Assets ratio means, "The ratio of stock to Current Assets". It comes out to 33.22 for the year 1996-97 i.e. base year. Then, it decreases in the two initial years and goes down to 27.19 in the year 1998-99. Then, it increases for constant two years but no so significantly and reaches to 28.56 in the year 2000-01. Then again, it decreases and goes down to 18.37 in the year 2003-04, which is the lowest level during the study period. Then after in the year 2004-05, it increases to 22.59. The average Inventory to Current Assets ratio comes out to 26.94, which is lower than the base year ratio. So, the capital is not engaged so much in the inventory in comparison to the total current assets. It clears that the inventory management has improved in the company.

Now, Inventory to Current Assets ratio index is assumed 100 for the base year i.e. 1996-97. So far the analytical point of view is concerned, Inventory to Current Assets ratio index gives an idea about the variation in Inventory to Current Assets ratio. It decreases in the first initial two years and goes down to 81.83 in the year 1998-'99. Then, it increases for two years continuously and goes up to 85.96 in the year 2000-'01. So, it recovers but not so significantly. Then again, it decreases for three years constantly and goes down to 55.29 in the year 2003-04 which is the lowest level during the courts period. Then after in the year 2004-05, it increases to 67.99. So, the company has tried to recover in the last year. Inventory to Current Assets ratio index comes on an average to 81.10 that are lower than the base year ratio. It points out the negative trend during the course period. The trend value also indicates the upward trend.

Here, the calculated value of chi-square works out to 5.05. On the other hand, the critical value of chi-square is 7.815. So, the calculated value of chi-square is lower than the critical value. It interprets that the null hypothesis is accepted. It means, "There is no significant difference in the Inventory to Current Assets ratio of the company".

Moreover, the standard deviation comes out to 12.49 while the co-efficient of variation works out to 15.40. So, there is much variation in the productive indices.

Table No. - 6.5

Inventory as percentage of Current Assets at GNVFC (Rs. in Crore)

Year	CA	Stock	RATIO	index	T.V.
1996-97	574.32	190.81	33.22	100.00	97.66
1997-98	673.56	210.38	31.23	94.01	93.52
1998-99	732.53	199.16	27.19	81.83	89.38
1999-2000	831.74	226.51	27.23	81.97	85.24
2000-01	851.18	243.10	28.56	85.96	81.10
2001-02	806.73	225.77	27.99	84.23	76.96
2001-03	847.41	221.25	26.11	78.59	72.82
2003-04	952.79	175.01	18.37	55.29	68.68
2004-05	1154.28	260.75	22.59	67.99	64.54
total	7424.54	1952.74	242.49	729.88	729.88
average	824.95	216.97	26.94	81.10	81.10

Chi Squ : 5.05

SD : 12.49

CV : 15.39

The table no. 6.6 indicates the statistical data in reference to Current Assets, Stock (inventory), inventory to current assets ratio, inventory to current assets ratio index and trend value of GSFC from the period 1996-'97 to 2004-'05 i.e. nine years. It also calculates and displays the chi-square value, co-efficient of variation and standard deviation for the same.

Percentage of Inventory to Current Assets ratio can be defined in such manner, "The ratio of stock to Current Assets". It comes out to 46.09 for the year 1996-97 i.e. base year. Then, it decreases in the first initial two years and goes down to 33.82 in the year 1998-99. Then, it increases and goes up to 36.56 in the year 2000-01 which is the highest level during the research period. Then again, it decreases to 31.11 in the year 2001-02. Then after it increases to 34.37 in the year 2002-03. Then again, it increases to 25.32 in the last year. So, it can be said that the company has tried to recover in the last year but can't do it significantly. Moreover, it can be also said that that inventory to

current assets ratio moves in a mixed trend during the study period. The average inventory to current assets ratio comes out to 34.45 that are lower than the base year ratio. So, it can be said that the capital is not engaged so much in the inventory in comparison to total current assets. It interprets that the inventory management has improved in the company.

Then, inventory to current assets ratio index is assumed 100 for the base year i.e. 1996-97. It decreases for first initial two years and goes down to 73.39 in the year 1998-99. Then, it increases for two years constantly and reaches to 79.32 in the year 2000-01. Then again, it decreases to 67.51 in the year 2001-02. Then after it increases to 74.58 in the year 2002-03. Then, it decreases high and goes down to 53.48 in the year 2003-04. Then, in the year 2004-05, it increases to 54.94. So, it can be said that the company has recovered in the last year but not so significantly. The inventory to current assets ratio index gives an idea about the variation in inventory to current assets ratio. It comes on average to 74.75, which is lower than the base year ratio. It indicates the positive trend. The trend value also indicates the upward trend.

Here, the calculated value of chi-square comes out to 4.40. On the other hand, the critical value of chi-square is 7.815. So, the calculated value of chi-square is lower than the critical value. It interprets that the null hypothesis is accepted. It means, "There is no significant difference in the Inventory to Current Assets ratio of the company". Moreover, the standard deviation works out to 14.35 while the co-efficient of variation comes out to 19.20. So, it is noted that there is much variation in the productive indices.

Table No. - 6.6

Inventory as percentage of Current Assets at GSFC (Rs. in Crore)

Year	CA	Stock	Ratio	index	T.V.
1996-97	1180.84	544.27	46.09	100.00	94.93
1997-98	1116.63	471.86	42.26	91.68	89.89
1998-99	1281.75	433.55	33.82	73.39	84.84
1999-2000	1497.17	537.14	35.88	77.84	79.79
2000-01	1349.63	493.43	36.56	79.32	74.75
2001-02	1558.13	484.81	31.11	67.51	69.70

2001-03	1198.94	412.13	34.37	74.58	64.66
2003-04	1512.33	372.81	24.65	53.48	59.61
2004-05	1515.06	383.64	25.32	54.94	54.56
total	12210.48	4133.64	310.07	672.73	672.73
average	1356.72	459.29	34.45	74.75	74.75

Chi Squ : 4.40

SD : 14.35

CV: 19.20

The table no. 6.7 displays the mathematical data in reference to Current Assets, Stock (inventory), inventory to Current Assets ratio, inventory to current assets ratio index and trend value in reference to Liberty Phosphate Ltd. from the period 1996-'97 to 2004-'05 i.e. research period. It also computes the chi-square value, co-efficient of variation and standard deviation for the same.

Percentage of Inventory (stock) to Current Assets ratio can be described in such fashion, "The ratio of stock (inventory) to Current Assets". It works out to 44.74 for the year 1996-97 i.e. base year. Then, it decreases in very next year and goes down to 39.73 in the year 1997-98. Then, it increases to 50.15 in very next year i.e. 1998-'99, which is the highest level during the study period. Then, it suddenly decreases for constant three years and goes down to 22.11 in the year 2001-'02. Then it increases in the year 2002-'03 and goes up to 38.27. Then again, it decreases in the last years and goes down to 24.61 in the year 2004-05 which is the lowest level during the course period. So, after seeing the above figures, it can be analyzed that the ratio moves in a mixed trend during the study period but it stays down in the last period. The average inventory to current assets ratio comes out to 37.25 that are lower than the base year ratio. So, it can be said that the capital is not engaged so much in the inventory in comparison to total current assets. It indicates that the inventory management has improved in the company.

Now, inventory to current assets ratio index is assumed 100 for the base year i.e. 1996-97. Then, it decreases to 88.79 in the very next year. Then, it increases to 112.09 in the next year i.e. 1998-99, which is the highest level during the research period. Then

after it starts the decreasing trend and goes down to 49.42 in the year 2001-02, which is the lowest level during the study period. Then it increases and reaches to 85.52 in the year 2002-03. Then again, it decreases in the last two years and goes down to 55.01 in the year 2004-05. The inventory to current assets ratio index draws the numerical picture about the variation in inventory to current assets ratio. It works on an average to 83.25, which is lower than the base year ratio. It interprets the positive effect. The trend value also indicates the positive trend.

Here, the calculated value of chi-square comes out to 21.24. On the other hand, the critical value of chi-square is 7.815. So, the calculated value of chi-square is higher than the critical value. It means that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, "There is a significant difference in the stock to current assets ratio of the company". Moreover, the standard deviation comes out to 19.14 while the co-efficient of variation works out to 22.99. So, it can be said that there is much variation in the productive indices.

Table No. – 6.7

Inventory as percentage of Current Assets at Liberty (Rs. in Crore)

Year	CA	Stock	Ratio	index	T.V.
1996-97	25.21	11.28	44.74	100.00	103.85
1997-98	31.16	12.38	39.73	88.79	98.70
1998-99	25.98	13.03	50.15	112.09	93.55
1999-2000	28.97	12.57	43.39	96.97	88.40
2000-01	29.29	10.76	36.74	82.10	83.25
2001-02	29.08	6.43	22.11	49.42	78.09
2001-03	30.21	11.56	38.27	85.52	72.94
2003-04	33.14	11.76	35.49	79.31	67.79
2004-05	35.67	8.78	24.61	55.01	62.64
total	268.71	98.55	335.23	749.22	749.22
average	29.86	10.95	37.25	83.25	83.25

Chi Squ : 21.24
SD : 19.14
CV : 22.98

The table no.6.8 shows the numerical data in reference to stock (inventory), current assets, inventory to current assets ratio, inventory to current assets ratio index and trend value of IFFCO from the period 1996-'97 to 2004-'05 i.e. study period. It also calculates and gives the chi-square value, standard deviation and co-efficient variation for the same.

Percentage of Inventory to current assets ratio means, "The ratio of stock (inventory) to Current Assets". It comes out to 53.80 for the year 1996-97 i.e. base year. Then, it decreases to 40.51 in the very next year. Then, it increases and reaches to 49.88 in the year 1999-00 which is the highest level during the study period. Then, it decreases again and goes down to 43.37 in the year 2000-01. Then again, it increases to 48.83 in the year 2001-02. Then again, it decreases constantly in the last three years and goes down to 35.77 in the year 2004-05, which is the lowest level during the study period. So, it can be said that the ratio moves in a mixed trend during the study period but in the last years it stays in a decreasing trend. The average of stock (inventory) to current assets ratio comes out to 44.28, which is lower than the base year ratio. So, it can be interpreted that the capital is not engaged so much in the inventory in comparison to total current assets. It shows that the inventory management has improved in the company.

Then, inventory to current assets ratio index is assumed 100 for the base year i.e. 1996-97. Then, it decreases in the very next year and goes down to 75.29. Then, it increases for two years continuously and goes up to 92.71 in the year 1999-00. Then, it decreases to 80.62 in the year 2000-01. Then again, it increases to 90.76 in the year 2001-02. Then after it decreases for three years and goes down to 66.49 in the year 2004-05 which is the lowest level during the study period. As the analytical point of view, inventory to current assets ratio index clarifies the picture about the variation in inventory to current assets ratio. The inventory to current assets ratio index comes on an average to 82.31, which is lower than the base year ratio. It indicates the positive trend. The trend value also shows the positive trend.

Here, the calculated value of chi-square comes out to 6.12. On the other hand, the critical value of chi-square is 7.815. So, the calculated value of chi-square is lower than the critical value. It means that the null hypothesis is accepted. It means, "There is no significant difference in the stock to current assets ratio of the company". Moreover, the standard deviation comes out to 9.86 while the co-efficient of variation works out to 11.98. So, it can be analyzed that there is some degree of variation in the productive indices.

Table No. - 6.8

Inventory as percentage of Current Assets at IFFCO (Rs. in Crore)

Year	CA	Stock	Ratio	index	T.V.
1996-97	1170.90	629.95	53.80	100.00	92.01
1997-98	1904.12	771.27	40.51	75.29	89.59
1998-99	2092.67	921.84	44.05	81.88	87.16
1999-2000	2230.27	1112.44	49.88	92.71	84.74
2000-01	2217.95	961.99	43.37	80.62	82.31
2001-02	2144.07	1046.92	48.83	90.76	79.88
2001-03	2674.42	1137.53	42.53	79.06	77.46
2003-04	2564.02	1020.56	39.80	73.98	75.03
2004-05	2603.99	931.51	35.77	66.49	72.61
total	19602.41	8534.01	398.55	740.79	740.79
average	2178.05	948.22	44.28	82.31	82.31

Chi Squ : 6.12

SD : 9.86

CV : 11.97

Stock Turn over Ratios of the fertilizer companies and Kruskal Wallis' one way analysis of variance test:

The comparative position of stock turn over ratios of fertilizer companies have been given in table no.6.9 along with the application of Kruskal Wallis' one way analysis of variance test on this ratio for the study period i.e., 1996-'97 to 2004-'05.

Year	GNVFC	R1	GSFC	R2	Liberty.	R3	IFFCO	R4
Comparative Stock Turn over Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test								
1996-'97	6.14	26	3.23	1	3.67	4	3.60	2
1997-'98	5.52	20.5	3.98	6	3.84	5	4.69	14
1998-'99	5.52	20.5	4.35	11	4.01	7	4.39	12
1999-'00	5.09	16	3.65	3	5.36	18	4.32	10
2000-'01	5.51	19	4.16	9	7.77	33	5.64	22.5
2001-'02	6.22	27	4.03	8	11.03	36	4.87	15
2002-'03	6.23	28	4.47	13	5.77	24	5.35	17
2003-'04	8.27	34	5.64	22.5	6.71	29	5.80	25
2004-'05	6.99	31	6.79	30	8.45	35	7.76	32
Total		222		103.5		191		149.5

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)}{n_j} - 3(N+1) \right]$$

$$= \frac{12}{(36+1)} \left[\frac{(222)}{9} + \frac{(103.5)}{9} + \frac{(191)}{9} + \frac{(149.5)}{9} \right] - 3(36+1) = \frac{---}{36}$$

$$= \frac{12}{1332} (5476 + 1190.25 + 4053.44 + 2483.36) - 111$$

=   118.95 - 111

=   7.95

The above table no.6.9 displays the calculated value of H is 7.95 which is higher marginally than the critical value i.e., 7.851. So here the null hypothesis based on Kruskal Wallis' one way analysis of variance test, at 5% level of significance is rejected and the alternative hypothesis is accepted. It means, "There is significant difference between the stock turn over ratios of fertilizer companies".

References:

(1) B. B. Howard and M. Upton : Introduction to Business Finance, Mc.—Graw Hill Book Company, Inc, New York, 1953, p. 188.

(2) Hunt, Pearson : William, Charles M, and Donaldson, Gordon : Basic Business Finance – Text and Cases, Richard D. Irwin, Illinois, III ed., 1966, p. 95.

(3) Surendra S. Singhvi and John A. Kaupisch : "Review of Management, Economic and Political Weekly, Vol. V, No. 35, (August 29, 1970), p. M—95.

(4) E. Leone : "Techniques for Improving Cash Turnover", Financial Executive Vol. 32, No. 1, (January 1966) p. 42.

(5) E. J. Mock and D. H. Shukett : "Increasing the Velocity of Corporate Funds", Management Science, Vol. 3, No. 4, (July—August, 1966), pp. 40—42.

(6) W. E. Metchell : Cash Forecasting, International Text Book, Pennysylvania, 1967, pp. 233—243.

(7) Gupta R. L. : Advanced Accountancy, Theory, Method and Application, Sultan Chand and Sons, New Delhi, ed. III., 1976, p. FSA 140.

(8) Hartley W. C. F. : Cash Forecasting and Controlling, London, 1976, p. 85.

(9) Sagan John : "Towards a Theory of Working Capital Management", The Journal of Finance, New York, Vol. X, May 1955, p. 124.

(10) Brigham, Eugena F., and Risks R. Bruce (ed.), Readings in Essentials of Managerial Finance, Holt, Rinehart and Wiston, U.S.A., 1968 Ed., pp. 32-33.

(11) James E. Walter "Determination of Technical Solvency", Journal of Business, Vol. 30(January, 1957) pp. 30—43.

(12) Mishra R. K. op. cit., p. 134.

(13) Guthamann, Harry, G., and Dougall, Herbert E.: Corporate Financial Policy, Prentice – Hall, New York, Ed. III, 1955, p. 395.

(14) Monga J. R. : Topics in Financial Accounting, National Publishing House, New Delhi, 1980, p. 136.

Chapter 7

Cash Management

Contents

1. Meaning and Introduction:

Cash occupies an important position in the current assets of a business. It provides liquidity for a business and keeps the business going. Sufficient cash is always required for meeting business obligations. Any shortage of cash will hamper the transactions of a concern any excess of it will be unproductive. The most unproductive of all the assets is cash. Cash in hand will not add anything to the business while fixed assets the machinery, plant etc and current assets like inventory will help the business in increasing its earning capacity. It should not be forgotten that the most unproductive assets is the only true liquid asset of a business. Together with cash marketable securities also provides liquidity to a business. Marketable securities are investments that can be converted into a predetermined amount of cash, on very short notice and at a little expense. Cash and marketable securities can be differentiated on the bases of income i.e. marketable securities generate income. Since these two assets are very close substitutes for one another they are often referred to in the same vein.

Cash can be said the lifeblood of a business firm, it is needed to acquire supplies, resources, equipment and other assets used in generating the products and services provided by the firm. It is also needed for the payments to workers and managers, faxes to governments, interest and principal to creditors and dividends to shareholders. In short we can say that cash is the only vehicle by which a business can complete its journey.

2. Significance of Cash Management:

As blood is irresistible for a living being, exactly cash is irresistible for a business. A concern following a total capitalized policy also can not work smoothly without cash. Today the concept of cash has been changed it doesn't mean only money in the form of currency i.e. cash in hand and bank, but it includes marketable securities. These are the securities which can easily be converted into cash. With the broad concept cash increased its importance. Necessity of cash can not be ignored at any level starting with top to

bottom. Cash is important as it is the medium, producer and available or rather say accepted in different forms. Let's discuss the same in detail.

- **Medium**

Cash is the medium of exchange which allows management to carry on the various activities of the business firm from day to day. Financial failure is improbable as long as the firm has the cash to meet its obligations. Without cash or at least accept to it, bankruptcy becomes a grim possibility. Cash is required to pay wages and salaries, taxes interest, dividend etc. it is also needed to acquire fixed assets like land-building, plant-machinery, equipments etc. Current assets like stock of raw materials, other spare-parts required etc and to receive some services too.

- **Producer**

Cash itself does not produce goods or services. But it is used as a medium to acquire other assets. It is the other assets which are used in manufacturing goods or providing services. The idle cash can be deposited in bank to earn interest. A business requires cash to acquire assets. The assets acquired by cash again help the business in producing cash. The goods manufactured or services produced are sold to acquire cash. A critical level of cash has to be maintained by a firm. It at a time it does not have sufficient cash with it, it will have to borrow from the market for reaching the required level. Thus, only unproductive asset makes other assets to produce and rightly called producer.

- **Different Forms**

The importance of cash has been increased after it is accepted in different forms. Assets easily convertible into a predetermined amount of cash are also considered as cash i.e. marketable securities. They are available in many forms and its main characteristic is that they represent "near cash" in that they may be readily sold. They serve as a back up pool of liquidity that provides cash quickly when needed. They also provide a short-term investment outlet for excess cash and are also useful for meeting planned outflows of funds.

3. Motivation for Holding Cash:

Cash and marketable securities are the firm's least productive assets. Unlike the firm's other assets, they are not required in producing goods or services. They are not part of the process of selling as are inventory and accounts receivable. When firms hold cash in currency or in form of marketable securities, they obtain no direct return on their investment. Marketable securities can generate income but its return income is much less than the return on other assets held by the firm. So why hold cash or marketable securities at all? Couldn't the firms' resources be better deployed elsewhere?

Despite the seemingly low returns, there are several good reasons why firms hold cash and marketable securities. The firms needs for cash may be attributed to the following needs : Cash for transactions, Cash and near, Cash assets as hedges and temporary investments. Motives for holding cash is discussed below under the headings Transaction Motive, Precautionary Motive and Speculative Motive.

Transaction Motive

One very important reason for holding cash in the form of non-interest bearing currency and deposits is transaction demand. A firm needs cash for making transactions in the day to day operations. Since debts are settled via the exchange of cash . the firm must hold some cash in the bank to pay suppliers and some currency sales for cash. The cash requirement arise due to the fact that there is no complete synchronization between cash receipts and payments. Sometimes cash payments exceed cash receipts or vice-versa. The expected payments in near future can be estimated so the transaction needs of cash can be anticipated. The receipts in futures may also be anticipated but the things do not happen as desired. If payment transactions are greater in amount than receipt transaction, cash may be raised through bank overdraft. On the other hand if receipt transactions are greater in amount than payment transactions, it may be spent on marketable securities. The maturity of security may be adjusted to the payments in future such as interest payment, dividend payment etc.

Precautionary Motive

The firms future cash needs for transactions purposes are often quite uncertain; emergencies may arise for which the firm needs immediate cash. A firm, therefore, is required to keep cash for meeting various contingencies. The firm must hedge against the possibility of these unexpected needs. Though cash inflows and cash outflows are anticipated but there may be variations in these estimates. For example, a debtor, who was to pay after 7 days may informs of his inability to pay; on the other hand a supplier who used to give credit for 15 days may not have the stock to supply or he may not be in a position to facilitate credit at present. In cash circumstances cash receipts will be less then expected and cash payments will be more as purchases may have to be made for cash instead of credit. Such contingencies are usual in a business. Cash should be kept for such contingencies or a firm should be in a position to raise finances at a short period. The cash maintained for precautionary motive is not productive or it remains idle. However, such cash may be invested in short period or low risk marketable securities which may provide cash as and when necessary.

Speculative Motive

The speculative motive relates to holding of cash for investing in profitable opportunities as and when they arise. Such opportunities do not come regularly. These opportunities cannot be scientifically predicted but only conjectures can be made about their, occurrence. For example the prices of shares and securities may be low at a time with an expectations that these will rise shortly. The prices of raw materials may fall temporarily and firm may like to buy at these prices. Such opportunities can be captured only if a firm has cash balance with it. These transactions are speculative because prices may not move in a direction in which we suppose them to move. The primary motive of a firm is no to gratify in speculative transactions but such investments may be made at times.

4. Factors Determining the Cash Balance:

Specific factors must be considered to determine the firms required cash balance. How much attention should a firm pay in making its cash operations more efficient ? This question can be solved only after recognizing the factors which affect the cash balance.

As a general rule, the firm should incur these expenses so long as their marginal returns exceed their marginal expenses. The factors that determine the costs and benefits holding liquid assets are listed below :

- **Synchronization of The Cash flows:**

Synchronization of the cash flows is possible when the financial manager selects a planning horizon over which to estimate the cash inflows and the cash outflows as they are expected to occur in each of the sub periods within the horizon. Planning horizon generally for the cash management is one year, with each of the twelve months being the sub period. Thus the financial manager forecasts the firms cash inflows and outflows for each month within the coming year.

The forecasting of the cash inflows centers on forecasts for the collections of accounts receivable. Account collection period is more important than the time of sale. Cyclical and seasonal payments patterns as well as to delays, defaults, returns and discounts in the collections must be considered. Other transactions like cash sales. Interest and dividend income, borrowing proceeds and the sale of the firms' securities of fixed assets are to be estimated.

For casting the cash outflows as they are expected to be incurred in each month of the planning horizon requires the financial manager to consider all accounts payable on the payments schedule. Generally, payable accounts are those for the purchase of raw materials, pay roll, selling and general administrative expenses etc. at the same time the financial manager must also estimate such financial cash outflows as the repayments of the loans, the purchase of fixed assets. Such as plant and machinery, equipments, interests, dividend payable and taxes. An adequate forecast by the financial manager will decrease the uncertainty element and the firm will have to maintain minimum precautionary balances.

- **Short Costs:**

A carefully constructed cash budget helps the firm to have a shortfall in its cash needs. Actual aim of the cash budget is to pinpoint those times when shortfall can be expected. It also can be unexpected. Shortfall, whether expected or unexpected will incur certain cost, depending upon the duration, severity and frequency of the shortfall. Expenses incurred as a result of a shortfall are called short costs.

Transactions costs associated with raising cash is one of the most common short costs. Liquid assets like marketable securities when converted, some transactions costs, e.g. commission to the broker, may have to be incurred. If shortage is covered by borrowings, costs include interest on loan, placement fees and other costs associated with arranging the loan. A deterioration of the firms credit rating results in shortfalls which increase in severity frequency, banks will start charging more for borrowings and the cost of capital will rise. And there are less quantifiable aspects of a deteriorated credit standing.

- **Excess Cash Balance Costs:**

The opportunity cost of holding the cash which may be represented by the companies required rate of return is the most significant cost associated with maintaining a of cash balance. It is not often necessary for a firm to maintain its liquid assets holdings in their most liquid form i.e. cash, as they may not be required to meet financial commitments for several weeks. In such a situation, the firm can reduce cash currying cots by investing the amount which is not required immediately in short term securities.

- **Procurement and Management Costs:**

The shortfall and the excess balance costs are the costs associated with establishing and operating a cash management staff and activities. These costs are generally fixed and include salaries, book keeping expenses and the shortage and handling of the securities. Expenses of the supervising the operations have to be paid to make the appropriate decisions such as the amount and type of marketable securities to purchase. This in turn requires book-keeping to keep track of the transactions and shortage facilities such as safe deposit boxes.

- **Compensating Balances:**

Modern business can't be imagine without banks. Commercial banks, for many services, are paid for by direct fees or indirectly by the firm keeping compensating balances at the bank. Compensating balances area minimum checking account levels that the firm agrees to maintain at the bank. Compensating balances are also maintained by the firm in conjunction with bank loans. Bank uses the compensating balances to loan the other customers and earn a rate of return on the balance, this would be indirect fee by the firm. The service motive seems to be the dominant reason today that firms keep large levels of cash.

- **Uncertainty:**

Exact synchronization of cash inflows and cash outflows can never be predicated with complete accuracy. The financial manager has to recognize the impact of uncertainty on cash management strategy. To overcome uncertainty first, a precautionary caution against shortfalls is needed which may be caused by irregularities in cash flows, unexpected delays in collection and disbursements, defaults and unanticipated cash needs. The uncertainty can be reduced to some level through improved forecasting, use of cash flows over which the financial manager has control and n increased ability to borrow. Certain cash flows are fixed and final which can be anticipated and the risk of uncertainty can be reduced.

5. Cash management:

The significance of cash is all ready discussed and cash being the most important of all the current assets, cash management has great importance. Cash is required to meet business obligations and it is unproductive when not used. Considering these two end points management has to work constantly for the best workouts.

Cash management mainly deals with

- Cash flows (in and out)
- Internal cash flows and
- Cash balances held by the firm at a point of time.

The cash management has to go work with cash planning and cash forecasts and budgeting to tune the above three things. Let's see the cash planning and cash for casts and budgeting in detail.

- **Cash Planning:**

Cash planning deals with the receipts and payments of cash. It is a technique to plan and control the use of cash. On the base of present business operations future cash flows can be projected. Anticipated future conditions can help in preparing a realistic projected cash flow statement. The cash inflows from various sources may be anticipated and cash out flows will determine the possible uses of cash.

- **Cash Forecasts and Budgeting:**

Cash planning is a technique to plan and control the use of cash while a cash budget is a device for the control of receipts and payments of cash. A cash budget is an estimate of cash receipts and payments during a future period of time. It is an analysis of cash flow in a business over a future for short or long time period. The short term and long term forecasts have their own importance.

Cash flow projection helps to make short term forecasts. Estimates are made for likely receipts in the near future and the expected disbursements in that period. Always there remains possibility that the forecasts will not be exact but then also the estimates of cash flows enable the planners to make arrangement for cash requirements. There remains chances that expected cash receipts may fall short or payments may exceed estimates. Sources of short term needs must be in planner's mind. Plans can be planned for the use of surplus for short period.

In normal situation a business is assumed to last for so many years. In long-term cash forecasts also become essential for proper cash planning. Long-term can be a period of three, four, five or more years. Long-term forecasts indicate company's future financial needs for working capital, capital projects etc.

We can have the same methods for both short-term and long-term forecasts.

- Receipts and Disbursements Methods and
- Adjusted net income method

▪ **Receipts and Disbursements Method:**

As the name of method shows the receipts and payments of cash are estimated. The sources of cash receipts are cash sales, collections from debtors, sale of fixed assets, and receipt of dividend or their incomes of all the items. The sales forecast is difficult one as the sales may be on cash as well as credit basis. Cash sales bring receipts at the time of sale while credit sales bring cash later on. The collection from debtors depends upon the credit policy followed by the firm. Cash receipts are disturbed if any fluctuation in sales takes place. Disbursements of cash may be made for cash purchases, to creditors for goods, purchase of fixed assets for meeting operating expenses such as wage bill, rent, taxes or other usual expenses, dividend to shareholders etc.

The equalization of receipts and disbursements are necessary over short as well as long periods. Surplus cash is to be invested in risk free marketable securities while any short fall in receipts will have to be met from banks or other sources. Payments estimates are easy to make while it is little beat difficult to estimate cash receipts accurately. The payments are to be made by outsiders, so there may be some problem in finding out the exact receipts at a particular period. Uncertainty reduced the reliability of this method.

▪ **Adjusted Net Income Method:**

Sources and uses approach is another name of this method. Generally it has three sections: sources of cash, uses of cash and adjusted cash balance. The projection of the need for cash at some future date and to see whether the company will be able to generate sufficient cash to possible and easy by the adjusted net income method. If not, then it will have to decide about other sources with borrowing or issuing shares etc. Amount of not income, determined from company's annual operating budget for the preparation of statement. But the estimation of working capital movement becomes difficult because items like receivables and inventories are influenced by factors such as fluctuations in

raw material costs, changing demand for companies products and likely delays in collections. Control of working capital and anticipation of financial requirement becomes easy by this method.

6. Managing Cash Flows:

It is financial mangers duty to see that invested cash is used efficiently. Some sort of control system over incoming cash should be established to minimize cash leaks. Patty cash funds should be under a tight control system & cheques made in payment for bills should be strictly controlled to assure that the materials were actually ordered and received. Cash management will be successful only of cash collection are accelerated and cash disbursements, as for as possible, are delayed. Before discussing the methods of accelerating cash, inflows and slowing cash out flows. Let's understand its objectives.

- **Objective of Accelerating Cash Inflows:**

There incurs an opportunity cost if value is not promptly received in return when a selling firm transfers value to a buyer through the provision of goods or services. The main objective of a collection system is to receive value from the buyer as quickly as possible. And subsidiary objective is to receive and process information associated with the payment. Another related factor to consider in designing a collection system is the relationship the firm has with those making payments. Collection procedures have the potential to harm payer payee relationships. The cost associated with receiving payments and the accompanying information are also included in collection system design. Along with these costs an addition cost like the predominant payment vehicle. Costs of tosses from theft or fraud also should be considered. With these factors in mind, the objective function may be stated in more formal terms as follow:

(1)   Minimize Cost of collection float

-        value of payment information

-        Value of relationship with payers

+   Collection system costs

+   Cost of losses through theft fraud.

- **Cost of Collection Float:**

The value of collection float is one of the most important factors in the objective function. For e.g. assume a company is losing approximately 6 calendar days of interest on Rs. 10,00,000 each week. The annual cost of this float at 12% opportunity cost is:

$$Rs. \ 10,00,000 \ X \ 6 \ days \ X \ 0.12 \ / 365 \ X \ 52$$
$$= Rs. \ 1,02,075 \ per \ year.$$

- **Value of Payment Information:**

The payment information is vital to the firms' accounts receivable function. Accounts receivable may not be able to post payments to accounts in a timely or accurate manner if payment is received quickly but remittance information is delayed, missing or garbled. It is important for the company to know which customers costs are being covered by the weekly payment so that belling accuracy can be maintained.

- **Value of Relationship with payers:**

Problem in position payment information to a customers account may harm the relationship between the firm and customer. For e.g. Suppose the collection system receives a customers payment very quickly but the failure of crediting the customers account for several days and suppose that an order is held until notice is received from accounts receivable that last months payments has been made. Such delays in posting could cause delay in release of goods and may irreparably harm relations with the customer.

- **Collection System Costs:**

A collection system adds costs in processing payments. Such costs are direct and indirect. Direct costs include bank charges for cheque processing or wire transfers while indirect costs include administrative effort in managing the collection system. Collection system cost most be traded off with other factors in the objective function. The cost differential must be traded off with the collection float difference.

- **Costs of losses through theft / fraud:**

There is a potential for loss due to theft and fraud where the payments are made through cash. It takes only a small number of losses through theft or fraud to counteract and otherwise very efficiently designed collection system the minimizes collection float but that fails to del with security problems.

- **Objective of Slowing Cash Out flows:**

Disbursement systems include the banks and the delivery mechanisms and procedures firms use to facilitate the movement of cash from the firms centralized cash pool to disbursement banks and then on to suppliers and other payers. Disbursement of cash is compulsory for the unit, but the systems manage the payments after particular time duration. Thus the function of a disbursement system is to process the payment obligation to vendors, employees and creditors. It is beneficial to delay the time at which value is transferred from the firm in a disbursement system value of the firm. However, any potential gain in value must be balanced against the costs of delay. The objective function may be stated as follows.

(2) Maximize

+ Value of disbursement float

- Loss of discounts for early payment

- Cost of excess balances in disbursement accounts

- transactions costs

+ Value of payee relations

+ The value from any dual balances

- Administrative, information and control costs.

- **Value of disbursement float:**

Payments are compulsory for a unit rather at a time or after some period of time. So all other things equal, a firm would rather pay later than sooner. There is value in delayed payments because a firm can use that payable cash for more time without any cost and if a firm obtains such payable cash from lenders or investors, interest of delayed period is

decrease in costs. It means that the cash out flow timeline plays an important role. Payment float is the entire out flow timeline, while disbursement float is measured from the time the payer mails the cheque to the time of presentment at the payer's bank. Disbursement float includes.

- (i) Mail float, it is the time between the payers mailing of the cheuqe and the payees receipt of it.
- (ii) Processing float, it is the time required by the payee to deposit the cheques after it has been received.
- (iii) Clearing float it is the time required by the banking system to return the cheque and present it against the payers disbursement account.

Thus, lengthening the payment time will increase the time value benefit to the firm.

- **Loss of discounts for early payment:**

Many credit terms permit discounts to be taken if payment is made before a given time period. Disbursement systems must consider the possible costs of missing discounts if payment cannot be made in time.

- **Cost of excess balances in disbursement accounts:**

Excess balances are defined as available balances above the level necessary to compensate the disbursement bank for its services. Excess balances arise in disbursement banks primarily because transfers of available funds into the disbursement account may not by synchronized with amounts presented against the account. A timing problem causes the excess balances. Banks usually post cheques to accounts late in the day, usually after the cutoff time for accepting transactions for the day. The problem can be solved

By sorting out cheques drawn on the firms account and reporting the totals to the firm in advance of posting. By transferring cash into the account from another account at the

same bank. By the arrangement to sweep any balances left at the end of the day automatically into an interest bearing account by the bank.

- **Transaction Costs:**

Transaction costs are the costs of transferring value from the concentration account to the costs of transferring value to payees. It includes bank charges, third party vendor information charges, in house expenses associated with payment, the costs of over drafting the disbursement account and any borrowing costs incurred as a result of the overdraft.

- **Value of payee relations:**

Although they are less important in collection and concentration systems, relationship with other parties are a primary concern in managing a disbursement system. When goods or service has already been provided and payment is due, efforts by the buyer to delay payment may be considered unfavorable by the seller. The payor benefits at the expense of the payee. The payor may find further business dealings with the payee strained or even more expensive as the payee tries to recover some of its costs caused by delayed payments.

It is very difficult to measure the costs of good supplier relationships. Sometimes delayed payments are costless, but sometimes such delays may even bring legal action and harmed credit ratings.

- **The value from dual balances:**

Dual balances are possible in disbursement systems. They arise when the payment is done by a cheque that shows decrease in cash but does not clear the concentration account until a later time. Available balances exist in both banks at the same time for the time of overlap. However, dual balances have been diminishing over time. Therefore most firms do not take them into account when designing disbursement systems.

- **Administrative information and control cost:**

Administrative costs refer to the management of the disbursement information system and the provision of information support for funding decisions. Timely information regarding disbursement amounts makes management sharp so that disbursement can be covered. Another administrative cost relates to reconciliation.

On other hand control costs relate to the problem of unauthorized disbursements. Most firms have careful control to minimize this likelihood. Limiting signature authorization is one of the best tools of control in which only two or three individuals at one site, requiring two signatures per cheque, performing frequent audits and even removing disbursement control from field personal etc are used.

- **Methods of collection system:**

Over – the – counter collections:

Over – the – counter collection system is very common method of collection in day to day market. In which the payment is received in a face to face meeting with the customer. Most retails or consumer businesses receive ate least some of their payments on over – the – counter basis. The basic components of an over – the – counter collection system include the field unit at which the payment is received a local deposit bank that serves as the entry point for the firms banking system and an input into the firms central information system.

The system design of an over – the – counter collection system includes field office location, type of payment accepted, selection of deposit banks, bank compensation and information gathering. In a more sophisticated reporting system, the field manager enters the amount of the deposit into a point – of – sale computer that records sales, inventory and other information. Periodically these data are transmitted directly to the information system at headquarters or to a service bureau for further processing.

The nature of the payments virtually requires that the firm does its own processing of payments for deposit. Efficient company procedures are important, with deposits made as

soon as possible after receipt of payment and with careful consideration of availability cutoff times.

Mailed Payments Collection System

For payments, in many companies, almost always cheques are mailed by the customer in response to an invoice. A mailed payments system contains all three components of collection float : mail float, processing float and availability float. The mailed payments collection system consists of collection centers, deposit banks and an information system. A designated collection center operated either by the company or by an outside agent receives mailed payments by customers. Payments are processed at the collection center, cheques are encoded, the deposit is prepared and made and data are transmitted to the companies information system.

The system design of a mailed payments collection system includes number of collection points, collection point location in house versus external operation, payer assignment, type of payer.

Other Collection Systems

Beyond the above methods other collection systems are also used in the market. Electronics and advanced communication systems are added in the same. These systems are still in its childhood, but they are growing in importance as electronic communications gain greater acceptance. It is seen that although the goal of any collection system is to speed inflow, the type of collection system that a firm uses is a function of the characteristics of the customer base and the method of the delivery of the product or service. Such other collection systems are preauthorized payments and lockbox systems.

Preauthorized Payments

When the payment amount and the payment date can be specified in advance, preauthorized cheques (PACS), preauthorized drafts (PADS) etc are used. On the agreed date, the pay initiates the value transfer from the payer through the banking

system, with no need for further action on the part of the payor. Preauthorized payments reduce mail float, processing and availability float and improve both parties forecasting ability.

Besides this on alternative of cheque clearance process is to substitute an electronic message of payment for the cheque. This eliminates the need for the paper and thus the various floats associated with taking the paper from one place to another. The corporate trade payments (CTP) system was the major experiment in the development of a system for electronic remittances. However the system has not attracted a significant volume of transactions. And the failure of this is caused by the costs of converting to electronic payments, the absence of adequate marketing efforts and the difficulty in sending proper advice as to what the remittance is supposed to pay. The major problem with electronic payments, however, does not relate to these factors. Beyond this it is first necessary to recognize that the elimination of float on cheques benefits the receiving firm but extracts the same costs from the paying firm and that paying firm must agree to remit electronically. Thus, with merits and demerits the electronic payment system is used less or more in the market.

Lockbox systems

A 'lockbox' is a post office box number to which some or all of the firm's customers are instructed to send their cheques. A bank provides such facility on the permission granted by a firm to take its cheques and immediately start them in the clearing process. Actually the mail addressed to this 'post office box' is delivered directly to the firms lockbox bank. This method serves to reduce mail and clearing float substantially.

But all firms do not find them of advantage. This method makes firm to give two mailing addresses for the firm to its customers the lockbox and the firms usual business address. This inevitably leads to the misrouting of some of documents to the lockbox that the firm would prefer to go directly to its business. A consequent delay in the delivery of these documents to the firm occurs, since banks often do not forward items received at the lockbox until the next day. This necessitates costs to the firm for example, Misrouted purchase orders from customers which the firm would like to process as soon as possible are delayed. Lockbox cheque processing systems at banks are oriented toward the rapid

clearance of routine cheques, not extraordinary items such as postdated cheques, unsigned cheques and promissory notes. Lockbox personnel has to be infracted to look for these items and not to send them on through the banking system error occur rather frequently with consequent inconvenience for the firm.

Lockboxes are not a problem free solution for floatation problems, their proper use can reduce all the types of floatation on incoming cheques. Two important questions are to be solved in the formation of a lockbox strategy and they are

- Where should the firm locate its lockboxes ? and
- To which lockboxes should each of the firms customers send their cheques?

The lockbox location problem can be solved by collecting the following sets of data:
- The mail and clearing times for sending cheques form each port of the firm's geographic sales area to each possible lockbox.
- The total amount of daily funds and number of cheques received by the firm from each part of the sales area. A stratified sample of high value cheques may be used to reduce collection costs for these data.
- The required rate of return for the computation of opportunity cost.
- The variable and fixed costs of each proposed lockbox site to speed clearing times lockboxes are usually located in cities.

It is relatively simple to calculate the one best lockbox with these data in hand, of the firm is constrained to have only one. This optimal solution to the one lockbox problem is simply the lockbox which has the lowest total cost, defined again as the sum of the opportunity cost of float and the costs of the lockbox.

There may be several lockbox location and customer assignment routines in the cash management. Some of these will always find the least cost combination of lockboxes and assignments while others will not. Generally, the routines that always lead to optimum solution are more difficult to calculate particularly by hand than those which may not lead to optimums.

Some warming about the lockbox location decisions are kept in mind when the firm is considering, analyzing and implementing a lockbox strategy. And they are determine customer zones, obtaining bank cost data, obtaining a representative sample of cheque and origination, the costing of float and interaction with the availability of borrowing capacity.

- **Methods of Accelerating Cash Inflows:**

Prompt Payment by Customers

In order to accelerate cash inflows, the collection form customers should be prompt. Prompt billing makes it possible. Information about the amount payable and the time by which it should be paid should be given promptly to the customers. It will be better if self addressed envelope is sent along with the bill and quick reply is requested. A cash discount allowed to the customers prompts customers to pay earlier. The availability of discount is a good saving for the customer and in an anxiety to earn it they make quick payments.

- **Quick Conversion of Payment into Cash:**

Cash collection procedure plays an important role in cash inflows amount. Cash inflows can be accelerated by improving the cash collecting process. As the firm receives the cheques written in favor or the concern by the customer, it should try to collect it as early as possible. There is a time gap between the cheque sent by the customer and the amount collected against it. The reasons for time gap time gap may be (I) mailing time i.e. time passed in transfer of cheque from customer to the firm by the post office, referred to as postal float. (II) cheque received form the customer is sent to the bank for the collection which customers time i.e. lethargy and (III) collection time within the bank i.e. time taken by the bank in collection the payment form the customers payment from the customers bank, called bank float. The postal float, lethargy and bank float are collectively referred to as deposit float. Deposit float means the cheques float means the cheques written by the customers but the amount not yet useable by the firm. An efficient

cash management will be possible only if the time taken in deposit float is reduced and make the money available for use. This can be done by decentralizing collections.

- **Decentralized Collections:**

A big firm operating over wide geographical area can not be so rigid of keeping just one center for the collection, but it can accelerate collections by using the system of decentralized collections. A number of collection centers are opened different areas instead of collection receipts at one place. Collection centers in different areas reduce the mailing time form customers dispatch of cheque and its receipt in the firm and then reducing the time in collecting these cheques. The cheques should be sent immediately for collection after its receipt. Since the party may have issued the cheque on a local bank; it will not take much time in collecting it. The amount so collected will be sent in the central office as soon as possible. Decentralized collection system reduces the financial requirements as it saves mailing and processing time.

- **Lock Box System:**

Lock box system is already discussed in detail in methods collection system as one of the collection system. Now, lets understand how does it help in accelerating cash inflows.

Lock box system is a technique of reducing mailing, processing and collecting time. In this system collecting centers at different places are selected by the firm. The places are selected on the basis of number of consumers and the remittances to be received from a particular place. The firm hires a post box in post office and asks the parties to send the cheques on that post box number. A local bank is authorized to operate the post box. The bank collects the post form the post box once in a day and starts the collection process of cheques. The amount so collected is credited to the firms account. The banks prepares a detailed account of cheques received which is used by the firm for processing purpose. This collection system of cheques accelerates the collection process and avoids delays due to mailing and processing time at the accounting department. Clerical work of the firm is transferred to the bank which may reduce firms costs, improve internal control and reduce the possibility of fraud.

- **Types of Disbursement Decisions:**

Disbursement decisions can be categories into two : strategic decisions and tactical decisions. Decisions having longer range consequences are strategic decisions and generally more difficult to change on short notice. Tactical decision are the day – to – day operating decisions.

- **Selection of Disbursement Bank Set:**

One or more disbursement banks are selected in strategic decisions. How many disbursement banks should be used ? where should they be located ? what should be the firms policy towards intentionally taking advantage of availability and clearing delays ? Such questions are answered when disbursement bank set is selected.

- **Selection of Concentration Bank:** The selection of concentration bank to fund disbursement bank is the second strategic decision. This decision is often not considered an active decision is often not considered an active decision variable. Usually the selection of concentration bank is done on the basis of other criteria. When the firm has more than one concentration bank, there remains a choice for the firm that from which concentration bank funds are drawn.

- **Disbursement Payment and Account Funding Mechanism:** The mechanism used for making payments and moving cash from the concentration bank to the disbursement banks is selected as the third strategic, decision. Cheques are by far the most common payment mechanism.

- **Level of Authority for Authorizing Disbursements**: Firm must decide the authority to release the firms cash. Some firms follow strict control at headquarters and do not permit disbursements to be authorized in the field. While some firms follow liberal policy and leave significant authority with field managers.

- **Policies for Determining When and How much to Pay**: Different firms follow different policies in payment whether simple or complicated such as "t Take all discounts and pay on the discount date". "Take only those discounts that are economically justified" or " Make all payments on the 10th of the month."

Tactical Decisions

- **Disbursement Authorization**: The first tactical decision is whether to authorize a particular disbursement. A particular disbursement should be made within the authority guidelines already established. Validity of invoice, payment is made or not, the quantity and quality of the goods or services are maintained or not such questions are solved by matching purchase orders and receiving reports with invoices to ensure that the firm actually owes the amount stated on the invoice.

- **Funding Amount and Timing**: Within strategic policy guidelines, decisions must be made about the amount and timing of transfer from the concentration bank into the disbursement amount. Transfer of cash is made daily or non daily, forecast can be used or not, the bank will allow overdrafts or not, such problem of cash transfer is solved.

- **Payment Preparation and Release:** A third tactical decision involves the preparation and release of the payment. The vehicle for making payment and the payment amount is decided. The form of payment whether in cash or by cheque, subtraction of discounts, spoilage during transit and so on. Such decisions are made in the field by some firms, whereas for other they are made at company headquarters.

- **Drawee Bank Selection**: A fourth tactical decision is related to the third. The drowse bank is to be selected from the existing set of disbursement bank. It may be possible either at headquarter or in the field, to draw a cheque on one of several banks, depending on the firms disbursement policies.

- **Mail Point**: From which point to mail the cheque is the fifth decision which is to be taken. The mail point and the drawled bank are independent decisions. Most firms mail the cheques from the point of the cheque preparation. However, some firms prefer distant locations to extend mail time. To receive any benefits from mail-time extension, one must assume that the postmark date is the valid payment date.

- **Methods of Slowing Cash Out flows**: The effective controlled disbursement system helps company is in maintaining cash. The objective of controlling cash outflows is to slow clown the payments as far as possible. Following are the methods which can be used to delay disbursements.

- **Payment on Last Date**: Payments on last day increases the cash out flow period. If the credit is for 10 days then payment should use made on 10^{th} day only. It becomes cost free for short period requirements and the firm can make use of cash discount also.

- **Payment Through Drafts**: Payments by drafts take more time than by giving cheques and payments can be delayed. When a cheque is issued then the company will have to keep a balance in its account so that the cheque is paid whenever it comes. On the other hand a draft is payable only on presentation to the issuer. The receiver presents a draft to its bank for presenting it to the buyers bank which takes a number of days before it is actually paid. The sources can be economized by using this method. The funds so saved can be invested in highly liquid low risk securities to earn income the recon.

- **Adjusting Payroll Funds**: Some economy can be exercised on payroll funds also. It is possible by reducing the frequency of payments. Monthly payment policy is preferred instead of weekly payment policy. Even finance manager can plan the issuing of salary cheques and their disbursements. Issue of cheques on Saturday restricts presentation of cheques for payment, even on Monday all cheques may

not be presented. On the basis of his past experience finance manager can deposit the money in bank because it may be clear to him about the average time taken by employees in encasing their pay cheques.

- **Centralization of Cheques**: Centralized payment policy increases payment period. Payments should be made through drafts or cheques. When cheques are issued from the main office then it will take time for the cheques to be cleared through post. The benefit of cheque collecting time is availed.

- **Inter – Bank Transfer**: Inter – bank transfer make efficient use of cash possible. If the company has accounts with more than one bank then amounts can be transferred to the bank where disbursements are to be made. It will help in avoiding excess amount in one bank.

- **Making use of Float:** Float is a difference between the balance shown in companies cash book (Bank Column) and balance in pass book of the bank. Issue of cheque reduces the balance at bank in cash book. Receiver may not present issued cheque for payment immediately. If the receiver is at some other station then again mailing process takes a number of days before it is presented. Until the time, the cheques are not presented to bank for payment there will be a balance in the bank. The company can make use of this float if it is able to estimate it correctly.

7.   Determining optimum cash balance:

A minimum amount of cash for setting the dues in time has to be maintained. The cash is required to purchase raw materials, pay creditors, day to day expenses, dividend etc. the test of liquidity of the firm is that it is able to meet various obligations in time. Therefore some cash may be kept as a safety stock for transaction needs. An appropriate amount of cash balance to be maintained should be determined on the basis of past experience and future expectations. The less cash balance than requirement weakens the liquidity of the firm. If higher cash balance is maintained then an opportunity to earn is lost. Thus, a firm

should maintain an optimum cash balance, neither a small nor a large cash balance. The purpose is achieved when the transaction costs and risk of too small a balance should be matched with the opportunity costs of two large a balance. There are basically two approaches to determine an optimal cash balance.

(I)   Minimizing cost Models and

(II)   Preparing Cash Budget.
          Cash budget plays an important role in cash management.

Cash Budget

A cash budget is an estimate of cash receipts and disbursements of cash during of a future period of time. Solomon Ezra says, " A cash budget is an analysis of flow of cash in a business over a future, short or long period of time. It is a forecast of expected cash intake and outlay." The use of cash is planned and controlled by the device namely cash budget. The cash budget points out period when there is likely to be excess or shortage of cash. Thus, a cash budget enables firm to plan the use of excess cash and to make arrangements for the necessary cash as and when required.

The expected cash receipts from various sources are anticipated. The estimated collections from debtors, bills receivables, interests dividends, other incomes and sale of investment and other assets will be taken into accounts. The amounts payable for the purchase of raw materials, creditors and meeting various other revenue and capital expenditure needs should be considered. cash forecasts include all possible sources from which cash is received and the channels in which payments are to be made so that a consolidated cash position is determined.

A firm co-ordinates cash budget with other activities of the business. The functional budgets may be adjusted according to the cash budget. Fruitful use of available funds is possible and the concern should not suffer for want of funds.

Cash Management Models A number of mathematical models have been developed to determine the optimal cash balance such as

- Operating Cycle Model
- Inventory Model
- Stochastic Model
- Probability Model   etc.

But to determine the optimum balance of cash the Inventory Model developed by William J. Baumol and the Stochastic Model developed by M.H. Miller and Daniel orr are popularly in use. These two models are discussed as under.

WILLIAM J. BAUMOL'S MODEL

William J. Baumol developed a model (The Transactions Demand for Cash : An Inventory Theoretic Approach) Which is usually used in inventory management but has its applications in determining the optimal cash balance also. Baumol funds similarities between inventory management and cash management. As Economic Order Quantity (EOQ) in inventory management involves trader off between carrying costs and ordering cost, the optimal cash balance is the trade off between opportunity cost or cost of borrowing or holding cash and the transaction cost. The optimal cash balance is reached at a point where the total cost is the minimum. The optimum cash balance is illustrated in the if following figure.

Total Costs

Opportunity Holding Costs

Transaction Cost

Optimum Cash Balance
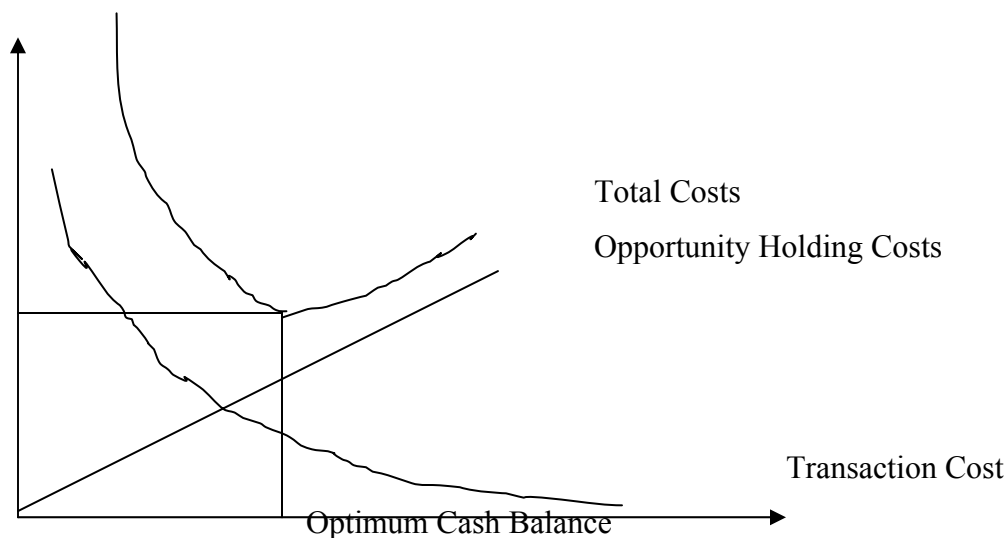
Baymol Model

Assumptions

- The cash needs of the firm are known with certainly.

- The cash disbursements of the firm occur uniformly over a period of time and are known with certainly.

- The opportunity cost of holding cash is known and it remains constant.

- The transaction cost of converting securities into cash is known and remains constant.

The Baumol model can also be represented algebraically.

$$C = \sqrt{2A \ X \ F}$$

Where C = Optimum balance

A = Annual Monthly Cash Disbursements

F = Fixed cost per transaction

O = Opportunity cost of holding cash.

MILLER AND ORR MODEL

Baumols model is based on the basic assumption that the size and timing of cash flows are known with certainty that is impractical. The cash flows of a firm are neither uniform nor certain. The shortcomings of Baumol Model are overcome in Miller and Orr model. A model for the Demand for Money is expanded on the Baumal model for firms with uncertain cash inflows and cash outflows. There are two control limits in the Miller and Orr Model – the layer control limit and the lower control limit along with a return point as shown in figure.
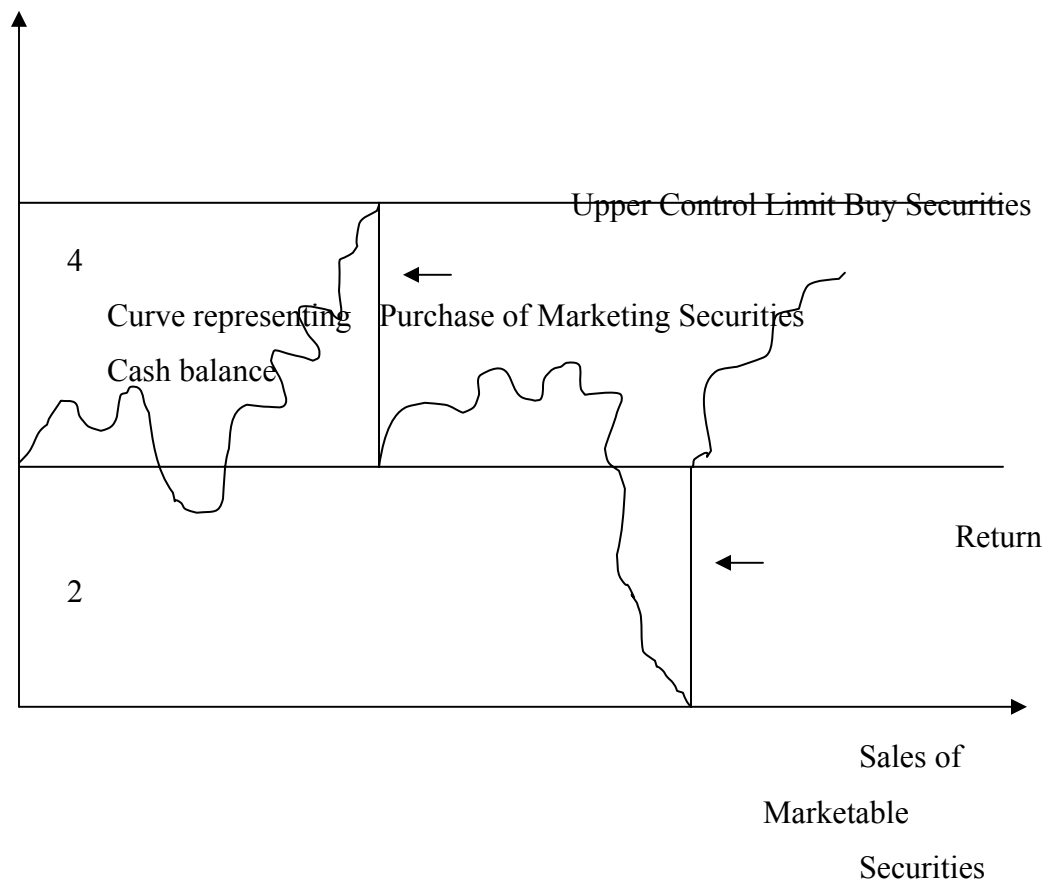
Miller Orr Cash Management Model

(Source: Management Accounting, R.K. Sharms, Shashi K. Gupta, Kalyani Publisers, Ludhiana, India. Pg. 228,)

When the cash balance touches the upper control limit (h), marketable securities are purchased to the extent of hz to return back to the normal cash balance of z. In the manner when the cash balance touches lower control limit Co. the firm will sell the marketable securities to the extent OZ to again return to the normal cash balance. The shread between the upper and lower cash balance limits called Z can be computed using Miller – Orr Model as Follows :

Z = 3 (¾ X Transaction cost X Variance of Cash Flows / Interest Rate) 1/3

Return Point $=$ Lower Limit $+$ Spread $(Z)/3$

Variance at Cash Flows

$=$ (Standard Deviation) 2 or (6) 2

8. Investment of Surplus Funds:

There are, sometimes, surplus funds with the companies which are required after sometime. There funds can be employed in liquid and risk free securities to earn some income as the close relationship between cash and marketable securities. There are number of avenues where these funds can be invested. It is crucial to select proper method of investment. Some of the methods are discussed herewith.

Treasury Bills: On behalf of the Central Government RBI issues treasury bills. These bills are issued only in bearer form. Name of purchaser is not mentioned on the bills, rather they are easily transferable from one investor to another. Interest is not receivable on such bills but the return is the difference between the purchase price and face (par) value or the bill. These are risk free securities with the backing of the Central Government.

Negotiable Certificates of Deposit: The money is deposited in a bank for a fixed period of time and marketable receipt is issued. The receipt may be bearer or registered, the latter facilitates transactions in the secondary market. The investor can decide the denominations and maturity periods. Interest and deposited amount are paid on maturity. It is different from the treasury bills which are issued on discount. Interest can be earned on short term surplus funds. The investment is secure unless the fails, the chances of which are remote.

Ready Forwards: A company willing to invest funds for a short period of lime may enter into a ready forward deal with a commercial bank or some other organization. Under this system the bank sells and repurchases the same security at pre-determined prices. The difference between the purchase and sales price generates the income. Ready

forwards are generally done in units, public sector bonds or government securities. It is linked with the position of the money market. The investor can earn more of money market is tight during busy season and at closing of the year.

Inter Corporate Deposits: For short term surplus is deposited with other companies which attract a good rate of return i.e. Inter – corporate deposits. Inter corporate deposits are of three types.

Call deposits: It is a deposit which a lender can withdraw on one days notice. In practice it takes three days to get this money. The rate of interest at present is ………. Percent on these deposits.

Three month deposits: These deposits are popular and are used by borrowers to tide over short – term inadequacy of funds. The interest rate on such deposits is influenced by bank overdraft interest rate.

Six month deposits: Six month is comparatively a long period which lenders may prefer because the lenders may not have surplus funds for a long period. Since inter – corporate deposits are unsecured loans, the creditworthiness of the borrower should be ascertained. Section 370 of the company's Act has placed certain restriction on inter – company deposit, these provisions are

A company cannot lend more than 10 % of its net worth to any single company.

The total lending of a company cannot exceed 30 % of its net worth without the prior approval of the central government and a special resolution should permit such a lending.

Bill Discounting: A bill arises out of credit sales. The buyer will accept a bill drawn on him by the seller. In order to raise funds the seller may get the bill discounted with has bank. The bank will charge discount and release the balance amount to the drawer. These bills normally do not exceed 90 days. The bill discounting is considered superior to inter

– corporate deposits. The company may also discount the bills as a bank does thus using its surplus funds. It is to be ensured that the discounted bills are trade bills and not accommodation bills. The bills backed by the letter of credit of a bank will be most secure as there are guaranteed by the drawes bank.

Investment in Marketable Securities: A reasonable balance of cash must be maintained. As there is no perfect balancing of inflows and outflows of cash, some times cash inflow is more than cash outflow. Instead of keeping the surplus cash as idle, the firm tries to invest it in marketable securities. It fetch some income to the business. The cash surpluses will be available during slack seasons and will be required when demand picks up again. A prudent and cautious approach is needed to invest the cash in securities. The selection of securities for investment should be carefully made so that the amount is raised quickly on demand.

In choosing among alternative securities, the firm should examine three basic features of a security: safety, maturity and marketability. Security refers with the absence of any type of risk. The maturity periods give higher returns. And the securities should have a ready market. Investments can be made only in near cash securities. If the securities selected require some time for realization then there may be payment problems. So, the securities should have a ready market and may be realizable in a very short period.

Money Market Mutual Fund (MMMFs): Money market mutual funds means a scheme of mutual fund which has been set up with the objective of investing exclusively in money market instruments. These instruments include treasury bills, dated Government securities with an expired maturity of up to one year, call and notice money commercial paper, commercial bills accepted by banks and certificates of deposits. Since November 1995, the Government has permitted private sector mutual funds which were limited to public sector only and they are also allowed to set up money market mutual fund. MMMFs are wholesale markets for low risk, high liquidity and short – term securities.

9. ANALYSIS AND INTERPRETATION OF DATA:

Cash Management at GNVFC:

The table no. 8.1 gives the numerical tree about the Cash & Bank amount, current liabilities, cash ratio, cash ratio index and trend value in reference to GNVFC Ltd. from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

By taking view of the table, it can be said that Cash & Bank increase in the initial years but overall they move in a mixed trend during the course period. Similarly, current liabilities also increase in the beginning but overall they move in a mixed trend for the same. Cash ratio means the ratio of Cash & Bank to current liabilities. It means that it is the comparison of Cash & Bank against the current liabilities. It comes out to 0.47 for the base year i.e. 1996-'97. Then, it decreases for two years in a raw and goes down to 0.37 in the year 1998-'99. Then, it increases marginally to 0.38 in the very next year. Then after, it decreases and increases constantly. In the year 2003-'04, it makes major upset and goes down to 0.11 which is the lowest level during the study period. Then, in the last year of research period i.e. 2004-'05, it improves slightly and goes up to 0.30. The average of cash ratio comes out to 0.32 which is lower than the base year ratio.

Now, cash ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it decreases for two years constantly and goes down to 80.15 in the year 1998-'99. Then, it increases to 81.25 in the very next year which is the highest level during the study period. Then, it continuously decreases and increases. In the year 2003-'04, it makes big upset and goes down to 23.81 which is the lowest level during the study period. Then, in the last year i.e. 2004-'05, it improves and reaches to 65.15. It comes on an average to 69.33 which is lower than the base year level. It states the negative trend. The trend value also says the downward trend.

The overall result can be determined by getting the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to

35.55 while the critical value of chi-square is 7.851. So, here the calculated value of chi-square is higher than the critical value. It indicates the acceptance of alternative hypothesis. It means, **"There is significant difference between cash ratios of fertilizer companies".** Moreover, the standard deviation works out to 523.49 while the co-efficient of variation comes out to 755.12. So, there is much variation in the productive indices.

Cash Management at GNVFC: Table – 8.1

Year	Cash & Bank Balance	Current Liabilities	Cash Ratio	index	t.v.
1996-97	1579.83	3374.6	0.468153	100	97.588313
1997-98	1842.71	4380.16	0.420695	89.862647	90.522663
1998-99	1987.25	5296.42	0.375206	80.146079	83.457013
1999-2000	2302.39	6053.15	0.380362	81.247432	76.391363
2000-01	2019.45	6402.05	0.315438	67.379259	69.325713
2001-02	2032.34	5601.12	0.362845	77.505706	62.260063
2002-03	1984.02	10913.06	0.181802	38.833961	55.194413
2003-04	2049.88	18389.44	0.11147	23.810698	48.128763
2004-05	1758.58	5766.19	0.304981	65.145642	41.063113
total	17556.45	66176.19	2.920954	623.93142	623.93142
average	1950.717	7352.91	0.32455	69.325714	69.325713

C.V. 755.11

S.D. 523.49

Chi. 35.55

Cash Management at GSFC:

The table no. 8.2 presents the mathematical data regarding cash and bank, current liabilities, cash ratio, cash ratio index and trend value in reference to GSFC Ltd. from the year 1996-'97 to 2004-'05 i.e. research period. It also calculates the chi-square value, standard deviation and co-efficient of variation for the same.

It can be pointed out from the table that cash and bank amount are decreasing in the initial three years but overall they move in a mixed trend during study period. On the

other hand, current liabilities are increasing in the first five years and then they are decreasing till the end i.e. 2004-'05. Cash ratio can be defined as, "The ratio of cash bank to current liabilities". It works out to 0.15 for the base year i.e. 1996-'97. Then, it decreases for two years and goes down to 0.05 in 1998-'99. Then, it improves marginally and reaches to 0.09 in the very next year. In 2000-'01, it makes major upset and goes down to 0.05 which is the lowest level during the course period. Then it increase and decreases constantly till the end. The average of cash ratio works out to 0.08 which is lower than the base year ratio. It clears that there is negative trend in cash ratio.

Now, cash ratio index is assumed 100 for the base year i.e. 1996-'97. Then, it decreases for two years in a raw and goes down to 34.12 in 1998-'99. Then it increases slightly and reaches to 61.51 in 1999-'00. Then again it decreases to 33.84 in 2000-'01, which is the lowest level during the course period. Then, it increases and decreases continuously till the end. After 2003-'04, it improves and goes up to 49.80 in 2004-'05. Cash ratio index draws the numerical picture about the fluctuation in cash ratio. It comes on an average to 54.06 which is lower than the base year level. It clears the negative trend of cash ratio. The trend value also states the downward trend in cash ratio.

The overall result can be determined by considering the value of chi-square, standard deviation and co-efficient of variation. The calculated value of chi-square comes out to 45.94 while the critical value of chi-square comes out to 7.851. So, here the critical value is lower than the calculated value. It allows the acceptance of alternative hypothesis. It means, **"There is significant difference between cash ratios of fertilizer companies".** Moreover, the standard deviation works out to 452.45. On the other hand, the co-efficient of variation comes out to 837.01. So, it can be noted that there is much variation in the productive indices.

Table- 8.2Cash Management at GSFC

Year	Cash & Bank Balance	Current Liabilities	Cash Ratio	index	t.v.
1996-97	93.09	611.94	0.152123	100	73.759478
1997-98	70.14	661.01	0.10611	69.752993	68.833661
1998-99	36.91	711.16	0.051901	34.117865	63.907844
1999-2000	69.37	741.33	0.093575	61.512763	58.982028
2000-01	41.22	800.62	0.051485	33.844388	54.056211
2001-02	86.71	859.05	0.100937	66.352282	49.130394
2001-03	42.03	779.03	0.053952	35.465846	44.204578
2003-04	41.54	765.66	0.054254	35.66446	39.278761
2004-05	55.34	730.56	0.07575	49.795303	34.352944
Total	536.35	6660.36	0.740087	486.5059	486.5059
average	59.59444	740.04	0.082232	54.056211	54.056211

C.V. 837
S.D. 452.45
Chi. 45.93

Cash Management at Liberty:

The table no. 8.3 displays the statistical data in reference to Cash & Bank, current liabilities, cash ratio, cash ratio index and trend value regarding **Liberty Co. Ltd.** from the year 1996-'97 to 2004-'05 i.e. nine years of research period. It also computes and gives the chi-square value, standard deviation and co-efficient of variation for the same.

It can be pointed out from the table that Cash & Bank amount are increasing from the year 2001-'02 to 2004-'05, but overall they move in a mixed trend. On the other hand, current liabilities are increasing in the initial years but overall they move in a mixed trend during the study period. Cash ratio means the ratio of Cash & Bank to current liabilities. It comes out to 0.21 for the year 1996-'97 i.e. base year. Then, it increases for two years constantly and goes up to 0.29 in 1998-'99. Then, it decreases continuously for

two years and goes down to 0.14 in the year 2000-'01 which is the lowest level during the study period. Then, it increases to 0.33 in the year 2001-'02 which is the highest level during the study period. Then, again it decreases to 0.16 in 2002-'03. Then after in the year 2004-'05, it improves slightly and goes up to 0.29. The average of cash ratio comes out to 0.22 which is higher than the base year ratio. It indicates the positive trend in cash ratio.

Now, cash ratio index is also considered because it gives an idea about the variation in current ratio. It is supposed to 100 for the base year i.e. 1996-'97. Then, it increases for two years and goes up to 138.06 in the year 1998-'99. Then, it decreases for two years in a raw and goes down to 68.53 in 2000-'01. Then, again it decreases and increases. After 2002-'03, it improves and reaches to 138.14 in the year 2004-'05. It comes on an average to 105.72 which is slightly higher than the base year level. It clears the positive trend in current ratio. The trend value also shows the upward trend in current ratio.

The overall result is determined by considering the chi-square value, standard deviation and co-efficient of variation. The calculated value of chi-square works out to 76.29 while the critical value of chi-square is 7.851. So, here the critical value is lower than the calculated value. It indicates the acceptance of alternative hypothesis. It means, **"There is significant difference between current ratios of fertilizer companies".** Moreover, the standard deviation comes out to 898.81 while the co-efficient of variation works out to 850.19. So, it can be said that there is some variation in the productive indices.

Table- 8.3

Cash Management at Liberty

Year	Cash & Bank Balance	Current Liabilities	Cash Ratio	index	t.v.
1996-97	2.18	10.31	0.211445	100	104.72872
1997-98	2.28	10.37	0.219865	103.98212	104.9763
1998-99	3.29	11.27	0.291925	138.06213	105.22389

1999-2000	2.32	11.98	0.193656	91.586982	105.47148
2000-01	1.83	12.63	0.144893	68.525201	105.71906
2001-02	2.68	8.04	0.333333	157.64541	105.96665
2001-03	2.8	17.36	0.16129	76.280036	106.21424
2003-04	2.95	18.06	0.163344	77.251487	106.46182
2004-05	4.06	13.9	0.292086	138.13821	106.70941
total	24.39	113.92	2.011839	951.47157	951.47157
average	2.71	12.65778	0.223538	105.71906	105.71906

C.V. 850.18
S.D. 898.81
Chi. 76.29

Cash Management at IFFCO:

The table no.8.4 provides the numerical data about cash & bank amount, current liabilities, cash ratio, cash ratio index and trend value in reference to IFFCO Ltd. from the year 1996-'97 to 2004-'05 i.e. 9 years of research period. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

By viewing the table, it can be said that cash & bank amount move in a mixed trend constantly during the study period. On the other hand, current liabilities also stay in a mixed trend for the same. Cash ratio can be described as the ratio of cash & bank to current liabilities. It comes out to 0.14 for the base year i.e. 1996-'97. Then, it decreases to 0.09 in the very next year which is the lowest level during the research period. Then, it increases to 0.24 in 1998-'99 which is the highest level during the course period. Then, again it decreases for three years constantly and goes down to 0.10 in 2001-'02. Then, again it increases. In the year 2004-'05, it improves slightly and reaches to 0.18. The average of cash ratio works out to 0.16 which is higher than the base year ratio. It indicates the positive trend in cash ratio. Now, cash ratio index is also considered in finalizing the overall result because it gives an idea about the fluctuation in cash ratio. It is assumed 100 for the base year i.e. 1996-'97. Then, it decreases and goes down to 62.13 in 1997-'98. Then, it increases to 165.89 in 1998-'99. Then, again it decreases for three years in a raw and goes down to 70.53 in the year 2001-'02. Then, again it increases in

the last year of study period i.e. 2004-'05, it improves slightly and reaches to 127.14. Cash ratio index comes on an average to 113.70 which is higher than the base year level. It states the positive trend in cash ratio. The trend value also shows the upward trend in cash ratio.

The overall result is decided by considering the chi-square value, standard deviation and co-efficient of variation. The calculated value of chi-square works out to 94.24 while the critical value of chi-square is 7.851. So, here the calculated value of chi-square is higher than the critical value. It allows the rejection of null hypothesis and acceptance of alternative hypothesis. It means, "There is significant difference between cash ratios of fertilizer companies". Moreover, the standard deviation works out to 1195.76 while the co-efficient of variation comes out to 1051.66. So, it can be pointed out that there is some variation in the productive indices.

Table- 8.4

Cash Management at IFFCO

Year	Cash & Bank Balance	Current Liabilities	Cash Ratio	index	t.v.
1996-97	81.74	576.72	0.141733	100	107.64085
1997-98	66.61	756.48	0.088053	62.125658	109.15623
1998-99	200.09	851	0.235123	165.89177	110.67161
1999-2000	155.02	765.37	0.202543	142.90431	112.18699
2000-01	121.38	762.17	0.159256	112.36325	113.70238
2001-02	78.9	789.27	0.099966	70.531063	115.21776
2001-03	222.13	1016.4	0.218546	154.19546	116.73314
2003-04	113.39	907.33	0.124971	88.173586	118.24853
2004-05	199.1	1104.92	0.180194	127.13626	119.76391
Total	1238.36	7529.66	1.450384	1023.3214	1023.3214
average	137.5956	836.6289	0.161154	113.70237	113.70238

C.V. 1051.65

S.D. 1195.75

Chi. 94.24

Cash position ratio of the fertilizer companies and Kruskal Wallis' one way analysis of variance test.

The comparative position of cash position ratios of fertilizer companies have been provided in the table no. 8.5 along with the application of Kruskal Wallis' one way analysis of variance test on this ratio for the study period i.e., 1996-'97 to 2004-'05.

T A B L E NO. 8.5

Comparative Cash Position Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test							
Year	GNVFC	R1	GSFC	R2	Liberty Phosphate Ltd.	R3	IFFCO	R4
1996-'97	0.47	36	0.15	15	0.21	23	0.14	13.5
1997-'98	0.42	35	0.11	10.5	0.22	24.5	0.09	6.5
1998-'99	0.38	33.5	0.05	2.5	0.29	27.5	0.24	26
1999-'00	0.38	33.5	0.09	6.5	0.19	21	0.20	22
2000-'01	0.32	30	0.05	2.5	0.14	13.5	0.16	17
2001-'02	0.36	32	0.10	8.5	0.33	31	0.10	8.5
2002-'03	0.18	19.5	0.05	2.5	0.16	17	0.22	24.5
2003-'04	0.11	10.5	0.05	2.5	0.16	17	0.12	12
2004-'05	0.30	29	0.08	5	0.29	27.5	0.18	19.5
Total		259		55.5		202		149.5

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)}{n_j} \right] - 3(N+1)$$

$$= \frac{12}{(36+1)} \left[\frac{(259)^2}{9} + \frac{(55.5)^2}{9} + \frac{(202)^2}{9} + \frac{(149.5)^2}{9} \right] - 3(36+1) = \frac{}{36}$$

$$= \frac{12}{1332} (7453.44 + 342.25 + 4533.78 + 2483.36) - 111$$

$$= 133.45 - 111$$

$$= \boxed{22.45}$$

The abovementioned table no.7 clears that the calculated value of H is 22.45, which is higher than the critical value i.e., 7.851. So, here the null hypothesis based on Kruskal Wallis' one way analysis of variance test, at 5% level of significance is rejected and the alternative hypothesis is accepted. It means, **"There is significant difference between the cash position ratios of the fertilizer companies".**

References:

(1)   Gitmen, L. J. : Principles of Managerial Finance (New York), Harper and Row, 1976, p. 157.

(2)   Robert H. Wessel : Principles of Financial Analysis – A Study of Financial Management, Macmillan Co., New York, 1961, p. 95.

(3)   Bureau of Public Enterprises : Annual Report on the Working of Industrial and Commercial Undertaking of the Central Government for the year 1967—68, p. 114.

(4)   Cash Credit : In this system, borrowing limits are fixed after assessing the needs of the business unit. The borrower is entitled to draw money according to his needs within the prescribed limit against the pledge or hypothecation of inventories of raw materials, work-in-process, finished goods, book debts and other marketable assets.

(5)   Prather, Charles L. : Financing of Business Firms, (Richard D. Irwin, Illinois), Second printing, 1956, p. 254.

(6)   See : Finance Ministry's O. M., No. F 11 (1)—BC/64 of March 11, 1964.

(7)   See : Comptroller and Auditor General of India (New Delhi), Audit Report (Commercial), 1964, p. 39.

(8)   Bureau of Public Enterprises : Compendium of BPE Circulars, 1969, p. 67.

(9)   See Raymond G. Schultz and Robert E. Schultz : Basic Financial Management, Text, Problems and Cases, Intext Educational Publishers, Pennsylvania, 1972, p. 228.

(10)   Kulkarni P. V. : Financial Management, Himalaya Publishing House, ed. 1983, p. 146.

(11)   Emerson O. Henke : Introduction to Accounting, Petrichelli/Charter, New York, 1974, p. 332.

Chapter – 8

Financing of Working Capital

Contents

1. Working Capital financing: An introduction:

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2. Bank (Commercial Loan

      ▪ **Types of Loan:**

3. Commercial Paper

4. Commercial Finance Companies

5. Analysis of data for short term financing of working capital.

1. Working Capital financing: An introduction:

Working capital management is the management of the firms' short term assets and liabilities, individually and in aggregate of all the functional areas of business financial decision making the one that occupies the substantial portion of the financial manager's working day is the management of the problems of current assets and liabilities. How much amount is invested in securities over the weekend? When are particular suppliers to be paid? Whether a credit limit for customer should be increased or the amount of borrowing to be done under the line of credit for the month? These may be the questions that manager has to answer. Short term debt consists of all those liabilities that must be paid within one year. Short term debt financing can be classified as under:

Short term debt financing includes:
- Trade credit and accruals
- Bank commercial loans
- Commercial paper
- Finance companies

This chapter focuses on the major sources of short-term financing management of the sample firms. For this purpose first let us clear about the terms, trade credit and accruals.

- **Trade Credit:**

Trade credit is generated when a company acquires, merchandise or materials and does not pay for them immediately. These transactions typically show up on the buyer's balance sheet as accounts payable and the seller's balance sheet as accounts receivable. Trade credit can result in a considerable amount of financing when the payment period is long. In short, trade credit is significant source of short-term financing for business firms. Smaller businesses, in particular usually rely heavily on trade credit to finance their operations, because they often are unable to obtain funds from banks or other lenders in the financial markets.

Most trade credit is extended on an open account basis. On receiving a purchase order from a firm, it evaluates the firm's credit worthiness using various information sources and decision criteria. If the supplier finds safe business with firm, he delivers ordered merchandise to the firm along with an invoice describing the contents of the sale, the total amount due and the terms of sale. When the firm accepts the material supplied, it in effect agrees to pay the due amount on the invoice terms. As the firm has accepted delivery, trade credit becomes almost automatic and is subject to only periodic reviews by the supplier. Open account trade credit is shown as accounts payable in the balance sheet.

Promissory notes are alternative to the open account arrangement. When a company signs a promissory note, which specifies the amount to be paid and the due date, it is formally recognizing an obligation to repay the credit. When a supplier questions the company's credit worthiness, it requires a company to sign promissory note. Promissory notes are shown as notes payable in balance sheet.

- **Acquiring Trade Credit:**

Trade credit is not available just for the asking. A credit analysis is performed on new customers, to see if they are worthy to receive credit. The credit quality of current customers is also reexamined regularly. The failure of companies to meet the credit standard of supplier either will lose credit or will get it under very restrictive terms. However, a restriction by one supplier does not guarantee that its competitors will do likewise. Credit standards being complex decision for a business, one should not be surprised to find varying standards being applied by different suppliers, even in the same industry. A buyer is therefore advised to shop around.

A business can purchase goods on open account after credit has been established. Trade credit is an easy and informal process compared to other sources. Trade credit creates debt in buyer's balance sheet and it is a financial obligation which is enforceable legally. In an effort to make a credit purchase more formal, a supplier will occasionally

ask the customer to sign a promissory note. This is frequently done for delinquent of the credit customers.

- **Trade Credit Terms:**

Credit terms, or terms of sale, specify the conditions under which a business is required to repay the credit that a supplier has extended to it. These conditions include maximum credit limit, credit period, cash discount (if any) given for prompt payment, the beginning date, and a special terms such as seasonal dating.

- **Maximum Credit Limit:**

Companies usually limit the maximum amount of credit a customer can have outstanding at any time. For e.g. a textile whole seller has been granted by a credit limit of Rs. 5,00,000/- by a textile manufacturer. Under these terms, the whole seller cannot allow its accounts payable with the manufacturer to exceed Rs. 5,00,000/-. Credit limits may vary based on, among other things, a customer's credit worthiness and the volume of business it does with a given supplier.

- **Credit Period:**

A credit period is the number of days in which a credit customer has to make payment. Normally the length of credit period remains in multiple of 15 days though it can be of any length.

- **Cash Discount:**

Cash discount is common practice to tend credit customers for early payment i.e. before the end of the credit period. To qualify for the discount, payment must be made within a specified number of days, known as the discount period. Take note that the credit period is not in addition to the discount period, but instead overlaps it.

- **Beginning Date:**

Credit period and discount period require beginning dates. A supplier, expecting payment in 45 days, must specify when the 45 days period begins. It may begin on the

day the goods are purchased, the date they are received by the customers or some other time. The beginning date is of more than passing interest considering that it can significantly lengthen the time that a customer has to make payment. Beginning dates vary surprisingly. The nature of the supplier's business is the determining factor.

- **Seasonal Dating:**

It is used by producers that have a strong seasonal pattern to their sales. A beginning date, under this system, is set far into the future, normally in the midst of the big season. Toy manufacturers are fine example. They begin delivering toys to retailers in May in anticipation of Janmashthmi season. However, the credit and discount periods start much later.

- **Cost of Trade Credit:**

Trade credit is considered a spontaneous source of financing because it normally expands as the volume of a company's purchases increase. It is also convenient to describe trade credit as a free source of debt financing, in as much as there is no explicit interest charge. So the use of trade credit is flexible, informal and relatively easy to obtain, especially for new and smaller firms. However, there are at least two situations when it remains no charge free.

- **Missed Cash Discounts:**

Missing cash discount may not appear to be a wise decision. In some quarters, it is considered bad business to miss a cash discount. But it may not be the cast at all. A business is literally 'buying time' by foregoing a discount. A company can obtain extra days of trade credit, but at the cost of missing a cash discount. If the terms of sales include a cash discount, the firm must decide whether or not to take it. If the firm accepts the cash discount, it foregoes the credit offered by the supplier and if it accepts delayed payment, it has to forgo cash discount.

- **Hidden Cost:**

Obviously, someone has to bear the cost of trade credit. Extending credit can be a rather costly undertaking for a supplier. Normally, the supplier passes on all or part of these costs to its customers implicitly as part of the purchase price of the merchandise, depending upon market supply and demand conditions. Generally, it is difficult to find the size of this added charge, especially if all competing suppliers offer the same terms. It were possible to separate the cost of extending credit from the price of the merchandise, a company would know what it is paying for trade credit.

- **Stretching Accounts Payable:**

A firm can postpone payment of the amount due to beyond the end of the credit period rather than pay suppliers within the credit period specified in the terms of sale. In this manner, stretching payments generates additional short term financing for the firm, but this credit is not cost free. It may deteriorate the credit ration of the firm for obtaining credit in future. Late payment penalties or interest charges also may be added to these costs, depending on specific industry practices. Although the suppliers favor occasional stretching of payables – for e.g. to meet seasonal need for funds, it may involve little or no cost to the firm. But if a firm persistently stretches accounts payable well beyond their due dates may find its trade credit cut off by suppliers, who may adopt cash before delivery (CBD) or cash on delivery (COD) policy when dealing with the firm in the future.

- **Accruals:**

Accruals represent services that have been provided to a business, but have not been paid for. Accrued expenses and deferred income are additional spontaneous sources of unsecured short term credit.

- **Accrued Expenses:**

The expense of wages is normally paid on a delayed basis, giving rise to accrued wages. Other frequent accruals found on corporate balance sheet are for rent and taxes. Such

expenses represent liabilities for services rendered to the firm that have not yet been paid for by the firm. As such it is an interest free source of financing. Accrued wages can be an especially important source of funding. A company can increase the average amount of accrued wages by lengthening the period between paydays. For instance by changing a pay cycle from two weeks to four weeks, level of accrued wages doubles itself. Accrued expenses can also be increased by delaying the payment of sales commission and bonuses. However, there remains legal and practical control to limit the extent to which a company can increase accrued expenses in this manner. The amount of accrued taxes and interest, a firm may accumulate also is determined by the frequency with which these expenses must be paid. At the same time, a firm has no control over the frequency of these tax and interest payments, so the amount of financing provided by these sources depends solely on the amounts of the payments themselves.

- **Deferred payments:**

Deferred payment comprises of payments received for goods and services that the firm has agreed to deliver at some future date. And these payments add to firm's assets namely, cash and is considered a source of funds. The primary sources of deferred income are advance payments made by customers. Such payment practices are common on large, expensive products like air-craft. These payments are not earned by the firm until delivery of the goods or services to the customers, so they are shown in balance sheet on liability side under the heading 'deferred income'.

2 Bank (Commercial) Loans:

Next to trade credit, bank commercial loans are the single most important means of raising short term corporate financing. Banks have been making seasonal and temporary loans to business for centuries. Bank borrowing consists of several types of credit arrangements including lines of credit, letters of credit, banker's acceptances etc. All of them have a unique combination of maturity, interest rate, fees, indentures (such as the collateral required) and the conditions under which the credit can be revoked.

- **Types of Loan:**

(a) **Special Purpose Loan:** A special purpose commercial loan is granted for a specific purpose and fixed period of time. It is the simplest credit arrangement and also known as single payment loan note. The funds are usually received at once and repaid in like manner. The maturity of these loans is normally less than one year. The note can be either a discount note or an add-on-note. For a discount note, advanced amount under the loan deal, is the face value of loan less interest amount for the period covered. For a discount note, the interest rate is decided at the time of its origination, since it is necessary to deduct the full interest rate amount at the beginning of the loan period.

For a note with interest at maturity, the face value of loan is received when the note is initiated. The interest is added to the principal amount at maturity. The interest rate for such notes, can either be fixed or vary over the life of the loan.

(b) **Line of Credit:** A line of credit is a pre-arranged loan commitment under which a bank agrees, in writing, to lend up to a given amount of funds for one year. Loanee can draw on all or part of these funds any time during the year. Such loans have no bound in amount or time within the year to repay. Since they are arranged in advance, little more than a phone call is needed to access a line of credit. The agreement specifies the terms and conditions of the loans to be made under the line of credit. It is a very flexible source of short-term financing. Interest is charged on only those funds that are actually borrowed, even though the line of credit may be much higher.

The primary purpose of a credit line is to supply funds to meet the short term, frequent seasonal, cash flow needs of the borrower. The second purpose of it is to provide a back up source of cash to pay off maturing commercial paper. Credit lines used in this way are called back up lines. And its third purpose is to provide a liquidity cushion or financial insurance. A financial manager provides for liquidity by obtaining a credit line that, although not intended to be used, is available if needed.

▪ **Committed versus Uncommitted Credit Lines:** A committed credit line is a formal, legal agreement covering the terms and conditions of the credit lines. Banks will grant loans if the borrower agrees to pay a commitment fee on the portion of the line that is not being used. And the banks are legally bound to lend money under the line as long as the terms and conditions are met by the borrower.

Under an uncommitted arrangement, a bank states that it will do its best to have funds available when the borrower calls for them. Under most circumstances, this will suffice. However, there is no contractual guarantee that a loan will be forthcoming. But sometimes banks may try to initiate a relationship with a potential client by offering an uncommitted line of credit for a relatively short period, say 6 months. At the end of this period, the bank reevaluates the prospects of developing an ongoing relationship before deciding whether to renew the line.

▪ **Compensation for Credit Lines:** Commitment fee is one of the elements of compensation for a credit line, which is the price for the bank's commitment to keep the line available. Such fees are not charged for keeping uncommitted line available. The amount may be based on the total credit line or only on the unused portion of the line. A bank may also charge for maintaining the line by requiring a certain level of demand deposit balances to be held at the bank. The amount of balances may be specified by the bank that must be held, either in rupees or as a percentage of the line or the balance credit that must be created by the balances held. The interest rate paid on borrowings against the line is the second element in the compensation for a credit line. The rate of interest differs based on the size and financial soundness of the borrower.

The line of credit may carry a set of conditions that limit the borrower's actions. These conditions may be positive, such as specifying the amount of working capital to be maintained, so certain financial ratios to be achieved or they may be negative, such as limiting management salaries, the expenditure amount or dividend payment without the

bank's prior approval. And if conditions are violated, the bank may require immediate repayment of outstanding notes.

- **Revolving Credit Agreement:** The difference between revolving credit agreement and line of credit is of time period i.e. revolving credit agreement is usually established for more than one year. Common maturities extend for two or three years, during which time, the borrower may borrow and repay loans several times. A revolving credit agreement can be converted into term loan based on terms in agreement. Revolving credit agreement is sometimes referred to as an evergreen loan as it is renegotiated prior to its maturity and represents a continuous source of credit. Same as in credit line, there is a commitment fee, met either by balances or by cash fees. The rate of interest is almost variable, based either on the prime rate or on money market rates.

(c) **Term Loan:** A term loan is more specific loan agreement than other types of loan agreement. It has a fixed maturity, usually of 2 to 5 years. The total amount of the loan is advanced to the borrower initially and is repaid in periodic installments over the life of the loan. The repayment may be in the form of equal installments or some other methods are followed that matches the cash flow generating capability of the borrower. Installments can be paid monthly, quarterly or semiannually.

Usually a term loan is obtained to finance a piece of capital equipment. When tangible asset is financed, it may be pledged as collateral against the loan. Interest rates differ on most term loans. The base for these rates can be the same as those for credit lines, although the prime rate tends to be the base more frequently used to price term loans than is true for line of credit. A higher transaction costs are charged from borrower in the form of an origination fee as the documentation are required frequently.

(d) **Letter of Credit:** A letter of credit is a guarantee from a bank stating that a loan will be made to the client if specified conditions are met. It is more common at international trade as exporter does not know an importer and also because information, language and

cultural differences. The importer presents a letter of credit from its bank, stating that the amount necessary for payment of the shipment will be paid in a specified date if conditions are met. Thus, importer enjoys the bank's credit rating for its own credit rating, thereby reducing the risk to the exporter.

Revocability: When a bank has a right to cancel the letter of credit, it is revoked or it is irrevocable when the bank is bound to honour the terms if the specified conditions are met. Pricing and maturity: It facilitates finance for short duration, for example, 30 to 90 days. The interest rate is fixed based on the prevailing rate at the time of the loan is issued. A commitment fee is also charged if loan is issued. And maturity of loan is decided based on the purpose for which it is issued.

(e) **Banker's Acceptance:** A banker's acceptance is generated by a time draft for which a bank agrees to pay to the holder at maturity. An amount of finance is provided when the bank advances on the time draft issued. Some banks use the term banker's acceptance to refer to a loan issued to finance the purchase of specific goods, whether for an international or a domestic transaction. Such loan is usually a discount loan. The discount from face value advanced to the borrower adds an interest at prevailing money market rates plus a fee or a commission. Because of the commission, the borrower pays higher cost than the commercial paper rate but as it is based on money market rates, it may be below the prime rate.

(f) **Unsecured Borrowing:** Line of credit and revolving credit agreements are generally unsecured loans, issued on the basis of the general financial strength of the borrower. Commercial banks lend such unsecured loans which are based on the strength of the income statement and the balance sheet of the organization. The bank considers two things i.e. the cash flow generating capability of the organization and the liquid resources as payment sources. In the case of borrower's default, the bank is a general creditor and has no specific claim on any assets of the firm. Although every company desires a loan with the fewest number of restrictions, banks make unsecured loans only to those

customers for which they perceive little, if any, repayment problem. Unsecured loans are normally granted only to firms having long, stable history of solid financial performance.

(g) **Secured Borrowings:** A secured loan is any loan that, as part of the loan agreement, gives the lender a claim on a specific set of assets in case of default. A collateralized loan and an asset based loan are two different approaches to secured lending.

- **Collateralized Loan:** Under a collateralized loan, the bank still views the credit from a financial statement prospective. To grant credit on an unsecured basis is very much risky for the bank. It is like fir regulations require that there be two exits to any building, the bank needs a second way out of a loan in case of unavailability of the primary exit. Collateral pledged as security for the loan provides this second exit. In case the borrower fails in satisfying one of the conditions of the loan and the loan cannot be paid when it is called, the collateral can be seized, after the appropriate legal steps are taken and disposed off to generate the funds to retire the loan. The collateral is sometimes called a secondary repayment source, as the bank does not view it as a means of repaying the loan but rather as a way of minimizing any potential loss if the loan is not repaid.

- **Asset Based Loan:** Accounts receivable and inventory are the assets commonly taken as collateral for a short term loan. The bank needs to ensure that the collateral is adequate to cover the loan if the second way out must be used. The use of collateral carries some cost for e.g. if accounts receivable are taken as collateral, it may be hard for the bank to collect from some accounts as a future supplier relationship influences the willingness to pay or disputes over returned and defective merchandise may also effect it. The bank may sell the accounts receivable to a collection agent, but this might be at a substantial discount from the full face value.

If inventory is taken as collateral, it demands the search of someone interested in purchasing it. Obviously, work-in-progress inventory has very little value. Frequently sales are below projections so for borrower it becomes difficult to generate cash flows to pay off the loan. These conditions question the salability of the inventory at anything approaching full value.

(h) **Accounts Receivable Loans:** Accounts receivables are the most commonly used forms of collateral for secured short term borrowing. Lender's point of view considers account receivable a desirable form of collateral, because of its liquidity and its value is relatively easy to recover if the borrower becomes insolvent. It includes accounts receivable involving documents representing customer obligations rather than cumbersome physical assets. Besides these advantages, it has potential difficulties. The borrower may pledge nonexistent accounts to defraud the lender. Also the recovery process in the event of insolvency may be hampered if the customer who owes the receivables returns the merchandise, or files a claim alleging that the merchandise is defective. Thus processing the receivables result in high costs, particularly when there is a large number of invoices involving small amounts. Nevertheless, many companies use accounts receivable as collateral for short term financing by either pledging their receivables or factoring them.

- **Pledging Accounts Receivables:** The pledging process starts with a loan agreement specifying the terms along with the procedures under which the lender will advance funds to the firm. The pledged accounts receivables are retained title to the receivables and continued to carry them on balance sheet by the firm. However, a footnote discloses the pledged status of the firm's receivables. Pledging is commonly practiced with smaller businesses. A firm that has pledged receivables as collateral is bound to repay the loan in case of failure to collect the pledged receivables.

Accounts receivable serve as collateral for many bank commercial loans and a majority of finance company loans. After the establishment of pledging agreement, the

firm periodically sends the lender a group of invoices along with the loan request. The lender investigates the credit worthiness of the accounts depending upon receipt of the customer invoices to determine which are acceptable as collateral. Depending on the quality of the receivables and company's financial position, these loans vary from 70% to 90% of the receivable value. The company then is required to sign a promissory note and a security agreement, after which it receives the funds from the lender.

Most receivable loans are made on a non-notification basis, as many creditors are not willing to wait for a default to occur before they exercise control over the receivables. So the customer continues to make payments directly to the firm. But in case creditors notify that they will pay directly to the bank bypassing the firm strengthens lender's side. And also arrangements such as these, while strengthening collateral, require constant vigilance on the part of a lender and are a definite administrative burden for the borrower.

- **Factoring Accounts Receivables:**
Factoring receivables includes the outright sale of the firm's receivable to a financial institution known as a factor. A number of so called old line factors, in addition to some commercial banks and finance companies are engaged in factoring receivables no longer appear on the firm's balance sheet. An agreement initiates the factoring process which specifies the procedures for factoring the receivables and the terms under which the factor will advance funds to the firm. The firm sends the customer order to the factor for credit checking and approval before filling it under the normal factoring arrangement. A credit department is maintained by the factor to perform the credit checking and collection functions. The firm supplies the order to the customer after the factor decides that the customer is an acceptable risk and agrees to purchase the receivables. Usually the customer is notified by an instruction to make payment directly to the factor as its accounts has been sold.

Most factoring of receivables is done on a non-recourse basis: in other words, the factor assumes the risk of default. The firm can supply the order to the customer and

assume the default risk itself in case of refusal by the factor to purchase a given receivable, but this receivable does not provide any collateral for additional credit.

In the maturity factoring, the firm receives payment from the factor at the normal collection due date of the factored accounts. It is the typical factoring. If the firm wants to receive the funds prior to this date, it usually can obtain an advance from the factor is called an advance factoring. The factor charges a factoring commissions or service fee, of 1 to 3 percent of the factored receivables to cover the costs of credit checking, collection and bad debt losses. The rate charges are decided depending upon the total volume of the receivables, the size of the individual receivables and the default risk involved.

Thus, the factoring receivables may be more costly form of credit than unsecured borrowing, the net cost may be below the stated factoring commission and interest rates because of credit department and bad debt loss savings.

(i) **Inventory Loans:** Inventories are another commonly used form of collateral for secured short term loans. Like receivables, many types of inventories are also liquid. That is why the inventories is a desirable form of collateral from lender's point of view. When judging whether a firm's inventory would be suitable collateral for a loan, the lender considers the type, physical characteristics, identifiably, liquidity and marketability of the inventory. Raw materials, work-in-progress and finished goods are three types of inventories. Normally, only raw materials and finished goods are considered acceptable as security for a loan. The physical characteristic, the items perish ability is the most important consideration for the lenders. Inventory subject to significant physical deterioration over time usually is not suitable as collateral.

Another considerable characteristic is identifiably by means of serial numbers or inventory control numbers which protects the lender against possible fraud and he is also aided at the time of establishing a valid title claim to the collateral if the borrower becomes insolvent and defaults on the loan. The other important considerations are the liquidity and the stability of the market price of the inventory. In the case of the

borrower's default, the lender wants to be able to take possession, sell the collateral and recover the full amount owed with minimal expense and difficulty.

- **Floating Liens:** Under a floating lien arrangement, the lender receives a security interest or general claim on the firm's entire inventory, this may include both present and future inventory. This type of agreement occurs when the average value of the inventory items is small, the inventory turnover frequently or both, and specific items are not identical. Thus, a floating lien is not protected much against losses of fraud or bankruptcy. So, most lenders do not advance a very high percentage of funds against the book value of the borrower's inventory.

- **Trust Receipts:** A trust receipt is a security agreement under which the firm holds the inventory, and proceeds from the sale in trust for the lender. The cashed inventory is immediately forwarded to the lender which then is used to reduce the loan balance. Companies engaged in inventory financing on a continuing basis draw up a new security agreement periodically and lenders advance the companies additional funds using recently purchased inventories as collateral.

All inventory items under a trust receipt arrangement must be readily identified by serial number or inventory code number. Thus the risk of fraud can be lessened. Automobiles and farm implement dealers who have to avail inventory for sale on their premises frequently engage in trust receipt financing. And this is also known as floor planning.

- **Cost of Bank Commercial Loans:** One thing that is apparent in our discussion of interest rates on bank commercial loans is the omission of compound interest. Technically compound interest can be applied to short term loans, but practically it is done seldom. Two problems hinder it. The first of these is that many of these loans contain aspects that are not easy to incorporate into compound interest formulas. And second is for short term loans, especially those under one year, compound interest is ignored. The prime rate is a key rate for any commercial

bank. This is the cost of short term loans which is charged from a bank's credit worth business customer. The prime rate is a standard or base rate of interest that is charged on loans of a predetermined level of risk. Loans with greater than standard risk will be charged rates above the prime and vice versa. Generally, there prevails close uniformity of prime rates from one bank to the next. As a result, it is common for businessmen and bankers to speak 'the' prime rate. Prime rates are charged in response to market condition, although not as frequently as other interest rates. As a matter of fact, many bank loans are granted so that the interest rate varies with changes in the prime rate.

3.   Commercial Paper:

Commercial paper is a short term unsecured debt security in the form of promissory notes issued by corporation. While traditionally an important alteration to bank loans, it has become increasingly popular in recent years. Maturities on commercial paper at the time of issue range from several days to months. Most commercial papers are sold directly to other corporations and institutional investors in private transactions. Large issuers of commercial paper normally attempt to tailor the maturity and amounts of an issue to the needs of investors. Thus, only companies with good credit ratings are able to borrow funds through the sale of commercial paper. Corporations with excess funds to invest, banks, insurance companies, pension funds, money market mutual funds and other types of financial institutions purchase the commercial paper.

Generally financially sound firms are attracted to have finance through commercial paper because interest rates on commercial paper issues tend to be below the prime lending rate. On a discount basis, commercial paper is sold. It means that the amount received is less than the stated amount of the note at issue and full face amount will be paid at maturity. The yearly financing cost of commercial paper depends on the maturity date of the issue, the prevailing short term interest rates and 'placement fee' is also added if it is arranged through the dealer. To successfully market commercial paper,

however, the company must normally have unused bank lines of credit equal to the amount of the issue.

Common Characteristics: There are four characteristics common to most commercial papers.

1. Non-secured: No specific collateral is received by investors to support their investment. And that is why only companies with excellent credit ratings are able to sell commercial paper.

2. Large Denomination: Due to the fact that commercial paper is sold only to large investors, it normally comes in Rs. 1,00,000/- or more.

3. Short Maturity: If commercial paper has a maturity under nine months, it can escape SEC registration requirements. In reality, most of it fall due within two months.

4. Discounted: Commercial paper is sold at par value minus discount. The difference amount is the interest expenses for the issuing corporation as there is no stated interest rate on these securities. And in addition the par value is paid all at one time, on the maturity date. It is also regarded as a form of cheque which is much the same as a personal cheque written on the issuing corporation. The basic difference between the two is that this certificate is made out for payment on a future date.

- **Alternative to Bank Commercial Loans**: For the most part, commercial paper is an alternative to bank loans. The reason for it is not clear entirely, but interest rates on commercial paper are often lower than bank loan rates, depending, obviously on the borrower and the bank. The 'non-secured' character also makes it attractive as such there are no compensating balances, collateral or protective covenants associated with commercial paper. It is really a very attractive means of raising money at least for those firms that can take advantage of it.

- **Cost of Commercial Paper:** Unlike most loans, there is no contractual interest rate associated with commercial paper. Thus, borrower is not required to pay specified amount at a decided rate on a certain dates. It doesn't mean that it is the cost free source. The cost is charged indirectly when commercial paper is sold at a discount from par or face value. The borrower receives one amount of money and repays a higher amount on some future date. The difference between these two amounts is the cost of commercial paper.

- **Limitations of Commercial Paper:** The primary disadvantage of this type of financing is that it is not always a reliable source of funds. It has impersonal market. A firm facing temporary financial difficulty may find that investors are unwilling to purchase new issues of commercial paper to replace maturing issues. The amount granted through commercial paper is limited to the amount of excess liquidity of the various purchases of commercial paper. During tight money period, enough funds may not be availed to meet the total needs of corporate issuers of commercial paper at reasonable rates. As a result, a firm (co.) should maintain adequate lines of credit and recognize the risk of relying too heavily on commercial paper. Finally, a commercial paper issue usually cannot be paid off before maturity. The company has to pay the interest costs though it no longer needs the funds from a commercial paper issue.

4. Commercial Finance Companies: Commercial finance companies are private companies that make commercial loans. A basic difference between commercial banks and commercial finance companies is the source of funds. Most of the funds of commercial banks are raised from the public in the form of deposits either demand or time. While the funds of commercial finance companies are raised directly through insurance of securities, such as commercial paper or longer- term notes, equity shares and bank loans. They are not subject to the regulations that apply to banks or consumer finance companies.

Frequently, businesses considered too risky to be granted credit by a commercial bank, are the customers of commercial finance companies. Their interest rates are also higher than banks. The interest rate charged may be 5-9% above prime. Although this is a substantial risk premium, usually there are neither commitment fees not compensating balance requirements. Commercial finance companies grant asset based loans which are similar to those of banks. They are based primarily on the underlying value of the assets rather than on the financial strength of the company. Accounts receivable is frequently used as collateral. It is based on a percentage of the acceptable receivables. Acceptable accounts are those from customers with an acceptable credit risk and a maturity shorter than a designated maturity, often three times of normal credit terms. The borrower is responsible for collection as receivables customers are not notified of the arrangement. When a receivable is either collected or the maturity exceeds the agreed maturity, it is no longer part of the borrowing base and the funds advanced against the collateral are repaid.

In case of insufficient amount of acceptable accounts receivables, inventory, possible machinery and equipment may be used as collateral to meet the desired financing requirements. The percentage of borrowing against the collateral varies with expected liquidation value. Commercial finance companies can be expected to take the steps necessary to ensure that the liquidation value of the assets is maintained at a level sufficient to cover the amount of the loan.

▪ **Analysis and interpretation of data:**

The Table No. 8.1 gives the mathematical data of Purchase, Creditors, Creditors payment days, Creditors payment days index and trend value in reference to **GNVFC** from the period 1996-'97 to 2004-'05. It also calculates the other data such as chi-square value, standard deviation and co-efficient of variation for the same.

Creditors' payment ratio means that it indicates the period in days in which the company does their payment to their creditors. These days come out to 36 days for the base year i.e. 1996-'97. Then, in the very next year, these days stay at same level. Then,

these days increase to 49 days in the year 1998-'99. Then, these days decrease for constant two years and go down to 42 days in the year 2000-'01. Then, these days increase again and go up to 53 days in the year 2003-'04. Then, in the last year i.e., 2004-'05, these days decrease to 50 days. So, in the end, the trend moves towards the decreasing trend. The average of creditors payment days work out to 45.89 days which is higher than the base year level.

Then, creditors payment days index is assumed 100 for the base year i.e. 1996-'97. So, far the analytical point of view is concerned, it gives an idea about the variation in creditor's payment day's level. In the very next year, it stays stable as the base year level. Then, it increases to 136.11 in the year 1998-'99. Then, suddenly it decreases and goes down to 116.67 in the year 2000-'01. Then again, it increases for constant two years and reaches to 147.22 in the year 2003-'04. Then, it decreases to 138.89 in the year 2004-'05. So, in the end, the level shows the decreasing trend. It comes on an average to 127.47 which is higher than the base year level.

Here, the calculated value of chi-square comes out to 7.25. On the other hand, the critical value of chi-square is 7.815. So, here the calculated value is lower than the critical value. It can be interpreted that the null hypothesis is accepted. It means, **"There is no significant difference in creditors' payment days' level of the company".** Moreover, the standard deviation comes out to 17.15 while the co-efficient of variation works out to 13.45. So, there is some variation in the productive indices.

Table No – 8.1

Creditors ratio of GNVFC   (Rs.in Crore)

Year	NWC	Creditors	%	DAYS	index	T.V.
1996-97	405.44	105.31	25.97	36.00	100.00	105.80
1997-98	372.89	211.34	56.68	36.00	100.00	111.22
1998-99	419.98	197.61	47.05	49.00	136.11	116.64
1999-2000	536.11	167.34	31.21	46.00	127.78	122.05
2000-01	503.97	204.87	40.65	42.00	116.67	127.47

2001-02	201.79	251.11	124.44	48.00	133.33	132.89
2001-03	185.70	242.44	130.55	53.00	147.22	138.30
2003-04	203.46	247.53	121.66	53.00	147.22	143.72
2004-05	292.47	239.46	81.88	50.00	138.89	149.14
total	3121.81	1867.01	660.10	413.00	1147.22	1147.22
average	346.87	207.45	73.34	45.89	127.47	127.47

Chi Squ: 7.25

SD : 17.14

CV : 13.45

The table no. 8.2 indicates the statistical data of Purchases, Creditors, Creditors payment days, Creditors payment days index and trend value of **GSFC** from the period 1996-'97 to 2004-'05 i.e. study period. It also computes the other data like chi-square value, standard deviation and co-efficient of variation for the same.

Creditors' payment days can be defined as, "The period in days in which the company does their payment to their creditors". These days come out to 112 days for the year 1996-'97 i.e. base year. Then, these days decrease slightly in the very next year and go down to 111 days. Then, these days increase to 116 days in the year 1998-'99. Then, suddenly, these days decrease high to 87 days in the year 1999-'00. Then again, these days increase constantly for three years and reach to 101 days in the year 2002-'03. Then after these days decrease to 97 days in the year 2004-'05. So, in the end, the trend moves to decreasing trend. The average of creditors payment days work out to 101.78 which is lower than the base year level.

Then, Creditors payment days index is supposed to 100 for the base year i.e. 1996-'97. Then, it decreases to 99.11 in the very next year. Then, it increases and goes up to 103.57 in the year 1998-'99. Then again, it decreases to 77.68 in the year 1999-'00. Then after it increases continuously for three years and goes up to 90.18 in the year 2002-'03.Then after it decreases for two years in a raw, and goes down to 86.61 in the year 2004-'05. Creditors' payment days index states the information about the variation in

creditors' payment days. It comes on an average to 90.87 which is lower than the base year level.

Here, the calculated value of chi-square comes out to 4.34. On the other hand, the critical value of chi-square is 7.815. So, the critical value is higher than the calculated value. It can be said that the null hypothesis is accepted. It means. **"There is no significant difference in creditors' payment days' level of the company".** Moreover, the standard deviation comes out to 7.94 while the co-efficient of variation works out to 8.74. So, it can be pointed out that there is some variation in the productive indices.

Table No – 8.2

Creditors ratio of GSFC   (Rs. In Crore)

Year	NWC	Creditors	%	Days	index	T.V.
1996-97	568.90	527.85	92.78	112.00	100.00	97.54
1997-98	455.62	575.59	126.33	111.00	99.11	95.87
1998-99	570.59	624.34	109.42	116.00	103.57	94.21
1999-2000	755.84	703.10	93.02	87.00	77.68	92.54
2000-01	549.01	754.29	137.39	94.00	83.93	90.87
2001-02	233.47	807.84	346.01	98.00	87.50	89.21
2001-03	-45.70	722.94	-1581.93	101.00	90.18	87.54
2003-04	290.06	705.11	243.09	100.00	89.29	85.87
2004-05	333.78	647.16	193.89	97.00	86.61	84.21
total	3711.57	6068.22	-239.98	916.00	817.86	817.86
average	412.40	674.25	-26.66	101.78	90.87	90.87

Chi Squ : 4.34
SD : 7.94
CV : 8.73

The table no. 8.3 displays the numerical data of Purchases, Creditors, Creditors payment days, Creditors payment days index and trend value in respect of **Liberty Phosphate Ltd.** from the period 1996-'97 to 2004-'05. It also states the calculation of chi-square value, standard deviation and co-efficient of variation for the same.

Creditor's payment days can be referred as, "The period in days in which the company does their payment to their creditors". These days work out to 60 days for the base year i.e. 1998-'99. Then, these days increase in the first initial two years and go up to 73 days in the year 1998-'99. Then, these days decrease slightly and go down to 72

days in the year 1999-'00. Then, again these days increase to 78 days in the year 2001-'02. Then, these days again decrease to 60 days in the year 2002-'03. Then after these days increase to 85 days in the last year i.e. 2004-'05. So, in the end, the trend moves towards the increasing trend. The average of Creditors payment days come out to 72 days which is higher than the base year level.

Then, creditors payment days index is supposed to 100 for the year 1996-'97 i.e. base year. Then, it increases to 121.67 in the year 1998-'99. Then, it decreases marginally and goes down to 120 days in the very next year. Then, it increases to 130 days in the year 2001-'02. Then after it decreases to 100 days in the year 2002-'03. Then after it increases again and goes up to 141.67 in the year 2004-'05 which is the highest level during the study period. It draws an idea about the variation in Creditors payment days' level. It comes on an average to 120 days which is higher than the base year level.

Here, the calculated value of chi-square comes out to8.55. On the other side, the critical value of chi-square is 7.815. So, the calculated value is higher than the critical value. In this reference, it can be determined that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is a significant difference in creditors 'payment days level of the company".** Moreover, the standard deviation comes out to 13.94 while the co-efficient of variation works out to 11.62. So, there is some variation in the productive indices.

Table No – 8.3

Creditors ratio of Liberty Ltd. (Rs. In Crore)

Year	NWC	Creditors	Ratio %	Velocity Days	Index	T.V.
1996-97	16.77	9.34	55.69	60.00	100.00	106.44
1997-98	20.35	10.37	50.96	64.00	106.67	109.83
1998-99	14.71	11.27	76.61	73.00	121.67	113.22
1999-2000	16.99	11.98	70.51	72.00	120.00	116.61
2000-01	16.66	12.63	75.81	78.00	130.00	120.00

2001-02	21.04	8.04	38.21	78.00	130.00	123.39
2001-03	12.85	17.36	135.10	60.00	100.00	126.78
2003-04	14.05	18.06	128.54	78.00	130.00	130.17
2004-05	19.81	13.90	70.17	85.00	141.67	133.56
total	153.23	112.95	701.61	648.00	1080.00	1080.00
average	17.03	12.55	77.96	72.00	120.00	120.00

Chi Squ: 8.55

SD : 13.94

CV : 11.62

The table no.8.4 states the statistical picture about the Creditors, Purchases, Creditors payment days, Creditors payment days index and trend value of **IFFCO** from the period 1996-'97 to 2004-'05. It also computes the chi-square value, standard deviation and co-efficient of variation for the same.

Creditors' payment days can be considered as, "The duration in days in which the company does their payment to their creditors". These days come out to 0 days for the year 1996-'97. Then, these days work out to 32 days for the base year i.e. 1997-'98. Then, these days increase to 35 days in the year 1998-'99. Then after for two years this level remain stable at level of 35 days, up to 2000-'01. Then, these days decrease and go down to 34 days in the year 2001-'02. Then again, these days increase to 42 days in the year 2003-'04. It is the highest level during the study period. Then, these days decrease and go down to 40 days in the year 2004-'05. So, in the end, the trend moves towards the decreasing trend. The average of creditors payment days come out to 36.13 which is higher than the base year level.

Then, Creditors payment days index is supposed to 100 for the base year i.e. 1997-'98. As the analytical point of view is concerned, this index draws numerical picture regarding the variation in creditors' payment days' level. Then, it increases slightly and goes up to 109.38 in the year 1998-'99. Then, it remains same for the next

two years in a raw. Then, it decreases to 106.25 in the year 2001-'02. Then again, it increases and goes up to 131.25 in the year 2003-'04 which is the highest level during the course period. Then after in the last year i.e. 2004-'05, it decreases and goes down to 125 days. It comes on an average to 112.89 which is higher than the base year level.

Here, the calculated value of chi-square works out to 1.96. On the other side, the critical value is 7.815. So, the critical value is higher than the calculated value. In this regard, it can be analyzed that the null hypothesis is rejected and the alternative hypothesis is accepted. It means, **"There is no significant difference in creditors' payment days' level of the company".** Moreover, the standard deviation comes out to 91.40 while the co-efficient of variation works out to 80.96. So, there is much variation in the productive indices.

Table No – 8.4

Creditors ratio of Liberty Ltd. (Rs. In Crore)

Year	NWC	Creditors	Ratio %	Velocity Days	Index	T.V.
1996-97	594.18	470.20	79.13	0.00		
1997-98	1147.64	596.81	52.00	32.00	100.00	100.78
1998-99	1241.67	603.64	48.62	35.00	109.38	104.24
1999-2000	1464.90	641.61	43.80	35.00	109.38	107.70
2000-01	1455.78	608.23	41.78	35.00	109.38	111.16
2001-02	1354.80	633.48	46.76	34.00	106.25	114.62
2001-03	1658.02	814.44	49.12	36.00	112.50	118.08
2003-04	1656.69	762.08	46.00	42.00	131.25	121.54
2004-05	1499.07	933.89	62.30	40.00	125.00	125.00
Total	12072.75	6064.38	469.51	289.00	903.13	903.13
Average	1509.09	758.05	58.69	36.13	112.89	112.89

Chi Squ : 1.96
SD : 91.40
CV :80.96

Creditors' Turn over ratios of the fertilizer companies and Kruskal Wallis' one way analysis of variance test.

The comparative position of creditors' ratios of fertilizer companies have been given in table no.4 along with the application of Kruskal Wallis' one way analysis of variance test on this ratio for the research period i.e., 1996-'97 to 2004-'05.

T A B L E NO. 8.5

Comparative Creditors' Turn over Ratios of fertilizer companies with Kruskal Wallis' one way analysis of variance test							
Year	GNVFC	R1	GSFC	R2	Liberty Phosphate Ltd.	R3	IFFCO	R4
1996-'97	25.97	2	92.78	24	55.69	15	79.13	22
1997-'98	56.68	16	126.33	29	50.96	13	52.00	14
1998-'99	47.05	10	109.42	26	76.61	21	48.62	11
1999-'00	31.21	3	93.02	25	70.51	19	43.80	7
2000-'01	40.65	5	137.39	33	75.81	20	41.78	6
2001-'02	124.44	28	346.01	36	38.21	4	46.76	9
2002-'03	130.55	31	-1581.93	1	135.10	32	49.12	12
2003-'04	121.66	27	243.09	35	128.54	30	46.00	8
2004-'05	81.88	23	193.89	34	70.17	18	62.30	17
Total		145		243		172		103

$$H = \frac{12}{N(N+1)} \left[\sum_{j=1}^{k} \frac{(R_j)}{n_j} \right] - 3(N+1)$$

$$= \frac{12}{(36+1)} \left[\frac{(145)}{9} + \frac{(243)}{9} + \frac{(172)}{9} + \frac{(106)}{9} \right] - 3(36+1) = \frac{}{36}$$

$$= \frac{12}{1332} (2336.11 + 6561 + 3287.11 + 1248.44) - 111$$

$$= 121.01 - 111$$

$$= \boxed{10.01}$$

The above table no.8.5 shows that the calculated value of H is 10.01, which is higher than the critical value i.e., 7.851. So here the null hypothesis based on Kruskal Wallis' one way analysis of variance test is rejected and the alternative hypothesis is accepted. It means, **"There is significant difference between the creditors' turn over ratios of the fertilizer companies".**

Refrences:

(1)   Agrawal N. K., Management of Working Capital, New Delhi : Sterling
        Publishers Pvt. Ltd. 1983.

(2)   Agrawal N. P., Analysis of Financial Statements, New Delhi : National
        Publishing House, 1982.

(3)   Agrawal R. C., State Enterprises in India., Allahabad : Chaitanya Publishing
        House, 1961.

(4)   Archer Stephen H. & D. Armosio, The Theory of Business Finance, New
        York and London, 1967.

(5)   Baneerjee Bhabatosh, Cash Management, The World Press, Private Ltd.,
        1982.

(6)   Bari R. R, Selected Readings in Cash Management, Delhi : Triveni
        Publications, 1981.

(7)   Batty J, Management Accountancy, London :
        Mac Donald and Evans Ltd., 1966.

(8)   Beckman. Theodoro. N, Credits and Collections Management and Theory,
        New York : Mc-Graw Hill, 1962.

(9)   Bhattacharya S. K. Raghvachari M. & Singh, A. K. Determinants of Effective
        Working Capital Management.
        Ahmedabad : Indian Institute of Management.

(10)   Block and Hirt., Foundation of Financial Management, Hichard D. Irwin Inc.,
        1984.

(11)   Brigham Eugene F. and Risks, R. Bruce., Readings in Essentials of
        Managerial Finance, U. S. A. : Holt, Rinehart and Winston, 1968.

(12)   Bucha Joseph and Koenigsberg Ernest, Scientific Inventory Management,
        New Delhi : Prentice Hall, India Pvt. Ltd., 1970.

(13)   Chadda R. S., Inventory Management in India, Bombay : Allied Publishers,
        1971.

(14)   Chapin Albert F., Credit and Collections – Principles and Prantice, New York,
        1947.

Chapter 9

SUMMARY OF FINDINGS

1. Introduction:

In the course of this study, different ratios, ratio indexes and trend value are calculated for the period 1996-'97 to 2004-'05. Statistical tools like standard deviation, co-efficient of variation and chi-square value are used for the present study. The year 1996-'97 was selected as the base year for the present study. The data are collected from the annual reports of various companies and some other supporting materials are also considered.

In the present study, two hypotheses have been tested from the analysis of different ratios of various fertilizers companies. First hypothesis is "Ratio indices of fertilizer companies may be represented by the straight line trend based on least square method". Chi-square test is also used. The second hypothesis is indicated as, "There is no significant difference between the ratios of fertilizer companies under the study". It is based on Kruskal Wallis one-way analysis of variance test and is concerned with inter unit comparisons.

Unit	Net Working Capital Turn over Ratio Average	Rank	Net Working Capital Turn over Ratio Index Average	Rank	Chi-square Value	Rank
GNVFC Ltd.	4.57	1	158.19	2	199.55	4
GSFC Ltd.	4.26	2	137.78	3	102.82	3
Liberty Phosphate Ltd.	3.92	3	158.57	1	53.02	2
IFFCO Ltd.	3.67	4	96.32	4	8.62	1
Combined Average	4.11		137.72		71.00	

2. Net Working Capital Turn over Ratio:

Net working capital turn over ratio can be defined as, "The ratio of sales to net working capital". It gives the information about the position of sales against the net working capital of the company.

Combined industrial average of net working capital turn over ratio during the course period is worked out at 4.11. So, in this reference it can be stated that for every rupee of net working capital, there is sales of Rs.4 approximately. So, this position is considered as good as company as a whole. If we see these figures with the individual company, GNVFC Ltd. (4.57) and GSFC Ltd. (4.26) are higher than the combined industrial average of net working capital turn over ratio. While Liberty Phosphate Ltd. (3.92) and IFFCO Ltd. (3.67) are lower than combined industrial average of net working capital turn over ratio. The position of GNVFC Ltd. is best in comparison to other companies.

As the success of net working capital turn over ratio is concerned, it can be pointed out from the net working capital turn over ratio indices of various fertilizer companies that the progress made in the net working capital turn over ratio during the course period has been the highest at 158.57 for Liberty Phosphate Ltd. while 158.19 for GNVFC Ltd. and 137.78 for GSFC Ltd. are higher than the combined average of net working capital turn over ratio indices.

Moreover, it can also be noted that the average value of chi-square value of fertilizer companies as a whole is higher than the critical value, consequently the net working capital turn over ratio indices of fertilizer companies or industry don't seem nearer to the straight line type pattern. The null hypothesis based on chi-square test is accepted regarding for all companies such as GNVFC Ltd. (119.55), GSFC Ltd. (102.82), Liberty Phosphate Ltd. (53.02) and IFFCO Ltd. (8.62) respectively. So, in all the companies, net working capital turn over ratio indices don't seem nearer to the straight line assumption as their chi-square value are higher than the critical value.

The second null hypothesis based on Kruskal Wallis' one way analysis of variance test at 5% level of significant is accepted as value of H=0.43 is lower than the critical value – 7.851. It makes clear that "There is no significant difference between the net working capital turn over ratio of the fertilizer companies".

At this time, it is required to state that the company should follow the required actions to increase the sales. These are as follows:

- IFFCO Ltd. should try to increase their sales as the ratio can be increased.
- Liberty Phosphate Ltd. and GSFC Ltd. should also try to increase their sales. These companies should introduce the new policies regarding to increase the sales.
- GNVFC Ltd. should also try to maintain this level, regularly.

Comparative Analysis of Current Ratio in Fertilizer Companies from 1996-'97 to 2004-'05						
Unit	Current Ratio Average	Rank	Current Ratio Index Average	Rank	Chi-square Value	Rank
GNVFC Ltd.	2.38	3	78.00	4	45.99	4
GSFC Ltd.	1.70	4	88.33	3	8.47	1
Liberty Phosphate Ltd.	2.49	2	90.86	2	33.29	3
IFFCO Ltd.	2.60	1	127.85	1	10.99	2
Combined Average	2.29		96.26		24.69	

Current Ratio:

Current ratio means, "The ratio of current assets to current liabilities". It gives the information about the current assets to current liabilities. In this reference it can be said that this ratio indicates the financial position of the company.

Combined industrial average of current ratio during the research period has come out at 2.29. As the analytical point of view is concerned, it can be noted that for every

rupee of current liabilities, there is current assets of Rs. 2.29. So, it is a favorable ratio because the standard level of current ratio is 2:1. If we compare these figures with individual company, IFFCO Ltd. (2.60), Liberty Phosphate Ltd. (2.60) and GNVFC Ltd. (2.38) are higher than the combined industrial average of current ratio while GSFC Ltd (1.70) is lower than the combined industrial average of current ratio. So the position of IFFCO Ltd. is best in comparison to other companies.

As the achievement of current ratio is concerned, it can be suggested from the current ratio indices of various fertilizer companies that the progress made in the study period has been the highest at 127.85 for IFFCO Ltd. while 90.86 for Liberty Phosphate Ltd., 88.33 for GSFC Ltd. and 78.00 for GNVFC Ltd. are lower than the combined industrial average of current ratio indices.

Moreover, it can also be disclosed that the average value of chi-square value of all fertilizer companies as a whole is higher than the critical value, consequently the current ratio indices of fertilizer industry don't seem nearer to the straight lint type pattern. The null hypothesis based on chi-square test is accepted regarding for all companies such as GNVFC Ltd. (45.99), Liberty Phosphate Ltd. (33.29), IFFCO Ltd. (10.99) and GSFC Ltd. (8.47) are higher than the critical value. So, in all the companies, current ratio indices don't seem nearer to the straight line assumption as their chi-square values are higher than the critical values.

The second null hypothesis based on Kruskal Wallis' one way analysis of variance test at 5% level of significant is rejected stock turn over ratio value of H=13.37 is higher than the critical value – 7.851 and alternative hypothesis is accepted. It indicates that "There is significant difference between the current ratio of the fertilizer companies".

By considering the above results, it is required to say that the company should apply the necessary suggestions. These are as follows:

- GSFC Ltd. must try to increase their current liabilities to increase the current ratio, because their ratio is lowest amongst all.

- IFFCO Ltd.'s financial position is best from other companies so that the company should try to maintain this level.

- GNVFC Ltd. and Liberty Phosphate Ltd. should also try to increase their current assets.

Comparative Analysis of Quick Ration in Fertilizer Companies From 1996-'07 to 2004-'05

Unit	Quick Ratio Average	Rank	Quick Ratio Index	Rank	Chi-square Value	Rank
GNVFC Ltd.	2.34	1	78.25	4	45.85	3
GSFC Ltd.	1.08	4	103.4	2	18.33	2
Liberty Phosphate Ltd.	1.59	2	97.43	3	83.22	4
IFFCO Ltd.	1.45	3	154.43	1	17.56	1
Combined Average	1.62		108.38		41.24	

QUICK RATIO:

Quick Ratio means, "The ratio of Quick assets to current liabilities". It indicates the liquid position of the company. Thus, it is important to refer Quick ratio of the fertilizer companies.

Combined industrial average of Quick ratio during the research period has come out at 1.62. From the analytical point of view, for every rupee of current liability, there is a Quick asset of rupee 1.62. If we compare this with the individual units, GNVFC (2.34) is higher than the combined industrial average of Quick ratio. While Liberty Phosphate Ltd. (1.59), IFFCO (1.45) and GSFC (1.08) are lower than the combined industrial average of Quick ratio of the Industry. So, the liquidity of GNVFC is satisfactory, in comparison to other companies.

So far as the achievement of Quick ratio is concerned, it can be said from the Quick ratio indices of various fertilizer companies that the progress made in the Quick ratio during the study period has been the highest at 154.43 for IFFCO Ltd. while 103.40 for GSFC Ltd., 97.43 for Liberty Phosphate Ltd. and 78.25 for GNVFC Ltd. are lower than the combined industrial average of Quick ratios.

Moreover, it also suggests that the average value of chi-square value of fertilizer companies as a whole is higher than the critical value, consequently the Quick ratio indices of fertilizer industry don't seen nearer to the straight line type pattern. The null hypothesis based on chi-square test is accepted regarding for all companies such as GNVFC Ltd. (45.85), GSFC Ltd. (18.33), Liberty Phosphate Ltd. (83.22) and IFFCO Ltd. (17.56) respectively. So, in all the companies, Quick ratio indices don't seem nearer to the straight line assumption as their chi-square values are higher than the critical value.

The second null hypothesis based on Kruskal Wallis' one-way analysis of variance test at 5% level of significant is rejected as value of H=15.18 is higher than the critical value − 7.851 and alternative hypothesis is accepted. It clears that there is significant difference between the Quick ratios of the fertilizer companies.

It is also necessary to say that the plant should take needful actions to improve their liquid position. Some suggestions are:
- GSFC Ltd. must increase their Quick assets in comparison to their current liabilities.
- GNVFC Ltd. should try to decrease their current liabilities regarding the present ratio.

Unit	Stock Turnover Ratio Average	Rank	Stock Turnover Ratio Index Average	Rank	Chi-square Value	Rank
GNVFC Ltd.	6.17	2	100.38	4	10.94	1
GSFC Ltd.	4.48	4	138.48	3	19.09	3
Liberty Phosphate Ltd.	6.29	1	171.23	1	103.64	4
IFFCO Ltd.	5.16	3	143.37	2	15.24	2
Combined Average	5.53		138.37		37.23	

Comparative Analysis of Stock Turnover Ratio in Fertilizer Companies From 1996-'97 to 2004-'05

Stock Turn-over Ratio:

Stock turn over ratio can be defined as, "The ratio of sales to stock amount". It indicates the sales position of the company. It clears the level of sales against the stock level during the year.

Combined industrial average of stock turn over ratio during the study period has come out at 5.53. From the analytical point of view, it can be said that the average stock is sold five and half times during the year by the fertilizer company. It indicates the selling capacity of the company. If it is compared with the individual units, Liberty Phosphate Ltd. (6.29), and GNVFC (6.17) are higher than the combined industrial average of stock turn over ratio while IFFCO (5.16) and GSFC (4.48) are lower than the combined industrial average of stock turn over ratio of the industry. So, the selling level of Liberty Phosphate Ltd. and GNVFC is satisfactory in comparison to other companies.

So far as the achievement of stock turn over ratio is concerned, it can be said from the stock turn over ratio indices of various fertilizer companies that the progress made in the stock turn over ratio during the study period has been the highest at 171.23 for Liberty Phosphate Ltd. while IFFCO (143.37) GSFC (138.48) are higher than the

combined industrial average of stock turn over ratio. While GNVFC (100.38) is lower than the combined industrial average of stock turn over ratio.

Moreover, it also suggests that the average value of chi-square value of fertilizer companies as a whole is higher than the critical value, consequently the stock turn over ratio indices of fertilizer industry don't seem nearer to the straight lint type pattern. The null hypothesis based on chi-square test is accepted regarding for all companies such as Liberty Phosphate Ltd. (103.64), GSFC (19.09), IFFCO (15.24) and GNVFC (10.94) respectively. So, in all the companies, stock turn over ratio indices don't seem nearer to the straight line assumption as their chi-square values are higher than the critical values.

The second null hypothesis based on Kruskal Wallis' one way analysis of variance test at 5% level of significant is rejected as value of H=7.950 is higher than the critical value, 7.851 and alternative hypothesis is accepted. It means that there is significant difference between the stock turn over ratios of the fertilizer companies.

It is also required to note that the company should take necessary actions to improve their selling capacity to do more turn over. Some suggestions are:

- Liberty Phosphate Ltd. should increase their sales in comparison to their level of stock.

- GSFC must be tried to increase their sales to increase the turn over.

- Adoption of different policies to increase sales value can improve the turn over of GNVFC.

Comparative Analysis of Debtors' Turn Over Ratios in Fertilizer Companies From 1996-'97 to 2004-'05						
Unit	Debtors' Turn over Ratio Average	Rank	Debtors' Turn over Ratio Index Average	Rank	Chi-square Value	Rank
GNVFC Ltd.	6.01	2	81.39	3	20.70	1
GSFC Ltd.	4.48	4	72.98	4	36.56	3
Liberty Phosphate Ltd.	5.09	3	148.58	1	85.84	4
IFFCO Ltd.	17.10	1	109.78	2	32.82	2
Combined Average	8.17		103.18		43.98	

Debtors' Turn over Ratio:

Debtors' turnover ratio can be described as, "The ratio of sales to Debtors". It gives the information about the total sales, cash sales and debit sales of the company. It clarifies the sales position in comparison to debtors' position.

Combined industrial average of Debtors' turn over ratio during the research period has come out at 8.17. From the analytical point of view, it can be said that for every rupee of Debtor, there is a sales of rupee 8.17. If we compare this with the individual units, IFFCO Ltd. (17.10) is higher than the combined industrial average of Debtors' turn over ratio. While GNVFC (6.01), Liberty Phosphate Ltd. (5.09) and GSFC Ltd. (4.48) are lower than the combined industrial average of Debtors' turn over ratio of the industry. So, the position of IFFCO Ltd. is satisfactory in comparison to other companies.

So far as the achievement of Debtors' turn over ratio is concerned, it can be noted from the Debtors' turn over ratio indices of various fertilizer companies that the progress made in the Debtors' turn over ratio during the course period has been the highest at 148.58 for Liberty Phosphate Ltd. And 109.78 for IFFCO Ltd. is also higher than the combined industrial average of stock turn over ratios. While 81.39 for GNVFC Ltd. and 72.98 for GSFC are lower than the combined industrial average of stock turn over ratios.

Moreover, it can be pointed out that the average value of chi-square value of fertilizer companies as a whole is higher than the critical value, consequently the debtors' turn over ratio indices of fertilizer industry don't seem nearer to the straight lint type pattern. The null hypothesis based on chi-square test is accepted regarding for all companies such as Liberty Phosphate Ltd. (85.84), GSFC (36.56), IFFCO (32.82) and GNVFC (20.70) respectively. So, in all the companies, stock turn over ratio indices don't seem nearer to the straight line assumption as their chi-square values are higher than the critical value.

The second null hypothesis based on Kruskal Wallis' one way analysis of variance test at 5 % level of significant is rejected as value of H=22.64 is higher than the critical value – 7.851 and alternative hypothesis is accepted. It clarifies that there is significant difference between the Debtors' turn over ratios of the fertilizer companies.

At this time, it is required to say that the company should take necessary actions to increase their sales. These are as under:

- Different policies to increase total sales as well as cash sales can improve the ratio of GSFC Ltd.
- IFFCO Ltd.'s selling position is best in comparison to other companies. So, the company should maintain this level.

Comparative Analysis of Cash Position Ratio in Fertilizer Companies from 1996-'97 to 2004-'05

Comparative Analysis of Net Working Capital Turn over Ratio in Fertilizer Companies from 1996-'97 to 2004-'05

Unit	Cash Position Ratio Average	Rank	Cash Position Ratio Index Average	Rank	Chi-square Value	Rank
GNVFC Ltd.	0.32	1	69.33	3	35.55	1
GSFC Ltd.	0.08	4	54.06	4	45.94	2
Liberty Phosphate Ltd.	0.22	2	105.72	2	76.29	3
IFFCO Ltd.	0.16	3	113.70	1	94.24	4
Combined Average	0.20		85.70		63.01	

Cash Position Ratio:

Cash position ratio can be described as, "The ratio of cash and bank to current liabilities". It gives the information about the cash and bank balance against the current liabilities. This ratio indirectly indicates the liquid position of the company.

Combined industrial average of cash position ratio during the study period i.e. 1996-'97 to 2004-'05 has come out at 0.20. So far the analytical point of view is concerned, it can be pointed out that for every rupee of current liabilities there is cash and bank balance of rupees 0.20. If we compare these figures with the individual company, GNVFC Ltd. (0.32) and Liberty Phosphate Ltd. (0.22) are higher than the combined industrial average of cash position ratio while IFFCO Ltd. (0.16) and GSFC Ltd. (0.08) are lower than the combined industrial average of cash position ratio. So the position of GNVFC Ltd. is satisfactory in comparison to other companies.

So far the achievement of cash position ratio is concerned, it can be stated from the cash position ratio indices of various fertilizer companies that the progress made in the cash position ratio during the study period has been the highest at 113.70 for IFFCO Ltd. while 105.72 for Liberty Phosphate Ltd. is higher than the combined industrial average of cash position ratio indices. And 69.33 for GNVFC Ltd. and 54.06 for GSFC Ltd. are lower than the combined industrial average of cash position ratio indices.

Moreover, it can also be indicated that the average value of chi-square value of all fertilizer companies as a whole is higher than the critical value, consequently the cash position ratio indices of fertilizer industry don't seem nearer to the straight lint type pattern. The null hypothesis based on chi-square test is accepted regarding for all companies such as IFFCO Ltd. (94.24), Liberty Phosphate Ltd. (76.29), GSFC Ltd. (45.94) and GNVFC Ltd. (35.55) are higher than the critical value. So, in all the companies cash position ratio indices don't seem nearer to the straight line assumption as their chi-square values are higher than the critical values.

The second null hypothesis based on Kruskal Wallis' one way analysis of variances test at 5% level of significant is rejected as value of H=22.45 is higher than the critical value – 7.851 and the alternative hypothesis is accepted. It indicates that "There is significant difference between the cash position ratio of the fertilizer companies".By viewing the above figures, it is required to way that the company should apply the needful suggestions. These are as under:

- GSFC Ltd. must try to decrease current liabilities to increase the ratio.
- IFFCO Ltd. should also try to decrease current liabilities so that the ratio can be increased.
- Liberty Phosphate Ltd. should also try to increase the cash bank balance so that the ratio can be increased.
- Liberty Phosphate Ltd. also tries to increase their sales.

Comparative Analysis of Creditors' Turn Over Ratio in Fertilizer Companies from 1996-'07 to 2004-'05

Unit	Creditors' Turn over Ratio Average	Rank	Creditors' Turn over Ratio Index Average	Rank	Chi-square Value	Rank
GNVFC Ltd.	73.34	2	127.47	1	7.25	3
GSFC Ltd.	-26.66	4	90.87	4	4.34	2
Liberty Phosphate Ltd.	77.96	1	120.00	2	8.55	4
IFFCO Ltd.	58.69	3	112.81	3	1.96	1
Combined Average	45.83		112.81		5.53	

Creditors' Turn over Ratio:

Creditors' turn over ratio means, "The ratio of creditors to net working capital". It gives the information about the creditors against net working capital. It also suggests the ability of paying miscellaneous expenses of the company.

Combined industrial average of creditors' turn over ratio during the study period has come out at 45.83%. So, by over viewing this figure, it can be stated that for every hundred rupees of working capital, there are creditors of Rs.46 approximately. If we compare these figures with the individual companies, Liberty Phosphate Ltd. (77.96%),

GNVFC (73.34%) and IFFCO (58.69%) are higher than the combined industrial average of creditors' turn over ratio. While GSFC Ltd. (-26.66%) is lower than the combined industrial average. So, the position of Liberty Phosphate Ltd. is satisfactory in comparison to other companies. So far the success of creditors' ratio is concerned, it can be intimated from the creditors' ratio indices of various fertilizer companies that the progress made in the creditors' ratio during the research period has been the highest at 127.47 for GNVFC Ltd. While 120.00 for Liberty Phosphate Ltd., 112.89 for IFFCO Ltd. is lower than the combined industrial average of creditors' ratios.

Moreover, it also states that the average value of chi-square value of all fertilizer companies is lower than the critical value, consequently the creditors' ratio indices of fertilizer industry seems nearer to the straight line type pattern. The null hypothesis based on chi-square test is accepted in reference to Liberty Phosphate Ltd. for 8.55 because this chi-square value is higher than the critical value. While the alternative hypothesis is accepted regarding GNVFC Ltd. (1.96), GSFC Ltd. (4.34) and IFFCO Ltd. (1.96) respectively. So, in all the companies, creditors' ratio indices seem nearer to the straight line assumption as their chi-square values are higher than the critical value.

The second null hypothesis based on Kruskal Wallis' one way analysis of variance test at 5% level of significant is rejected as value of H=10.01 is higher than the critical value-7.851 and alternative hypothesis is accepted. It clarifies that there is significant difference between the creditors' ratio of the fertilizer companies. At this time, it is needful to state that the company should follow the necessary actions to increase the working capital and to decrease the creditors. These are as under:
-      GSFC Ltd. must purchase by cash so that the creditors' ratio can be decreased and the company should also do try to increase their current assets.
-      IFFCO Ltd. should also try to increase their current assets and to decrease the creditors so that the creditors' ratio can be decreased.

Liberty Phosphate Ltd. and GNVFC Ltd. must also try to increase their current assets and to decrease the creditors. The company should also give importance to cash purchase.

Bibliography:

(15)   Agrawal N. K., Management of Working Capital, New Delhi : Sterling Publishers Pvt. Ltd. 1983.

(16)   Agrawal N. P., Analysis of Financial Statements, New Delhi : National Publishing House, 1982.

(17)   Agrawal R. C., State Enterprises in India., Allahabad : Chaitanya Publishing House, 1961.

(18)   Archer Stephen H. & D. Armosio, The Theory of Business Finance, New York and London, 1967.

(19)   Baneerjee Bhabatosh, Cash Management, The World Press, Private Ltd., 1982.

(20)   Bari R. R, Selected Readings in Cash Management, Delhi : Triveni Publications, 1981.

(21)   Batty J, Management Accountancy, London : Mac Donald and Evans Ltd., 1966.

(22)   Beckman. Theodoro. N, Credits and Collections Management and Theory, New York : Mc-Graw Hill, 1962.

(23)   Bhattacharya S. K. Raghvachari M. & Singh, A. K. Determinants of Effective Working Capital Management. Ahmedabad : Indian Institute of Management.

(24)   Block and Hirt., Foundation of Financial Management, Hichard D. Irwin Inc., 1984.

(25)   Brigham Eugene F. and Risks, R. Bruce., Readings in Essentials of Managerial Finance, U. S. A. : Holt, Rinehart and Winston, 1968.

(26)   Bucha Joseph and Koenigsberg Ernest, Scientific Inventory Management, New Delhi : Prentice Hall, India Pvt. Ltd., 1970.

(27)   Chadda R. S., Inventory Management in India, Bombay : Allied Publishers, 1971.

(28)   Chapin Albert F., Credit and Collections – Principles and Prantice, New York, 1947.

(29)   Choudhary A. B., Analysis and Interpretation of Financial Statements through Financial Ratios. Orient Longmans, 1970.

(30)   Cumen Ward S., Principles of Financial Management, New York, 1970.

(31)   Dagli Vadilal, The Public Sector in India, Bombay, 1969.

(32)   Dauten Carl, A, Business Finance—The Fundamentals of Financial Management, Englewood Cliffs, (N.J.) 1961.

(33)   Dobler Donald W. and Leelamer (Jr.) ., Purchasing and Materials Management, New York, 1965.

(34)   Donaldson E. F, Corporate Finance, New York : Ronald Press Company, 1957.

(35)   Earnest Davies, National Enterprises London : George Allen and Unwin Ltd., 1946.

(36)   Emerson O. Henke., Introduction to Accounting, New York : Petrocelli/Charter, 1974.

(37)   Ettinger Richard, P. and Goliep David, E., Credits and Collections, New York : Prentice Hall, 1962.

(38)   Firth Michael., Management of Working Capital, The Macmillan Press Ltd., 1976.

(39)   Fitzgerald's N. S. Gole., Analysis and Interpretation of Financial Statements, Butter Worth's IV Edn., 1966.

(40)   Foulke Roy A., How to Control Accounts Receivable for Greater Profits, New York, 1959.

(41)   Gestenberg Charles, W., Financial Organisation and Management of Business, Bombay : Asia Publishing House, 1962.

(42)   Gitmen L. J., Principles of Managerial Finance, New York : Harper and Row, 1976.

(43)   Gole V. L., The Management of Working Capital, Melborne : The Australian Accountant, 1959.

(44)   Gole V. L., Fitzgerald's., Analysis and Interpretation of Financial Statements, Sydney, 1966.

(45)   Greig Cutbert, Commercial Credits and Accounts Collection, the Furniture Record, London, 1952.

(46)   Gross Harry, Financing Small and Medium Sized fertilizer Business, (N.J.) : Prentice Hall INC. Englewood Cliffs.

(47)   Gupta R. K., Public Enterprises in India, Agra : Sahitya Bhawan, 1978.

(48)   Gupta R. L., Advanced Accountancy, New Delhi : Sultan Chand and Sons, 1976.

(49)   Gupta S. P., Statistical Methods, New Delhi : Sultan Chand, 1984.

(50)   Guthmann H. G., and Dougall, H., Corporate Financial Policy, New Delhi : Prentice Hall, 1955.

(51)   Hanson A. H., Managerial Problems in Public fertilizer Enterprises, Bombay, 1962.

(52)   Hartley W. C. F., Cash Planning, Forecasting and Controlling, London, 1976.

(53)   Harvey M. Wagner, Principles of Operations Research with Special Reference to fertilizer Manufactures, Inventories, NBER, 1950.

(54)   Herbert B. Mayo, Basic Finance—An Introduction to Money and Financial Management, W. B. Saunders Company, 1978.

(55)   Hingorani N. L. & Ramanathan, A. R., Management Accounting, New Delhi : S. Chand & Sons, 1973.

(56)   Homonoff Richard & Mullins, David Wiley, Jr., Cash Management, D. C. Heath and Company, 1975.

(57)   Howard B. B. and M. Upton, Introduction to Business Finance New York : McGraw—Hill Company Inc 1953.

(58)   Howard L. R., Working Capital – Its Management and Control, London : Macdonald & Evans Ltd., 1971.

(59)   Hunt Pearson, William Charles M. and Donaldson, Gordan Basic Business Finance Text and Cases, Richard D. Irwin, Illinois, 1966.
(60)   I. C. W. A. London, "The Profitable use of Capital in Industry", London : I. C. W. A., 1965.
(61)   Johon, F. Magee, "Guide to Inventory Policy Functions and Lot Sizes". Harvard Business Review, 34 (January—February) 1956.
(62)   Johnson, R. W., Financial Management, Allyn & Bacon, Boston, 1962.
(63)   Joseph, L. Wood, Credit and Collections in Doris Lillcan, Business, Finance Hand Book, New York : Prentice Hall, 1953.
(64)   Juma Volter Mwapachu, Management of fertilizer units in Developing Countries, Oxford and I. B. H. Publishing Company, 1983.
(65)   Khare, B. D., Inventory Control, New Delhi : National Productivity Council, 1971.
(66)   Keneddy, Ralph D. & Mcmullan Stewart Y, Financial Statements : Form, Analysis and Interpretations : Richard D. Irwin, Illinois, V., 1968.
(67)   Kent, Raymond P., Corporate Financial Management, Richard D. Irwin, Illinois, 1960.
(68)   Kulkarni P. V., Financial Management, New Delhi : Himalaya Publishing House, 1983.
(69)   Khera, S. S., Government in fertilizer Business, Delhi, National Publishing House.
(70)   Kuchhal S. C., Financial Management, Allahabad : Chaitanya Publishing House, 1973.
(71)   Lawrence, D. Schall & Charles W., Haley Introduction to Financial Management, New York : McGraw Hill Book Company.
(72)   Laxmi Narain, fertilizers in india, Delhi 1968.
(73)   Lincoln Edmond E., Applied Business Finance, New York : Mc-Graw Hill, 1929.
(74)   Mamoria C. B., Organisation, Finance and Management of Industries, 1969.
(75)   Mayor John. N., Financial Statement Analysis., New Delhi : Prentice Hall of India Pvt. Ltd., 1974.
(76)   Mehta, D. R., Working Capital Management, New Jersey Prentice-Hall Inc. Englewood Cliffs, 1974.
(77)   Mishra, R. K., & Ravi Shanker S., Current Perspective in fertilizers , Delhi : Ajanta Publications (India), 1985.
(78)   Mishra R. K., Problems of Working Capital with reference to selected Public Undertakings in India, Bombay : Somaiya Publications Pvt. Ltd., 1975.
(79)   Mitchell W. E., Cash Forecasting, Pennsylvania : International Text Book, 1967.
(80)   Motall M. H. B. and E. I., Working Capital, its role in the Short-run Liquidity Policy of Industrial Concerns, Accounting Research Vol. 9, 1958.
(81)   Murao Bahadur's, Management Accounting, New Delhi : Meenakshi Prakashan, 1982.
(82)   Nagar K. N, Basic Elements of Statistics, New Delhi : Meenakshi Prakashan, 1974.

(83)   National Association of Accountants, Cash Flow Analysis for Managerial Control, New York, Research Report No. 38, 1961.
Techniques in Inventory Management, New York, Research Report No. 40, 1964.

(84)   National Council of Applied Economic Research : Structure of Working Capital, New Delhi, 1966.

(85)   National Association of Credit Management : Credit Management Hand Book, Richard, D. Irwin, Inc. Home Wood Ill., 1965.

(86)   Nigam, B. M. L, Advanced Cost Accounting, Bombay : Himalaya Publishing House, 1983.

(87)   Nigam Dr. Raj. K., Management of Public Sector in India, Bombay, 1971.

(88)   O. Donnell and Milton, S. Goldberg, Accountant Financial Administration, New Delhi : Prentice Hall of India Pvt. Ltd., 1964.

(89)   Om Prakash, The Theory and Working of State Corporations, London : Patwardhan, Orient Longman Ltd., 1971.

(90)   Orgler Yair, E., Cash Management, and Models, WordsWorth Publishing Co. Inc. Belmont, California, 1970.

(91)   Pandey I. M., Financial Management, New Delhi : Vikas Publishing House Pvt. Ltd., 1983.

(92)   Park Colin and Gladson John W., Working Capital, New York : Macmillan Company, 1963.

(93)   Prasanna Chandra, Financial Management—Theory and Practice. New Delhi: Tata Mc—Graw Hill Publishing Company, 1984.

(94)   Prather Charles L., Financing of Business Firms, Richard D. Irwin, Illinois. 1956.

(95)   Ramanadham V. V., The Working of Public Sector, New Delhi: Allied Publishers, 1965.

(96)   Ramamoorth V. E., Working Capital Management, Madras: Institute of Financial Management and Research, 1976.

(97)   Raymond A. Hoffman, Inventories : A Guide to their Control. Costing and Effects upon Income and Taxes, New York : Ronald Press, 1962.

(98)   Raymond G. Schultz and Robert, E. Schultz, Basic Financial Management— Text Problems and Cases. Pennsylvania : Intex Educational Publishers, 1972.

(99)   Robanson W. A., Problems of Nationalised Industry, London : George Allen and Unwin Ltd., 1952.

(100)   Robert H. Werssel, Principles of Financial Analysis, New York : The Macmillian Co., 1961.

(101)   Robert N. Anthony, Management Accounting—Text and Cases, Richard D. Irwin, Inc., 1964.

(102)   Saliers E. A., Hand Book of Corporate Management and Procedure, New York : McGraw Hill, 1927.

(103)   Saloman J. Flink & Donald Granewald, Management Finance, John Wiley & Sons. Inc., 1969.

(104)   Sanker T. L., Mishra R. K. and Ravishanker, Public Enterprises in India – The Focus on Researches, Bombay : Himalaya Publishing House, 1983.

(105) Sharma G. D., Working of State Enterprises in Rajasthan (Unpublished Thesis)

(106) Sharma B. S., Financial Planning in the Indian Public Sector—A Management Approach, New Delhi : Vikas Publishing House, 1974.

(107) Smith, K. V., Management of Working Capital, New Delhi : West Publishing Company, 1974.

(108) Simpson & Kafka. 'Basic Statistics'

(109) Starr, Martin, K. and David, W. Miller, Inventory Control, Theory and Practice, Englewood Cliffs (N.J.), Prentice Hall, 1962.

(110) Stevens W. Mackenzie, Financial Organisation and Administration, New York : McGraw Hill, 1934.

(111) Tarrif Commission as quoted in Venketsubbiah, H. The Anatomy of Indian Planning Bombay : Vora & Company, 1969.

(112) Thomas Keens, D. L., Business Accounts and How to Read Them, in Studies in Accounting : W. T., Baxter, Sweet and Maxwell Ltd., 1950.

(113) United Nations Some Problems in the Organisation and Administration of fertilizers, New York : 1954.

(114) Walker Ernest, W., Essentials of Financial Management, New Delhi : Prentice Hall of India Ltd. 1976.

(115) Walter M. H. The Profitable Use of Capital in Industry, London : I.C.W.A., 1966.

(116) Wixon Rufus and Walter, G. Kell, Accountant's Handbook, New York : The Ronald Press Company, 1956.

(117) Van Horne James C., Fundamentals of Financial Management, (N.J.), Prentice Hall INC. Englewood, Cliffs, 1971.

(118) Yorston R. K., Smyth E. B., Brown S. R. & Rodger, W. G. Advanced Accounting, The Law Book Co. of Australia Pvt. Ltd., III ed., 1953.

(119) Vyas J. N. Financing and Industrial, N. K. Vyas, Family Trust, Ahmedabad, 1983.

(120) Ziauddin Khan and Arora R. K., Fertilizers in India, Ed. 1975.