INTRODUCTION AND DESIGN OF THE STUDY
CHAPTER I
INTRODUCTION AND DESIGN OF THE STUDY

Indian economy has undergone radical changes in the last decade. Major policy and liberalization measures have been launched by the Government of India in almost all fields of economic activity in which the Government is involved in one way or the other. Substantial liberalization of controls have been effected in the fields of industrial licensing, foreign trade, foreign investments in industry, disinvestments of government holdings in industry and public sector enterprises, opening up of several sectors to private investment, and rationalization of direct and indirect taxes. In such a changed economic scenario, it is imperative for all industries, whether public or private, to timely tighten their belts and check their financial stability in the forthcoming competitive days. For, only financial soundness can ensure the survival and longevity of enterprises. Many business ventures have failed due to a lack of proper financial management, and more specifically because of inefficient liquidity management. One of the major handicaps in developing new industries and transforming the existing ones from traditional to modern modes of management, is the paucity of finance. Hence, it is essential to study the extent to which the Indian industries have been successful in managing their working capital to ensure liquidity and profitability of the enterprises.

Although making profit is the primary goal of business, unless there is cash coming through profit, a business enterprise cannot survive for a long period of time. The sustained growth of it depends first on its liquidity and then on its earnings. The earnings improve if the firm is successful in improving the asset turnover, and minimizing the cost. The firm should aim at improving the utilization of both its current and fixed assets. There is a limit up to which fixed assets can be put to effective use. But, with regard to current assets, which forms more than one-half of an enterprise’s
total assets, its efficient management and utilisation will substantially bring down the investment in it. Every business enterprise strives to improve its earnings and also the quality of those earnings. The quality of earnings increases if a greater part of the earnings comes from better asset and profit managements. In order to maximize the wealth of the firm, the business has to concentrate more on the management of the assets side rather than the liability side of the balance sheet.

1.1. STATEMENT OF THE PROBLEM

The general state of corporate liquidity in India has tended to be fairly difficult. A large number of business enterprises in the public and private sectors, irrespective of their age, size or product lines, are found experiencing enormous difficulties in meeting their short-term maturing obligations. For a smooth running of the business, it should have the required degree of liquidity. It should be neither excessive nor inadequate. Excessive liquidity implies accumulation of idle funds which earn no profit for the firm, and inadequate liquidity results in interruption of production, and hampers the firm’s earning capacity also.

During the 1990’s, the Indian industrial sector has gone through periods of robust growth and also severe slow down. These variations in performance took place in the backdrop of substantial policy changes during the same period. The policy changes of 1990’s have affected different industries in different ways. The chemical industry is one among the various industries which have benefitted the most from liberalization and market orientation. This industry has responded well and benefitted significantly by taking advantage of the stimuli for growth.

The importance of chemical industry lies in the fact that it embraces various sectors extending from fertilizers and agro-chemicals to pharmaceuticals and dyes, many of which are closely related and interdependent. The products which are penultimate
outputs for one set of users are the starting points for others, and finished products for the manufacturers. The chemical industry, which comes under the category of intermediate goods, is working capital-intensive in nature, and so, this study intends to find out the extent to which the industry is successful in managing the working capital to ensure both liquidity and profitability. The profitability, in turn, may result in better quality of earnings.

The research problem is applied to selected chemical products in order to find answers to the following questions:

1. How far is the industry efficient in resource allocation to various components of current assets?
2. What type of financing policy has been followed in financing the net current assets?
3. What is the direction of the movement of working capital?
4. How does one identify whether a company is liquid or not?
5. Does liquidity affect the profitability and quality of earnings?

1.2. OBJECTIVES OF THE STUDY

The broad objectives of the study are to analyse the working capital, liquidity and quality of earnings of the firms. The specific objectives of the study are as follows:

1. To study the structure of working capital of the sample firms.
2. To study the financing policy adopted for the net current assets.
3. To analyse the trends in working capital, and also to determine the efficiency of working capital management.
4. To examine the various measures of liquidity, and to measure its association with profitability.
5. To compute the quality of earnings, and to measure its relationship with liquidity.
1.3. **HYPOTHESES OF THE STUDY**

The following hypotheses are framed in consonance with the objectives of the study:

1. There is no significant difference in the structure of current assets among the sample groups.
2. There is no significant difference in the risk-values among the sample groups.
3. There is no significant relationship between risk-value and return on equity in the sample groups.
4. There is no significant difference in current assets index, current liabilities index and gross sales index among the sample groups.
5. There is no significant difference in performance, utilization and efficiency indices among the sample groups.
6. There is no significant relationship between the selected liquidity measures and the return on total assets.
7. There is no significant relationship between the selected liquidity measures and the quality of earnings.

1.4. **METHODOLOGY**

**Sampling Design**

The chemical industry is purposively selected for the study considering its importance in different sectors of the economy. The industry is highly heterogeneous in nature, and is classified as organic chemicals and inorganic chemicals. Various chemical products are listed under inorganic chemicals.

In the first stage, four chemical products viz., paints and varnishes, drug formulations, fertilisers and pesticides are selected, since they represent important sectors of economy like agriculture, industry and society.
In the second stage, the selection of the firms is made. The Official Directory and ‘prowess’ Database of the centre for Monitoring Indian Economy (CMIE), is extensively used to select the sample firms. At the time of selection of samples, the number of firms listed in the CMIE directory was 19 under paints and varnishes group, 162 under drug formulations group, 47 under fertilisers, and 39 under pesticides group. Since time series analysis is to be made for the chosen period of 1989-90 to 1998-99, the financial data for the continuous period of ten years has become necessary. This constraint has resulted in the reduction of the sample firms to fifty.

The sample includes thirty seven Indian companies in the private sector, eight foreign companies, three companies in the government sector, and two Central Government undertakings.

The sample companies are classified into different groups on the basis of the products manufactured, size and age for the purpose of analysis.

Classification by products

Though there are many chemical products, the study focuses only on four chemical products viz., paints and varnishes, drug formulations, fertilisers and pesticides.

Classification of the sample firms by products

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Product</th>
<th>No. of Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Paints and varnishes</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Drug formulations</td>
<td>19</td>
</tr>
<tr>
<td>3.</td>
<td>Fertilisers</td>
<td>14</td>
</tr>
<tr>
<td>4.</td>
<td>Pesticides</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

Source : Collected from secondary data
Classification by Age

The sample companies are also classified into three age-groups viz. old, moderately old and new. The old companies are those incorporated prior to 1950; those incorporated between 1950 and 1975 are classified under moderately old category, and those incorporated after 1975 are classified under new category.

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Age</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Old</td>
<td>19</td>
</tr>
<tr>
<td>2.</td>
<td>Moderately old</td>
<td>18</td>
</tr>
<tr>
<td>3.</td>
<td>New</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

Source: Computed

Classification by Size

The sample companies are classified into four size groups based on their average paid-up capital which is the simple average of the paid up capital at the end of the years 1989-90 and 1998-99. These groups are small, medium, large and giant. The companies that have an average paid up capital up to Rs. 10 crores are classified as small companies; those with a paid up capital of more than Rs.10 crores but up to Rs.25 crores are classified under the medium category. Those having more than Rs 25 crores but up to Rs 50 crores are classified as big companies, and those above Rs 50 crores are classified under the giant group.
Classification of the sample firms by size

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Size</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Small</td>
<td>27</td>
</tr>
<tr>
<td>2.</td>
<td>Medium</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Large</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Giant</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Computed

Classification by Liquidity

The sample companies are also classified into less liquid and more liquid ones based on the liquidity scores assigned to them. The liquidity scores are assigned based on the weightage given to the selected liquidity measures. Since median value of the liquidity ranks is applied as the cut-off point, the sample include 25 less liquid and 25 more liquid firms.

Classification of the sample firms by liquidity scores

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Liquidity</th>
<th>Liquidity scores</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Less liquid</td>
<td>503-656</td>
<td>25</td>
</tr>
<tr>
<td>2.</td>
<td>More liquid</td>
<td>657-945</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Computed

The product-wise classification of the companies is applied throughout the study, whereas age-wise and size-wise classifications are applied only to carry out the first two objectives of the study, since the resource allocation to current assets and the financing policy in respect of the same are also influenced by the age and size of the companies. The liquidity-wise classification is applied only to study the impact of the liquidity measures on the profitability and also on the quality of earnings.
Sources of Data and Data Collection

The study is mainly based on the secondary data which are collected from the Official Directory and "Prowess" Data base of the Centre for Monitoring Indian Economy (CMIE). The Stock Exchange Official Directory, Mumbai, and Kothari's Industrial Directory of India were also referred to supplement the data. The Reserve Bank of India Bulletin, and the publications of the Central Statistical Organisation were also used as Data sources. Random checks were conducted by comparing the data with the Annual Reports of the companies.

Framework of Analysis

The study is directed towards analysing the working capital, liquidity and quality of earnings of the sample firms and product groups. A product group consists of the firms manufacturing the same type of product. Inter-firm comparison and product group comparisons are made throughout the study period. As the Ratio Analysis is regarded as one of the best tools in analysing and comparing the time series data of different firms, this study makes extensive use of ratios in the process of analysing the data. Ratios are computed in order to study the structure of working capital, liquidity measures and the quality of earnings.

The study makes use of various statistical tools in order to analyse the data, and to form conclusions out of it. The statistical techniques like arithmetic mean, median coefficient of variation (c.v), 't’ tests, trend indices, average growth rate, correlation coefficient (r), coefficient of determination (r^2), analysis of variance, discriminant analysis, multiple correlation coefficient, step-wise multiple regression analysis, Spearman’s rank correlation and correlation matrix are employed in the study. The use of all these techniques at different places is made in the light of the nature and suitability of data available and to satisfy the requirements of the analysis. A brief description of the important tools used for the analysis and their application in the study, is given below:
The percentage analysis is applied to study the structure of working capital. The median value is used to provide a cut-off point to distinguish the less liquid companies from the more liquid ones. F test and 't' tests have been conducted in order to study the significance of association between the variables.

**Trend Indices**

The trend indices are computed to find out the change in the value of variable in the year ‘t’ from that of the base year. To compute the index of change in a variable, the following formula is used:

\[ I_t = \frac{(Y_t)}{Y_0} \times 100 \]

where, \( Y_t \) is the value of the variable in the year ‘t’ for which the index is to be computed, and \( Y_0 \) is the value of the variable in the base year.

The trend indices are employed to study the direction of movement of current assets, current liabilities and gross sales.

**Annual Growth Rate (AGR)**

This shows the rate of growth of a variable at a point of time in the study period. It is given by the formula:

\[ Y = a + bt \]

where, 
\[ b = \frac{[N \sum Y_t - \sum Y \sum t]}{[N \sum t^2 - (\sum t)^2]} \]

\[ a = Y - bt \] , where \( y \) = mean of \( y \) 

and \( t = \) time in years 

(b gives the rate of growth at a given point of time).

The annual growth rate is calculated to find out the growth of current assets, current liabilities and gross sales in respect of the sample firms and groups.
Correlation Co-efficient

It is the numerical expression of relationship between two variables ie. X and Y.

It is defined as:

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

To interpret the relationship between the two variables, co-efficient of determination called $$r^2$$ is used. The relationship between risk-value and return on equity is studied by calculating the correlation and regression co-efficients.

Analysis of Variance (ANOVA)

It is the technique of analysing the variance explained by the dependent variable based on selected independent variables. The independent variables are termed as group variables or factors. ANOVA is used to find out whether the group means of the dependent variable differ significantly or not based on the classification of the independent variable.

The ANOVA test is extensively applied in this study to find out whether there is any significant difference in the working capital structural ratios among years, among age groups, among size groups, and among product groups. The test is also applied to find out whether the risk-values differ significantly or not among the different groups. The test is carried out to find whether the current assets, current liabilities and gross sales differ among different groups. It is also applied to find out the significance of difference in respect of performance index, utilisation index and efficiency index among different sample groups.

Spearman’s Rank Correlation

Spearman’s Rank correlation ($$r_s$$) is the technique of determining the degree of correlation between two variables in case of ordinal data where ranks are given to the different values of the variables. The Spearman’s Rank correlation co-efficient is
calculated because this statistics does not assume any specific distribution for the two
variables.\textsuperscript{3} The Spearman's Rank correlation technique is applied in this study to find out
the degree of relationship between the liquidity ratios included under a particular group.
For calculating $r_s$ between the liquidity ratios all the fifty sample companies are
considered as the number of observations.

\textit{Discriminant Function}

The discriminant function analysis attempts to construct a function with the
selected liquidity ratios so that the companies belonging to less liquid or more liquid
groups are differentiated at the maximum. The linear combination of the variables is
known as discriminant function, and its parameters are called discriminant function
co-efficients. The typical discriminant function will be of the form:

$$Z = a_0 + a_1 + x_1 + a_2 x_2 \ldots \ldots a_n x_n$$

where $a_0 = \text{constant}$

$a_1 \ldots a_n = \text{Discriminant function co-efficients of the independent variables}$

$x_1 \ldots x_2 \ldots \ldots \text{are independent variables}$

The Canonical correlation is applied for the discriminant function. This is
interpreted as the percentage of the variation in the dependent variable viz., $Z$ explained
by all the discriminating variables. Once the discriminant function is arrived at, then the
efficiency of the function as to how accurately it classifies the companies into the
respective groups is assessed. For this, a classification matrix is developed using 'actual'
and 'predicted' group membership of the companies. From this, overall classification
accuracy is calculated which in turn shows the efficiency of the discriminating ratios in
the discriminant function.
The discriminant function is constructed using "Mahalanobis Minimum D Squared" method which is based on the generalised squared Euclidean distance that adjusts for unequal variance in the variables.

The discriminant function is applied in this study to classify the companies into 'less liquid' and 'more liquid' categories. For this purpose, fourteen liquidity measures are selected. The discriminating variables in this study are the liquidity measures.

**Correlation Matrix**

This is an array of correlation coefficient values arranged in a tabular form where the row and column variables show the correlation of each variable with every other variable in the array. The correlation matrix is employed in this study to identify the liquidity ratios which are highly correlated. If there is a correlation of more than 0.70 between two liquidity ratios, then one of such ratios is ignored and the remaining ratios alone are considered for the stepwise multiple regression analysis. This is done to remove the multi-collinearity effect among the independent variables viz., the liquidity measures. The correlation matrix is prepared to select the least correlated liquidity measures for the regression analysis.

**Step-wise Multiple Regression Analysis**

This is a method of construction of a multiple regression equation wherein each variable is entered in the equation based on certain selection criteria. Initially, the equation starts with no predictor variable. Then, the variable with the maximum correlation with the dependent variables is selected based on the F value (The F value is fixed as 3.84 with an associated probability of 0.05) which should be greater than or equal to the cut-off value fixed already and is considered for inclusion in the equation. The next and the remaining variables are then selected and considered for entry. The variables are selected and considered for entry in the equation based on their highest partial correlation values and their respective F values.
This study attempts to find out the extent to which the selected twelve liquidity measures (after the elimination of some liquidity measures by calculating Spearman's Rank correlation co-efficient and correlation matrix) have significant impact on the dependent variable viz., return on total assets. The step-wise multiple regression analysis is carried out first by considering all the sample firms together. Then, the analysis is carried out for less liquid and more liquid firms also. Further, since the study focuses on the firms manufacturing four chemical products viz., paints, drug formulations, fertilisers and pesticides, step-wise regression analysis is conducted separately for the sample firms manufacturing such products.

In order to find out the extent to which the liquidity measures have significant effect on the quality of earnings, the above said procedure is repeated by considering the selected twelve liquidity measures as independent variables, and the quality of earnings is taken as a dependent variable. The step-wise multiple regression analysis is carried out for the sample firms taken together, for the less liquid firms, the more liquid firms, the paint firms, the drug formulation firms, the fertiliser firms and the pesticide firms separately.

Models Used

The study has applied certain models for analysis of the data. A brief description of models used in the study are also given.¹³

Efficiency of Working Capital Management

The efficiency of working capital management is computed by applying a model by which the working capital performance index, utilization index and efficiency index are computed.
Working capital performance
index of individual component
\[ \frac{W_i(t-1)}{W_i} x \frac{S_t}{S_t - 1} \]

where, \( W_i = \) individual working capital components
\( t = \) current year
\( S = \) gross sales

By following the average method, overall performance index of working capital is calculated as follows:

Overall performance index of working capital
\[ \frac{S_t}{S_t - 1} x \frac{\sum_{i=1}^{n} W_i(t-1)}{N} \]

where, \( N = \) number of working capital components

For calculating the working capital utilization index, the model is as follows:

Working capital utilisation index = \( \frac{A_{t-1}}{A_t} \)

where \( A = \) \( \frac{\text{Current assets}}{\text{Sales}} \)

To measure the overall efficiency of working capital management, the final model is as follows:

\[ EI (WCM) \frac{S_t}{S_t - 1} x \frac{\sum_{i=1}^{n} W_i(t-1)}{N} x \frac{A_{t-1}}{A_t} \]

**Quality of Earnings Model**

The quality of earnings model applied in the study is based on a set of formulae\(^5\).

Quality of earnings = Return on net worth – (Business Risk + Financial risk)
The quality of earnings is due to efficient asset management, cost management and favourable financial leverage.

Cost management \[= (\text{Profit margin} - \text{Average profit margin}) \times \text{Average Asset turnover} \]

Financial leverage \[= (\text{Return on Investment} - \text{Average return on investment of the industry}) \times \text{debt/equity} \]

Business risk \[= \text{Assumed to be equal to the average return on Investment of the industry} \]

Financial risk \[= (\text{Average return on investment of the industry} - \text{cost of debit}) \times \text{debt/equity} \]

**Lambda Model**

The lambda model and lambda probability values are calculated to determine the probability of the liquidity position not being sufficient to prevent insolvency. The model given by Gallinger is given below:

\[
\text{Lambda} = \frac{\text{Liquid reserves + average free cash flow}}{\text{Standard deviation of free cash flow}}
\]

The free cash flow is calculated by deducting the capital expenditure from cash from operations. The cash from operations is arrived at by preparing the cash flow statement under indirect method.

**Preparation of Cash Flow Statement by Indirect Method**

Net profit before income tax  
Add non cash charges (depreciation)  
Add net decrease in current assets  
Add net increase in current liabilities  
Less net increase in current assets  
Less net decrease in current liabilities  
Less tax paid  
\[\therefore \text{ cash flow from operations} \]  
Less net cash flow from investment activities  
\[\therefore \text{ free cash flow} \]
Period of Study

The period 1989-90 to 1998-99 is chosen as the study period as it has witnessed industrial growth, economic crisis as well as recovery.

Scope of the Study

The present study intends to throw light on the existing management practices in the areas of liquidity. It attempts to analyse the extent to which the theoretically correct working capital management techniques are adopted in practice. The composite liquidity index which is computed, is expected to act as a guide to the financial institutions and creditors in judging the short-term solvency of the firms. The quality of earnings model reflects the competitive position of the firm in the industry. The overall financial performance of a firm is judged by applying this model.

1.5. LIMITATIONS OF THE STUDY

1. Since the study mainly depends on the published financial data, it is subjected to all the limitations that are inherent in the published financial statements.

2. The period of study could not be updated on account of the failure on the part of some of the sample companies to submit the financial statements in time. The deletion of such companies from the sample will reduce the sample size. So, it is decided to confine the period of study only to the period of the 1990's.

3. Although the sample size consists of private Indian companies, foreign companies, co-operative and joint sector firms, separate analysis in respect of them could not be carried out on account of the limited sample size.

4. In-depth analysis in respect of the components of current assets could not be done due to non-availability of detailed information.

5. Inflationary effects have been ignored and only historical values have been taken into consideration for analysis.

6. In a few sample companies, for some years, the accounting period did not correspond to twelve months. In such cases, to facilitate inter-company comparison the figures have been suitably annualized.
1.6. PLAN OF THE STUDY

The present study consists of six chapters.

The introductory chapter states the problem, objectives, hypotheses, sampling design, sources of data, framework of analysis, the importance and limitations of the study.

The second chapter deals with the definitions of various concepts used in the study, and also reviews the past studies undertaken in the area of research.

The third chapter describes the sample industry and other industries representing the sample products.

The fourth, fifth and sixth chapters are core chapters, specifically meant for analysis and discussion. The fourth chapter analyses the working capital which is studied under four sections. The first section discusses the resource allocation to working capital components. The second section deals with the financing policy, and the third section examines the trends in working capital and the fourth section analyses the efficiency in the management of working capital.

The fifth chapter analyses the liquidity of the sample firms and product groups. It is discussed under three sections. The first section deals with liquidity measures, the second section makes computation of composite liquidity index and the third section discusses the effect of liquidity on profitability.

The sixth chapter deals with the computation of quality of earnings and its relationship with liquidity.

The seventh chapter summarises the findings of the study.
References


