5.1 Meaning of Financial Statement Analysis:

The term ‘Analysis’ refers to rearrangement and simplification of data given in the financial statement. The analysis is done by establishing the relationship between the items of the Balance sheet and Profit and Loss Account. Financial analysis refers to an assessment of the viability, stability and profitability of a business, or Company. It is a process of examining and comparing financial data. Analysis refers to the proper arrangement of financial data. Analysis of financial statements means an attempt to determine the significance and meaning of data presented in financial statements. Such an analysis makes use of various analytical tools and techniques to data of financial statements so as to derive from them certain relationships that are significant and useful for decision making. It is performed by professionals who prepare reports using ratios that make use of information taken from financial statements and other reports. These reports are usually presented to top management as one of their basis in making business decisions. Based on these reports, management may:

1. Continue or discontinue its main operation or part of its business.
2. Make or purchase certain materials in the manufacture of its product.
3. Acquire or rent/lease certain machinery and equipment in the production of its goods.
4. Issue stocks or negotiate for a bank loan to increase its working capital.
5. Other decisions that allow management to make an informed selection on various alternatives in the conduct of its business.

Moore and Jaedicke: have defined financial analysis as process of synthesis and Summarization of financial operative data with a view to getting an insight in to the operative of a business enterprise

Metcalt and Titard: have defined financial analysis as process of evaluating the relationship between component parts of financial statement to obtain a better understanding of a firm’s position and performance.
5.2 Advantages of Ratio Analysis

Financial statements i.e., Profit and Loss account and Balance Sheet prepared at the end of the year do not always convey to the reader the real profitability and financial health of the business. They contain various facts and figures and it is for the reader to conclude, whether these facts indicate a good or bad managerial performance. Ratio analysis is the most important tool of analyzing these financial statements. It helps the reader in giving tongue to the mute heaps of figures given in financial statements. The figures then speak of liquidity, solvency, profitability etc. of the business enterprise. Some important objects and advantages derived by a firm by the use of accounting ratios are

5.2.1 Helpful in Analysis of Financial Statements

Ratio analysis is an extremely device for analyzing the financial statements. It helps the bankers, creditors, investors, shareholders etc. in acquiring enough knowledge about the profitability and financial health of the business. In the light of the knowledge so acquired by them, they can take necessary decisions about their relationships with the concern.

5.2.2 Simplification of Accounting Data

Accounting ratio simplifies and summarizes a long array of accounting data and makes them understandable. It discloses the relationship between two such figures, which have a cause and effect relationship with each other.

5.2.3 Helpful in comparative study

With the help of ratio analysis comparison of profitability and financial soundness can be made between one firm and another in the same industry. Similarly, comparison of current year figures can also be made with those of previous years with the help of ratio analysis.

5.2.4 Helpful in locating the weak spots of the business

Current year’s ratios are compared with those of the previous years and if some weak spots are thus located, remedial measures are taken to correct them.
5.2.5 Helpful in forecasting
Accounting ratios are very helpful in forecasting and the plans for the future.

5.2.6 Estimate about the trend of the business
If accounting ratios are prepared for a number of years, they will reveal the trend of costs, sales, profits and other important facts.

5.2.7 Fixation of Ideal Standards
Ratios help us in establishing ideal standards of the different item of the business. By comparing the actual ratios calculated at the end of the year with the ideal ratios, the efficiency of the business can be easily measured.

5.2.8 Effective Control
Ratio analysis discloses the liquidity, solvency and profitability of the business enterprise. Such information enables management to assess the changes that have taken place over a period of time in the financial activities of the business. It helps them in discharging their managerial functions e.g., planning, organizing, directing, communicating and controlling more effectively.

5.3 Limitations of Ratio Analysis
Ratio analysis is a very important tool of financial analysis. But despite it’s being indispensable, the ratio analysis suffers from a number of limitations. These limitations should be kept in mind while making use of the ratio analysis

5.3.1 False accounting data gives false ratios
Accounting ratios are calculated on the basis of given data given in profit and loss account and balance sheet. Therefore, they will be only as correct as the accounting data on which they are based. For example, if the closing stock is over-valued, not only the profitability will be overstated but also the financial position will appear to be better. Therefore, unless the profit and loss account and balance sheet are reliable, the ratios based on them will not be reliable. There are certain limitations of financial statements as such; the ratios calculated on the basis of such financial statements will also have the same Limitations
5.3.2 Comparison not possible if different firms adopt different accounting Policies

There may be different accounting policies adopted by different firms with regard to providing depreciation, creation of provision for doubtful debts, method of valuation of closing stock etc. For instance, one firm may adopt the policy of charging depreciation on straight-Line basis, while other may charge on written-down value method. Such differences make the accounting ratios incomparable.

5.3.3 Ratio analysis becomes less effective due to price level changes

Price level over the year goes on changing, therefore, the ratios of various years cannot be compared. For e.g., one firm sells 1,000 machines for Rs 10 lacks during 1992, it again sells 1,000 machines of the same type in year 1993 but owing to rising prices the sale price was Rs 15 lakh. On the basis of ratios it will be concluded that the sales have increased by 50% whereas in actual, sales have not increased at all. Hence, the figures of the past years must be adjusted in the light of price level changes before the ratios for the years are compared.

5.3.4 Ratios may be misleading in the absence of absolute data

For example, X Company produces 10 lakh metres of cloth in 1992 and 15 lakh metre in 1993, the progress is 50%. Y Company raises its production from 10 thousand metres in 1992 to 20 thousand metres in 1993, the progress is 100%, and comparison of these two firms made on the basis of ratio will disclose that the second firm is more active than the first firm. Such conclusion is quite misleading because of the difference in the size of the two firms. It is, therefore, essential to study the ratios along with the absolute data on which they are based.

5.3.5 Limited use of a Single Ratio

The analyst should not merely rely on a single ratio. He should study several connected ratios before reaching a conclusion. For example, the Current Ratio of a firm may be quite satisfactory, whereas the Quick Ratio may be unsatisfactory.
5.3.6 Window Dressing
Some companies in order to cover up their bad financial position resort to window dressing i.e., showing a better position than the one, which really exists. They change their balance sheet in such a way that the important facts and truth may be concealed.

5.3.7 Lack of proper standards
Circumstances differ from firm to firm hence, no single standard ratio can be fixed for all the firms against which the actual ratio may be compared.

5.3.8 Ratios alone are not adequate for proper conclusions
Ratios derived from analysis of statements are not sure indicators of good or bad financial position and profitability of a firm. They merely indicate the probability of favorable or unfavorable position. The analyst has to carry out further investigations and exercise his judgment in arriving at a correct diagnosis.

5.3.9 Effect of personal ability and bias of analyst
Another important point to keep in mind is that different persons draw different meaning of different terms. One analyst may calculate ratios on the basis of profit after interest and tax, whereas another analyst may consider profits before interest and tax; a third may consider profits after interest but before tax. Therefore, before making comparisons, one must be sure that the ratios have been calculated on the same basis.

Although ratio analysis suffers from a number of limitations as enumerated above, yet it is a very useful and widely used tool of analyzing the financial statements. Useful conclusions may be arrived at by ratio analysis provided the above-mentioned limitations are kept in mind while using the results obtained from ratio analysis.

5.4 Classification of Ratio
In ratio analysis the ratios may be classified into the four categories as follows;

(I) Liquidity Ratios
(II) Profitability Ratios
(III) Activity Ratios
(IV) Solvency Ratios
5.4.1 Liquidity Ratios

"Liquidity" refers to the ability of the firm to meet its current liabilities. The liquidity ratios, therefore, are also called 'Short-term Solvency Ratios.' These ratios are used to assess the short-term financial position of the concern. They indicate the firm's ability to meet its current obligations out of current resources.

In the words of Salomon J. Flink, "Liquidity is the ability of the firm to meet its Current obligations as they fall due".

In the words of Herbert B. Mayo, "Liquidity is the ease with which assets may be converted into cash without loss."

Short-term creditors of the firm are primarily interested in the liquidity ratios of the firm as they want to know how promptly or readily the term can meet its current liabilities. If the term wants to take a short-term loan from the bank, the bankers also study the liquidity ratios of the firm in order to assess the margin between current assets and current liabilities.

Liquidity ratios include two ratios: -

1. Current Ratio
2. Quick Ratio

5.4.2 Profitability Ratios

The main object of all the business concerns is to earn profit. Profit is the Measurement of the efficiency of the business. Equity shareholders of the company are mainly interested in the profitability of the company.

Profitability ratios include the following

1. Gross Profit Margin Ratio
2. Operating Profit Margin Ratio
3. Net Profit Margin Ratio
4. Return on Capital Employed Ratio
5. Return on Net worth Ratio
6. Earnings per Share Ratio
5.4.3 Activity Ratios

These ratios are calculated on the basis of 'cost of sales' or 'sales'; therefore, these ratios are also called as 'Turnover Ratios'. Turnover indicates the speed or number of times the capital employed has been rotated in the process of doing business. In other words, these ratios indicate how efficiently the capital is being used to obtain sales; how efficiently the fixed assets are being used to obtain sales; and how efficiently the working capital and stock is being used to obtain sales. Higher turnover ratios indicate the better use of capital or resources and in turn lead to higher profitability. Turnover ratios include the following
1. Inventory Turnover Ratio
2. Debtors Turnover Ratio
3. Fixed Assets Turnover Ratio
4. Investment Turnover Ratio

5.4.4 Solvency Ratios

These ratios are calculated to assess the ability of the firms to meet its long-term Liabilities as and when they become due. Long term creditors including debenture holders are primarily interested to know whether the company has ability to pay regularly interest due to them and to repay the principal amount when it becomes due. Solvency ratios disclose the firm’s ability to meet the interest costs regularly and long-term indebtedness at maturity. Solvency ratios include the following ratios
1. Debt-Equity Ratio
2. Interest Coverage Ratio

Financial ratios are one of the techniques of Financial Statement Analysis which has been used from time to time by analysts to analyze the various financial aspects of the Business firms. The financial analysts by comparing different items through the use of ratios have been attempting to add meaning to financial statement figures. Ratios have remained confined to their use for the assessment of borrowers, financial position. However, the development of various ratios and their publication by different institutions has led to their use for different purposes like determination of liquidity and solvency, etc. Financial ratios have been widely used in the various studies pertaining to financial strength and weaknesses analysis. Various studies on company
position covering a specific period time; have also used the financial ratios to represent the financial health.

A financial ratio is a relationship between two quantities on a firm’s financial statements, which is dividing one quantity by another. The purpose of using ratios in financial statement analysis is to reduce the amount of data to workable form and to make the data more meaningful. The information that is derived from financial statement analysis by using ratios has a wide range of applications. Financial Managers use Financial Ratio Analysis to evaluate performance records. Trade Creditors delve into the short-term debt paying ability of Business firms through financial ratios. Bank loan officers use financial ratio analysis in short and long term evaluations. Investors can know the overall financial strength of prospective investments.

The following ratios are used:

1. Return on Capital Employed
2. Fixed Assets Turn Over Activity Ratio
3. Gross Profit Ratio
4. Net Profit Ratio
5. Expense to Sales Ratio
6. Operating Profit Margin Possibility Ratio
7. Debt. Equity Ratio
8. Interest Coverage Ratio – Solvency Ratio
9. Current Ratio – Liquidity Ratio

(1) **Return on Capital Employed**

The ratio for return on capital employed reflects the relationship between “Net Profit” and “Capital Employed”. It measures the overall profitability. This is an important ratio as it guides the management to assess the merits of new projects. In this ratio the profit is taken after deducting the taxes and by adding back, the interest. The term ‘Capital Employed’ refers to long term funds provided by the owners as well as creditors. The objective of computing this ratio is to find out how efficiently the long
– term funds supplied by the creditors and shareholders have been used. This ratio is computed by dividing the net profit after tax and before interest by capital employed.

\[
\text{Return on Capital Employed} = \frac{\text{Profit before interest and taxes}}{\text{Capital Employed}}
\]

(2) **Fixed Assets Turn-Over Ratio**

Fixed Assets Turn-Over Ratio comes under the category of activity ratio. Fixed Assets Turn-Over Ratio will indicate the effective utilization of fixed assets. The ratio is widely used in airlines and public utilities which are capital-intensive. These ratios are also variously called “Turnover Ratios”. Activity Ratios measure the efficiency with which assets are converted into sales. Activity Ratios are determined by diving sales with the book value of assets.

\[
\text{Fixed Assets Turn-Over Ratio} = \frac{\text{Sales}}{\text{Fixed Assets}}
\]

A high ratio indicates efficient utilization of fixed assets in generating sales and a low ratio may signify that the firm has an excessive investment in fixed assets.

(3) **Gross Profit Ratio:**

Apart from the creditors, also interested in the financial soundless of a firm are the owners and management. The management of the firm is eager to measure its operating efficiency. Similarly the owners invest their funds in the expectation of reasonable return. The operating efficiency of a firm and its ability to ensure adequate returns to its shareholders depends ultimately on the profits earned by it. The profitability of a firm can be measured by its profitability ratios.

Gross profit ratio expresses the relationship between gross profit and sales. It indicates the average margin on the goods sold. It shows whether the yelling prices are adequate or not. A low gross profit ratio may indicate a higher cost of goods sold due to higher cost of production. It may also be due to low selling prices. A higher gross profit ratio, on the other hand, indicates relatively lower cost and is a sign of good management.

\[
\text{Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Sales}}
\]
(4) **Net Profit Ratio:**

Net Profit Ratio measures the relationship between net profit and net sales of concern. A reasonable gross profit margin is necessary to earn adequate net profits. This ratio is computed by dividing the net profit by the net sales.

\[
\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Sales}}
\]

(5) **Expenses to Sales Ratio:**

Another profitability ratio related to sales is the expenses ratio. It is computed by dividing expenses by sales. It presents the relationships that exist between item (or groups) of expenses and not sales. It indicates the portion of sales which is consumed by various items of operating cost.

\[
\text{Expenses to Sales Ratio} = \frac{\text{Expenses}}{\text{Net Sales}}
\]

The expenses ratio is closely related to the profit margin. The expenses ratio is, therefore, very important for analyzing the profitability of a firm. It should be compared over a period of time with the industry average as well. A low ratio is favourable while a high one is unfavourable.

(6) **Operating Profit Margin Ratio:**

The operating ratio establishes relationship between operating cost and net sales. This ratio is an important ratio that explains the changes in the net profit margin ratio. The operating expenses cost of goods sold, selling expenses and general and administrative expenses. Extraordinary gains and losses should be excluded while calculating the operating expenses. The main objective of computing this ratio is to determine the operational efficiency with which production or purchases and selling operations are carried on. This ratio is computed by dividing the operating expenses or cost by the net sales.
Operating Ratio = \[ \frac{\text{Cost of Goods Sold} + \text{Operating Expenses}}{\text{Net Sales}} \]

(7) Debt – Equity Ratio

This ratio measures the proportion of long term debt to equity. This ratio is helpful to providers of long term loans and finance. If this ratio is already high, lending further to such an enterprise carries greater risk. In finance risk and return go together. A firm with high leverage can further borrow only at a higher cost.

Debt Equity Ratio indicates to what extent the firm depends upon outsiders for its existence. For the owners it is useful to measure the extent to what they can gain benefits of maintaining control over the firm with a limited investment.

\[ \text{Debt Equity Ratio} = \frac{\text{Debt}}{\text{Equity}} \]

(8) Interest Coverage Ratio:

This ratio comes under the Solvency Ratio. This is the ratio of earnings before interest and taxes to interest expense. The ratio is a pure number of and indicates as to how many times the interest is covered by profits. It is a measure which indicates the current ability of the firm to support current debt service (Interest elements) charges. Higher the number, higher is the ability to service the debt.

\[ \text{Interest Coverage Ratio} = \frac{\text{Earnings before Interest and taxes}}{\text{Interest Expenses}} \]

(9) Current Ratio

This is the ratio of current assets to current liabilities. This ratio is considered to be very significant in the analysis of liquidity and working capital management. Liquidity is the ability of a firm to meet its short – term obligations like payment of creditors,
bill payable and outstanding expenses. A firm may be profitable but yet not liquid. A firm which is not liquid may sooner or later find itself in a situation of insolvency.

\[
\text{Current ratio} = \frac{\text{Current Assets}}{\text{Current Liability}}
\]

A ratio of 2:1 is considered ideal. However, too high ratio does not indicate a satisfactory situation. Such a ratio may be the result of accumulation of accounts receivable due to slackness in collection and piled up inventories due to poor sales.

**5.5 Analysis of Variance (ANOVA)**

The analysis of variance frequently refers to by the contraction ANOVA is a statistical technique specially designed to test whether the means of more than two quantitative populations are equal.

The analysis of variance technique developed by R.A. Fisher in 1920’s, is capable of fruitful application to a diversity of practical problems. Basically it consists of Classifying and cross-classifying statistical results and testing whether the means of a specified classification differ significantly. In this way it is determined whether the given classification is important in affecting the results. From the cross-classification it could be determined whether the mean qualities of the outputs of the various machines differed significantly. Such a study would determine, for example whether uniformity in quality of outputs would be increased by standardizing the procedures of the operators and similarly whether it could be increased by standardizing the machines. Analysis of variance thus enables us to analyze the total variation of data into components which may be attributed to various “sources” or “causes” of variation.

The analysis of variance originated the agrarian research and its language is thus Loaded with such agricultural terms as block and treatments which are differentiated in term of varieties of seeds, fertilizers or cultivation methods The word treatment in analysis of variance is used to refer to any factor in the experiment that is controlled at different levels or values.
5.5.1 One-way classification

The steps in carrying out the analysis are:

1. Calculate variance between the samples. The variance between samples (group) measures the difference between the sample mean of each group and the overall mean weighted by the number of observations in each group. The variance between samples takes into account the random variations from observation to observation. It also measures difference from one group to another. The sum of squares between samples is denoted by SSC. For calculating variance between the samples we take the total of the square of the deviations of the means of various samples from the grand average and divide this total by the degree of freedom. Thus the steps in calculating variance between samples will be:
   
   (a) Calculate the mean of each sample i.e. \( X_1, X_2, \) etc.
   
   (b) Calculate the grand average \( X \). Its value is obtained as follows:
   
   \[
   X = \frac{X_1 + X_2 + X_3 + \ldots}{N_1 + N_2 + N_3 + \ldots}
   \]
   
   (c) Take the difference between the means of the various samples and the grand Average
   
   (d) Square these deviations and obtain the total which will give sum of squares
   
   Between the samples; and
   
   (e) Divide the total obtained in step (d) by the degrees of freedom.

2. Calculate variance within the samples. The variance (or sum of squares) within samples measures those inter-samples differences due to change only. It is denoted by SSE. The variance within samples (groups) measures variability around the mean of each group. Since the variability is not affected by group differences it can be considered a measure of the random variations of values within a group. For calculating variance within the samples we take the total of the sums of square of the deviation of various items from the mean of values of the respective samples and divided this total by the degree of freedom.

Thus, the steps in calculating variance within the samples will be:
(a) Calculate the mean value of each sample. i.e $1X$, $2X$, etc
(b) Take the deviations of the various items in a sample from the mean value of the respective samples:
(c) Square these deviations and obtain the total which gives the sum of square within the samples and
(d) Divide the total obtains in step (c) by the degree of freedom. The degree of freedom
is obtained by deduction from the total number of items the number of samples.
3. Calculate the ratio $F$ as follows:
4. Compare the calculated value of $F$ with the table value of $F$ for the degree of
Freedom at a certain critical level generally we take 5% level of significance. If the Calculated value of $F$ is greater than the table value, it is concluded that the difference in sample means is significant.

**Analysis of variance (ANOVA) Table: One way classification**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>Df</th>
<th>MSS</th>
<th>$F$</th>
<th>$P$-value</th>
<th>$F$ crit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Between Samples $SSC_1 = c - 1$ $MSC = SSC / (c - 1)$
Within Samples $SSE_2 = n - c$ $MSE = SSE / (n - c)$ $MSC / MSE$

**Total SST n-1**
$SST = $ Total sum of squares of variations $SSC = $ Sum of squares between samples (columns) $SSE = $ Sum of squares within samples (rows) $MSC = $ Mean sum of squares between samples
MSE = Mean sum of squares within samples

Compare the calculated value of F with the table value of F for the degrees of freedom at certain critical level. If the calculated value of F is greater than the value, it is concluded that the difference in sample means is significant; on the other hand, if calculated value of F is less than the table value, the difference is not significant and has arisen due to fluctuations of simple sampling.

5.6 Trend

A time series may show fluctuations in the upward and downward directions but there is a distinct tendency for it either to increase or decrease in the long run. For example, if we observe wholesale price level in India from 1951 to 1980, we shall find that despite short-run fluctuations there is a marked tendency of the prices to increase. If we observe the series of the death rates in India over the last 50-60 years, we observe distinct tendency for it to fall continuously because of improved health-facilities, prevention of epidemics, medical research, etc. Such long-run tendency of a time series to increase or decrease over a period of time is known as trend or secular trend. Simpson and Kafka define trend as follows:” Trend, also called secular or long-term trend, is the basic tendency of production, sales income, employment, or the like to grow or decline over a period of time. The concept of trend does not include short-range oscillation but rather steady movement over a long time.”

5.6.1 Straight line Trend

Let us discuss the fitting of a straight line first. We had shown in chapter 9 that if the equation is \( y=a + bx \) then the application of the method of the least squares gives the following normal equation

\[
\Sigma y = na + b\Sigma x \text{ and } \Sigma xy = a \Sigma x + b\Sigma x^2
\]

these can be solved to obtain the value of a and b. In time series analysis, x is taken as time and y denotes the value of the variable at different points in time.

Solution of is greatly simplified if the origin is taken at the middle of the series. This is easily done in that case where n is odd (i.e., the number of year is odd 5, 7, 9,11, 13, etc.). The new origin here is taken as nth year. For example, if the data is for the period 1960 to 1970, i.e., 11 year the origin will be the = 6th year or 1965.
Then $\Sigma x$ will be zero and from
A problem when $n$ is even. What should be the middle year? The problem is resolved by taking the origin at the mid-point of and nth year. For example, if data for the period 1960 to 1971, i.e., 12 year, are given the origin will be the means of 6th and 7th year, i.e. the midpoint of 6th and 7th year. Thus 1965.5 would be the origin. Frequently deviations from the origin are multiplied by 2 and this value is denoted by $x$. This producer simplifies calculations.

5.6.2 Fitting of Parabolic Trend

A parabola is given by the equation:

$$y = a + bx + cx^2$$

Method of least squares can be employed in a similar way as described by us earlier to obtain the coefficient $a$, $b$ and $c$. The normal normal equations are

$$\Sigma y = na + b\Sigma x + c\Sigma x^2$$
$$\Sigma xy = a\Sigma x + b\Sigma x^2 + c\Sigma x^3$$
$$\Sigma x^2 y = a\Sigma x^2 + b\Sigma x^3 + c\Sigma x^4$$

Choice of a new origin is to be made exactly in the same manner as described above. In such a case $\Sigma x$ and $\Sigma x^3$ are reduced to zero, then

$$\Sigma y = na + c\Sigma x^2$$
$$\Sigma xy = b\Sigma x^2$$
$$\Sigma x^2 y = a\Sigma x^2 + c\Sigma x^4$$. Solution of these give the value of $a$, $b$ and $c$. 

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