Part – II
Management & Cost Accounting

Chapter–4

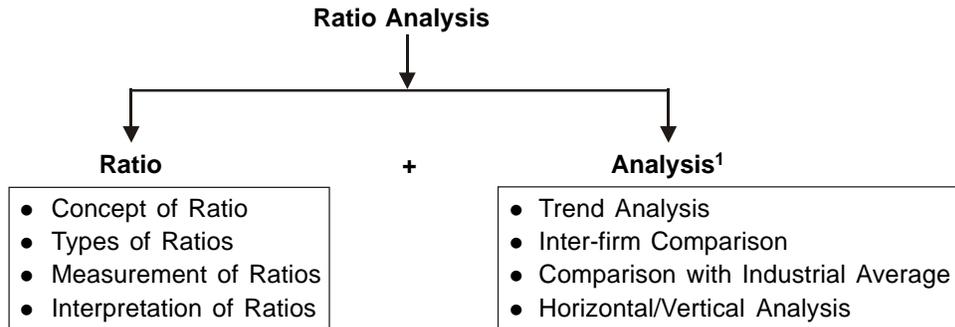# Ratio Analysis

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LEARNING OBJECTIVES

In this chapter we will study:

- Introduction
- Concept of Ratio
- Types of Ratios
- Measurement and Interpretation of Ratios
- Application of Ratios
- Methodology for Ratio Analysis
- Du-pont Chart for Ratio Analysis
- Advantages of Ratio Analysis
- Limitations of Ratio Analysis

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4.1 INTRODUCTION

Ratio analysis is a technique used to evaluate the financial health of the concerned organisation from interested groups' point of view using different ratios as a tool. It comprises of two terms *viz.* ratio and analysis and therefore both the terms should be dealt separately while studying ratio analysis.

Ratio Analysis

Ratio	+	Analysis[1]
• Concept of Ratio • Types of Ratios • Measurement of Ratios • Interpretation of Ratios		• Trend Analysis • Inter-firm Comparison • Comparison with Industrial Average • Horizontal/Vertical Analysis

4.2 CONCEPT OF RATIOS

Absolute financial data of an organization does not provide useful information but whenever it is compared with another financial data of the same organization it provides useful information and constitutes a ratio.

Illustration

Suppose following is the data related to Company A.

Profit — Rs.10,000

Sales — Rs.1,00,000 ⟶ Data dealt separately is not useful.

[(Profit/Sales)*100/Sales = 10%] is useful information as it represents profit margin ratio.

4.3 TYPES OF RATIOS

There are various groups, which are interested in financial health of the organization. These groups are Owners/Shareholders, Short-term creditors (suppliers, suppliers of short-term loans), Long-term creditors (Debenture holders, Banks and Financial Institutions providing term loans), Management and government.

Furthermore, the risk and return perceived by abovesaid groups are varying in nature and since risk–return trade off is the objective of any group, this leads to basis for classification of financial health. Thus financial health of the organization can viewed as follows:

1. Financial health from owner's point of view.
2. Financial health from short-term creditor's point of view.
3. Financial health from long-term creditor's point of view.
4. Financial health from management's point of view.
5. Financial health from government's point of view.

Here **Financial health** means **ability to serve** the concerned group.

The classification of ratios is done on the basis of the purpose of different groups mentioned above having direct interest in the organization concerned.

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1. Analysis refers to application of ratios in different ways (mentioned above) for the purpose of planning financial decisions and in solving decision-making problems. This portion is beyond the scope of this book.

There are five broad categories of ratios on the basis of its nature:
1. Liquidity ratios
2. Profitability ratios
3. Solvency ratios
4. Turnover ratios
5. Market ratios

- Liquidity ratios measure liquidity position of the organization. Liquidity means ability to meet short-term obligations. Short-term obligation includes bills payables, outstanding expenses, bank overdraft etc.
- Profitability ratios measure profitability position *i.e.* ability to earn profit. Higher the ratio better it is.
- Solvency ratios measure solvency position of the organization. Solvency means ability to meet long-term obligations. Long-term obligation includes loan repayments, debt servicing *i.e.* interest payments etc.
- Turnover ratios measure position of resources utilization. A higher turnover ratio indicates better utilization of resources. Resources include fixed assets, current assets, working capital etc.
- Market ratios reflect performance of the organization within industry concerned/economy. Market ratios are useful to secondary market (stock market) investors.

Table 1 and **Table 2** stated below, describe the summary of ratios with groups having direct interest.

Table 1

Groups having direct interest	Relevant ratios
Owners/shareholders	- Profitability ratios - Market ratios
Short-term creditors	- Liquidity ratios - Turnover ratios
Long-term creditors	- Solvency ratios
Management	- Turnover ratios - Market ratios
Government.	- Profitability ratios - Market ratios

Table 2 (Summary of ratios)

Type of ratios	Name of the ratios
Liquidity ratios	1. Current Ratio (CR) 2. Quick Ratio (QR) 3. Cash Ratio
Profitability ratios	1. Gross Profit Margin (GPM) 2. Operating Profit Margin (OPM) 3. Net Profit Margin (NPM)

Type of ratios	Name of the ratios
	4. Return on Investment (ROI):- • Return on Net worth (RO Net worth) • Return on Capital Employed (ROCE) • Return on Total Asset (ROTA)
Solvency ratios	1. Debt-equity ratio
	2. Fixed charge coverage ratio
Turnover ratios	1. Fixed Asset Turnover Ratio (FATOR)
	2. Current Asset Turnover Ratio (CATOR)
	3. Total Asset Turnover Ratio (TATOR)
	4. Debtors Turnover Ratio (Drs TOR)/Average Collection Period (ACP).
	5. Creditors Turnover Ratio (Crs TOR)/Average Payable Period (APP)
	6. Working Capital Turnover Ratio (WCTOR)
	7. Stock Turnover Ratio (*a*) Raw material turnover ratio (*b*) Work in progress turnover ratio (*c*) Finished goods turnover ratio
Market ratios	1. Dividend Payout Ratio (D/P ratio)
	2. Price-Earning Ratio (P/E Ratio)
	3. Dividend Yield
	4. Earnings Yield

4.4 MEASUREMENT AND INTERPRETATION OF RATIOS
Liquidity Ratio
Liquidity ratio measures liquidity position of the organization. Liquidity means ability to meet short-term obligations *i.e.* current liabilities (bank overdraft, bills payable, outstanding expenses etc.).

Remark

Liquidity of asset is different from liquidity of organization stated above. Liquidity of asset means ease of convertibility of that asset into cash.

The extent of liquidity depends upon the level of current assets. (Current assets are those, which convert into cash within one year *e.g.* cash, debtors, stock, marketable securities, prepaid expenses, loans and advances (given) etc.).

Types of Liquidity Ratios
The different types of liquidity ratios are as follows:
1. Current ratio
2. Quick ratio or acid test ratio

3. Cash ratio or super quick ratio.
- Higher the liquidity ratios, higher will be the liquidity position.
- Higher the liquidity ratios, higher will be the amount of Working Capital (WC).
- Working capital means excess of Current Assets (CA) over Current Liabilities (CL).

$$\textbf{Current Ratio (CR)} = \frac{\textbf{Current Assets (CA)}}{\textbf{Current Liability (CL)}}$$

- A very high Current Ratio indicates inadequate employment of funds.
- A very low Current Ratio indicates that business is trading beyond its resources and is signal of danger for management.
- CR is a measure of margin of safety to short-term creditors *i.e.* higher the CR, greater the safety of funds of short-term creditors.

$$\textbf{Quick Ratio} = \frac{\textbf{Current Assets – Inventory (Stock)}}{\textbf{Current Liability}}$$

- Quick ratio is used to measure the liquidity position, when stock (inventory) is doubtful.

$$\textbf{Cash Ratio} = \frac{\textbf{(Cash + Marketable Securities)}}{\textbf{Current Liability}}$$

- Cash ratio is the most penetrating test regarding the liquidity position and is used when debtors are also doubtful.
- A very high cash ratio is not desirable because it indicates the organization has an idle cash balance leading to decrease in profitability.

Note: The ideal current ratio is 2:1

The ideal quick ratio is 1:1

The ideal cash ratio is 0.5:1

Profitability Ratios

Profitability Ratios measures the profitability position of the organization. Profitability means ability to earn more profit.

Following are the different types of profitability ratios:

1. Gross Profit Margin (GPM)
2. Operating Project Margin (OPM) and Operating Ratio (OR)
3. Net Profit Margin (NPM)
4. Return on investment
   (*i*) Return on Net Worth
   (*ii*) Return on Capital Employed (ROCE)
   (*iii*) Return on Total Assets (ROTA)

$$\textbf{Gross Profit Margin} = \frac{\textbf{Gross Profit}}{\textbf{Sales}} \times \textbf{100}$$

$$\textbf{Operating Profit Margin} = \frac{\textbf{Operating Profit}}{\textbf{Sales}} \times \textbf{100}$$

$$\text{Operating Ratio} = \frac{\text{Operating Expenses}}{\text{Sales}} \times 100$$

$$\text{Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Sales}} \times 100$$

- Higher the profitability ratios (GPM, OPM, NPM), higher will be the profitability position of the concerned organization.
- Lower the operating ratio (OR = OE/Sales), the better it is.
- In case gross profit margin is satisfactory but the operating profit margin is not satisfactory then it indicates that the organization is incurring huge operating expenses. Again if operating profit margin is satisfactory but net profit margin is not satisfactory then it indicates that the organization has heavy debt burden. In this situation, to improve the net profit margin, the organization should try to reduce debt burden in order to reduce the interest payment obligation leading to improvement of net profit and hence net profit margin.

Note

Income Statement for the Year ———

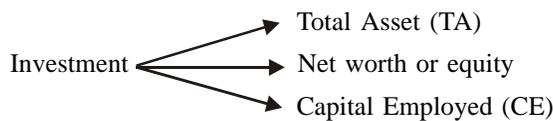|	Particulars	Amount (Rs.)
	Sales	——
Less	Cost of Goods Sold (COGS) ⎫ Trading A/c	——
	Gross Profit (GP)/(Gross Loss) ⎭	——@
Less	Operating Expenses (OE)	——
	Operating Profit (OP)	——@
Add	Non operating income/less non operating losses	——
	Earning Before Interest and Tax (EBIT)	——@
Less	Interest	══
	Earning Before Tax (EBT)	——@
Less	Tax	——
	Profit After Tax (PAT)/Net profit (NP)	——@
Less	Provision for dividend	——
Less	Provision for tax	
Less	Transfer to general reserves P & L (appropr.) A/c	——
	Profit & loss A/c	——@

P & L A/c

Goes to

Balance sheet liability side (under the head 'Reserves and surplus' as Profit & Loss A/c or Retained Earnings (RE))

- @ Stands for balancing figure.
- OE includes general and administrative expenses plus selling and distribution expenses plus depreciation.
- Gross Profit (G.P.) = Sales – Cost of Goods Sold (COGS)

- Operating Profit (OP) = G.P. – Operating Expenses (O.E.)
- Earning Before Interest and Tax (EBIT) = OP + Non-Operating Profit (NOP)/Less Non-Operating Expenses (NOE)
- Net Profit (N.P.) = EBIT – (Interest + tax).
- Interest is tax-deductible item which means interest is charged before the tax is levied. Whereas dividend is not tax-deductible item which means dividend is paid after tax is paid. This is the reason why debt is cheaper source of finance as compared to equity.

Return on Investment—There are three approaches regarding definition of investment.:

$$\text{Investment} \begin{cases} \text{Total Asset (TA)} \\ \text{Net worth or equity} \\ \text{Capital Employed (CE)} \end{cases}$$

$$\textbf{ROTA} = \frac{\textbf{Net Profit}}{\textbf{Total Asset}} \times \textbf{100}$$

- ROTA measures overall profitability of the organization because TA includes total resources of the organization.
- ROTA is the most popular measure of Return On Investment (ROI).

$$\textbf{Return on net worth or equity} = \frac{\textbf{NP}}{\textbf{Net worth of equity}}$$

$$= \frac{\textbf{Net Profit}}{\textbf{(Equity Capital + Reserve \& Surplus)}}$$

- Return on equity measures the productivity of the owner's capital (*i.e.* risk capital) employed in the firm.

$$\textbf{ROCE} = \frac{\textbf{Net Profit}}{\textbf{Capital Employed (CE)}}$$

CE = Total long-term fund = Total asset – Current liability
- Higher the return on investment (ROTA, RO net worth, ROCE) higher will be the profitability.

Solvency Ratios

Solvency ratios measure solvency position of the concerned organization. Solvency means ability to meet long-term obligations. There are two categories of liabilities arising out of long-term obligations *i.e.* long-term creditors *viz.* fixed charge/interest payment obligation and principal repayment. Thus there are two ratios to measure the solvency position.

   1. Fixed Charge/Interest Coverage Ratio (for fixed charge obligation):

$$\textbf{Fixed Charge/Interest Coverage Ratio} = \frac{\textbf{EBIT}}{\textbf{Fixed Charges}} \; (\textbf{Unit – Times})$$

- Higher the ratio, better it is.
- This ratio indicates the extent of EBIT towards fixed charge/interest payment obligation.

2. Debt Equity (D/E) ratio (for principal repayment obligation):

$$\text{D/E ratio} = \frac{\text{Long - term Debt}}{(\text{Equity Capital} + \text{Reserve \& Surplus})}$$

- Lower the ratio, better it is.
- D/E ratio measures the margin of safety of principal amount invested by long-term creditors. More the equity, more safe will be principal of long-term creditors.
- Equity capital acts as cushion to long-term creditors.
- Leverage means making use of low cost debt capital in order to boost the earnings on equity *i.e.* return on equity. Low cost debt means, Rate of earnings > Interest rate of debt capital.
- Trading on equity is possible when leverage exits.

Illustration (Trading on equity):

(In Rs.)

Particulars	Company A	Company B
Equity	1,00,000	40,000
Long-term debt at 10% rate of interest	-	60,000
Total capital employed	1,00,000	1,00,000
EBIT (Earnings Before Interest and Tax)–15% (say)	15,000	15,000
Less: Interest	-	6,000
EBT (Earning Before Tax)	15,000	9,000
Less: Tax @ 40% (say)	7,500	3,600
EAT (Earnings After Tax)/PAT/NP	7,500	6,400
Return on equity = (NP/Equity) x 100	7.5%	10.6%

From above table it is clear that Company B is in better position as it gives more return to its shareholders in comparison to Company A. This is known as trading on equity. Thus trading on equity means maximizing shareholder's wealth (measured in terms of return on equity) through use of low cost debt capital in total capital employed.

Here we can trace out that trading on equity is possible because leverage exists. Company B has used low cost debt capital means Rate of earning (Rate of EBIT—15%) > Interest rate of debt capital—10%). This excess earning (15% – 10% = 5%) goes to equity as equity shareholders have residual claim on income.

Turnover Ratios

- It measures the position of resources utilization. Resources include 5M (men, machine, material, money, method) + IT.
- Higher the turnover ratio, better it is. The unit of turnover ratio is 'Times'. The different turnover ratios are as follows:

$$\text{'X' Turnover Ratio ('X' T.O.R.)} = \frac{\text{Cost of Goods Sold (COGS)}}{\text{Average 'X'}}$$

$$\textbf{Average 'X'} = \frac{\textbf{Opening Balance (X)} + \textbf{Closing Balance (X)}}{\textbf{2}}$$
$$\downarrow$$
$$\textbf{TA, FA, CA etc.}$$

- Total Asset Turnover Ratio (T.A.T.O.R.) $= \dfrac{\text{Cost of Goods Sold (COGS)}}{\text{Average total asset}}$

- Fixed Asset Turnover Ratio (F.A.T.O.R.) $= \dfrac{\text{Cost of Goods Sold (COGS)}}{\text{Average fixed asset}}$

- Current Asset Turnover Ratio (C.A.T.O.R.) $= \dfrac{\text{Cost of Goods Sold (COGS)}}{\text{Average current asset}}$

- Working Capital Turnover Ratio (W.C.T.O.R.) $= \dfrac{\text{Cost of Goods Sold (COGS)}}{\text{Average current asset}}$

Note:
- If previous year's Balance Sheet (B/S) is not given, then replace average figure with closing balance figure.
- If COGS is not available, replace it with sales figures.

Stock or Inventory Turnover Ratio

❑ Stock Turnover Ratio $= \dfrac{\text{(COGS)}}{\text{Average Stock}}$ (unit in times)

   Average Stock $= \dfrac{\text{Opening stock} + \text{Closing stock}}{2}$

If COGS is not available, replace it with sales.

❑ Stock velocity or stock holding period $= \dfrac{360 \text{ or } 365}{\text{Stock turnover ratio}}$ days

or, Stock velocity or stock holding period $= \dfrac{360 \times \text{Average stock}}{\text{COGS}}$

- Stock turnover ratio shows how fast (in times) the average stock is sold during the year. Higher the stock turnover ratio, better it is.
- Stock velocity shows the average time (in days) the stocks remain lying in warehouse before being sold.
- Lower inventory turnover ratio shows that the stock is blocked and not immediately sold means stock is piling up in warehouse.
- In case of manufacturing organization, there are three categories of stocks *viz.* raw material stock, semi finished goods or work in progress and finished goods stock.
- The formula shown above is meant for finished goods stock. The formula for other category of stocks are as follows:

   ○ Raw Material Stock Turnover Ratio $= \dfrac{\text{Raw material consumed during the year}}{\text{Average raw material stock}}$

○ Work-in-Progress (WIP) Turnover Ratio $= \dfrac{\text{Cost of manufacturing during the year}}{\text{Average work-in-progress stock}}$

● The raw material stock turnover ratio measures how many times the average raw material stock is being send for production during the year.

Note: A high inventory turnover ratio may be caused by maintaining a low level of inventory as inventory turnover ratio is inversely proportional to average inventory (see formula). This may result into frequent stock outs leading to possible loss of sales and customer goodwill.

This favourable high turnover ratio may be used for window dressing *i.e.* a firm may prepare its balance sheet at a point when its level of inventory is very low. As a result, it may appear that the firm has a very comfortable liquidity position alongwith adequate inventory turnover, which is not correct.

Debtors Turnover Ratio

❑ Debtors Turnover Ratio $= \dfrac{\text{Credit sales}}{\text{Average debtors}}$ (unit is times)

If credit sales are not available, replace it with sales.

❑ Average Collection Period (ACP) $= \dfrac{360 \text{ or } 365}{\text{Debtors turnover ratio}}$ days

$$\text{ACP} = \dfrac{360 \times \text{Average debtors}}{\text{Credit sales}}$$

Or, Average Collection Period (ACP) $= \dfrac{12 \text{ Months}}{\text{Debtors turnover ratio}}$ months

● Debtors' turnover ratio shows how promptly debtors are making payments.
● Higher the ratio shows debtors are paying frequently.
● ACP shows the average time (in days) taken by the debtors in making the payment.
● Lower the ACP (or higher the debtors turnover ratio), better it is because it reduces the chances of bad debts.

Creditors Turnover Ratio

○ Creditors Turnover Ratio $= \dfrac{\text{Credit purchases}}{\text{Average creditors}}$ (unit is times)

If Credit Purchases are not available, replace it with purchases.

○ Average Payable Period (APP) $= \dfrac{360 \text{ or } 365}{\text{Creditors turnover ratio}}$ Days

$$\text{APP} = \dfrac{360 \times \text{Average creditors}}{\text{Credit purchase}}$$

Or, Average Payable Period (APP) $= \dfrac{12 \text{ Months}}{\text{Creditors turnover ratio}}$ Months

● Creditors turnover ratio shows how frequently trade creditors (suppliers) are paid. This ratio reflects the credit worthiness of the organization.

- Higher the ratio shows organization is paying frequently.
- APP shows the average time (in days) taken by the organization in clearing suppliers' bill (Bills payable).
- Lower the APP (or higher the creditors turnover ratio), better it is, because it improves credit worthiness of the concerned organization. Again a very high creditors turnover ratio is not desirable as it shows that the organization is not fully utilizing the credit period extended by suppliers.
- Creditors turnover ratio acts as spontaneous source of finance as in case of favourable credit worthiness fund can be made available through postponement of payment of suppliers' bill.

Market Ratios

- Market ratios reflect the performance of concerned organization in secondary market.
- Market ratios are useful for investors of stock market as it helps in fundamental analysis of concerned organization.
- Following are different types of market ratios:

1. Dividend per Share (DPS) $= \dfrac{\text{Total distributable profit}}{\text{Number of outstanding shares}}$

2. Earnings per Share (EPS) $= \dfrac{\text{Earnings available to equity shareholder}}{\text{Number of outstanding shares}}$

   OR Earnings per Share (EPS) $= \dfrac{\text{PAT less preference dividend}}{\text{Number of outstanding shares}}$

   Where PAT = Profit after Tax

3. Dividend payout ratio (D/P Ratio) $= \dfrac{\text{DPS}}{\text{EPS}} \times 100$

   ○ 40% Dividend payout ratio means organization has paid Rs. 40 as dividend against earnings of Rs. 100.

4. Price-Earning Ratio (P/E Ratio) $= \dfrac{\text{MP}}{\text{EPS}} \times 100$

   ○ P/E Ratio is a multiplier used for evaluating market value of share as:
     Market Price per share = (P/E) × EPS

5. Earnings yield $= \dfrac{\text{EPS}}{\text{MP}} \times 100$

6. Dividend yield $= \dfrac{\text{DPS}}{\text{MP}} \times 100$

Where MP is market price per share.

Note1:
1. Stock velocity ≡ Stock (Inventory) holding period
2. A/R velocity ≡ Average Collection Period (ACP)
3. A/P velocity ≡ Average Payable Period (APP)

4. Cost of sales ≡ COGS (Cost of Goods Sold in case Closing stock is zero)
5. If Gross Profit (GP) = x% of sales, where x = GPM (Gross Profit Margin) is given, then GP can be written in terms of COGS as given below,

$$GP = \left(\frac{x\% \text{ of sales} \times 100}{(100 - x\% \text{ of sales})} \right)\% \text{ of COGS}$$

e.g.

If GPM = 20%

Then GP = 20% of sales as GPM = (GP/sales) × 100

Or,

$$GP = \left(\frac{20 \times 100}{(100 - 20)} \right)\% \text{ of COGS}$$

Or,

GP = 25% of COGS

Note 2:

The three turnover ratios *viz.* inventory turnover ratio, debtors turnover ratio, and creditors turnover ratio have bearing on the liquidity of the concerned firm.

The combined effect of the three turnover ratios is summarized below:

Inventory holding period	= 2 Months
Add: Debtors collection period	= +1.5 Months
Less: Creditors payment period	= − 3 Months
Total	= 0.5 Months

(Say)

As a rule, the shorter the period, the better is the liquidity position and vice-versa.

Note 3:

Relationship between working Capital (WC) and Liquidity

- Working capital represents capital employed in current asset components *viz.* cash, stock and debtors.
- Though WC is not a ratio but it is frequently used as a measure of firm's liquidity position.
- An enterprise should have sufficient WC in order to be able to meet the claims of creditors and meeting day to day needs of business. The greater the amount of WC, the greater the liquidity of the firm. In other words,

Liquidity ∝ WC

Thus, inadequate working capital is the 1st sign of financial problems for concerned firm.
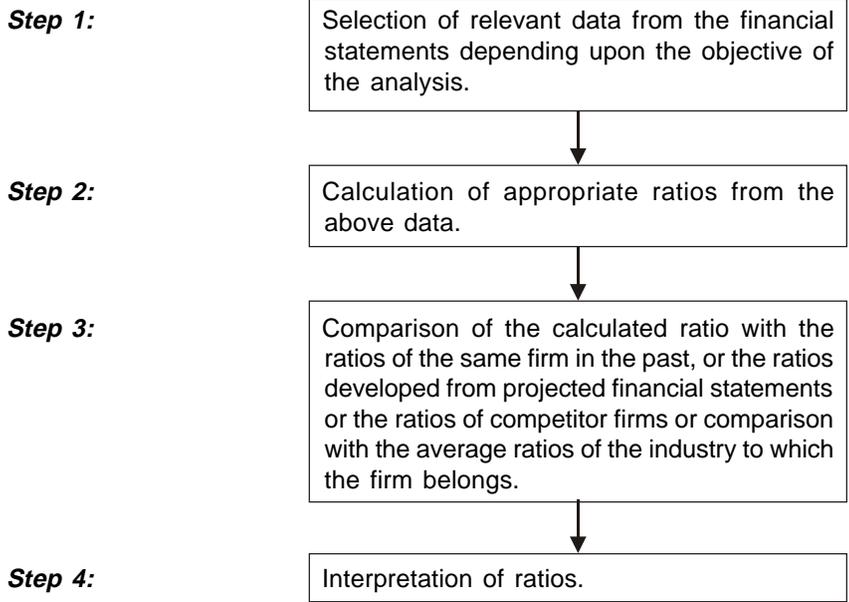
4.5 APPLICATION OF RATIOS

Following are different ways for application of ratios, which help in planning financial decisions and in solving decision-making problems.

- Trend analysis
- Inter-firm comparison
- Comparison with industrial average *i.e.,* digging out strength and weakness.

4.6 METHODOLOGY FOR RATIO ANALYSIS

Methodology for ratio analysis is as follows:

Step 1:	Selection of relevant data from the financial statements depending upon the objective of the analysis.

Step 2:	Calculation of appropriate ratios from the above data.

Step 3:	Comparison of the calculated ratio with the ratios of the same firm in the past, or the ratios developed from projected financial statements or the ratios of competitor firms or comparison with the average ratios of the industry to which the firm belongs.

Step 4:	Interpretation of ratios.

Note: The source of financial data for ratio analysis may be the audited financial statements published in annual report of the organization concerned.

4.7 DU-PONT CHART FOR RATIO ANALYSIS

- Du-Pont chart is designed by Du-Pont Company of America.
- This chart shows how change in any resource/monetary activity of organization affects overall profitability measured in terms of return on total asset.
- This chart helps the management to exercise control, as it incorporates all the resources/monetary activities of the organization.
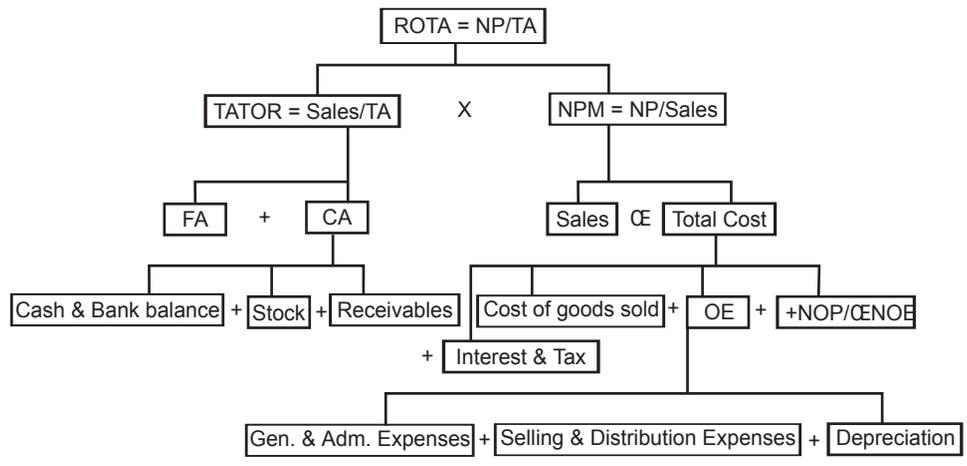
Where,
TATOR : Total Asset Turnover Ratio
NP   : Net Profit
NPM   : Net Profit Margin
TA   : Total Asset
FA   : Fixed Asset
CA   : Current Asset
OE   : Operating Expenses
NOP   : Non Operating Profit
NOE   : Non Operating Expenses
● According to this chart:
Return on Investment = Asset Turnover × Profit Margin

Illustration

Return on Investment = Asset Turnover × Profit Margin

            12 % = 6 % × 2 % ————— case 1

OR   12 % = 2 % × 6 % ————— case 2

This means ROI can be achieved by increasing asset turnover (= Sales/TA) in case profit margin is low (case 1) or by increasing profit margin in case asset turnover is low (case 2).

Dealers and footpath traders work on this principle as with low profit margin they achieve ROI through higher asset turnover (case 1). Whereas showroom traders with low asset turnover achieve ROI through higher profit margin.

To assess the financial position of the firm or for inter-firm comparison, the following steps should be followed-

Evaluate the following ratios and make assessment as suggested below:

1. Current Ratio (CR)
2. Quick Ratio (QR)
3. Inventory Turnover Ratio
4. Debtors Turnover Ratio or ACP
5. Creditors Turnover Ratio or APP
6. Gross Profit Margin (GPM)
7. Net Profit Margin (NPM)
8. Return on Investment (ROI)
9. Debt–Equity Ratio
10. Total asset turnover ratio, working capital turnover ratio etc.

● Ratios (1) and (2) measure liquidity position of the firm. Whereas the cause of liquidity position (good or bad) lies in ratios (3), (4) and (5).

● Ratios (6) and (7) measures the profitability position of the firm. Cause of profitability approach (favourable/adverse) lies in ROI *i.e.* ratio (8).

Again, cause of profitability approach also lies in COGS. As COGS increases, GP (= Sales – COGS) decreases.

● Debt–Equity ratio measures load of debt on equity. It measures margin of safety to creditors and leverage available to equity.

- Ratio (10), (3) and (4) measures the efficiency of management. Lower the T.A.T.O. ratio means under utilization of assets (resources). In this situation, the level of activity can be enhanced without making capital investment.

Illustration: (Application of ratios as tool in decision-making problem)

From the following information taken from the records of two companies (A and B) of the same industry, answer the questions given at the end using ratios as tool.

Particulars	Company A	Company B
Cash	2,10,000	3,20,000
Debtors	3,30,000	6,30,000
Stock	12,30,000	9,50,000
Plant and equipment	16,95,000	24,00,000
Total Assets	**34,65,000**	**43,00,000**
Sundry creditors	9,00,000	10,50,000
8% Debentures	5,00,000	10,00,000
Equity share capital	11,00,000	17,50,000
Retained earnings	9,65,000	5,00,000
Total Liabilities	**34,65,000**	**43,00,000**
Sales	56,00,000	82,00,000
Cost of Goods Sold (COGS)	40,00,000	64,80,000
Other Operating Expenses (OE)	8,00,000	8,60,000
Interest expenses	40,000	80,000
Income taxes	38,00,000	3,90,000
Dividends	10,000	1,80,000

Questions

1. Which company is using the shareholder's money more profitably?
2. Which company is better able to meet its current debts?
3. If you were to purchase the debentures of one company, which company's debenture would you buy?
4. Which company collects its receivables faster, assuming all sales to be credit sales?
5. Which company has extended credit for a greater period by the creditors, assuming all purchases (equivalent to COGS) to be credit purchases?
6. How long does it take each company to convert an investment in stock to cash?

Solution

Following are the relevant ratios used for answering the above questions:

S.No.	Relevant ratios	Company A	Company B
1	Return on equity	18.40 %	17.33 %
2	**Liquidity Ratios:**		
2.1	Current ratio	1.88	1.81
2.2	Quick ratio	0.6	0.9
2.3	Cash ratio	0.23	0.30
3	**Solvency Ratios:**		
3.1	Debt service coverage ratio	20 times	10.7 times
3.2	Debt–equity ratio	0.24	0.44
4	Average collection period	21 days	27 days
5	Average payable period	81 days	58 days
6	Stock holding period	110 days	53 days

Answer to Question No. 1:
From the above table it is evident that return on equity in case of Company A is comparatively more than Company B, therefore it can be concluded that Company A is using shareholders' money more profitably as compared to Company B, as return on equity represents yield on shareholders' fund.

Answer to Question No. 2:
From the above table it is evident that CR in case of Company A is slightly higher than Company B but QR and cash ratio in case of Company B is higher than Company A and since QR and cash ratio are more rigorous test for assessing liquidity position as compared to CR it can be concluded that liquidity *i.e.* ability to meet current debts in case of Company B is more than Company A.

Answer to Question No. 3:
From the above table it is evident that solvency position of Company A is better than Company B which represents ability to meet long-term obligations in terms of interest payment obligation as well as principal repayment obligation. It can, therefore, be concluded that one should purchase debentures of Company A instead of Company B.

Answer to Question No. 4:
Since ACP of Company A is comparatively less than Company B which means average collection time for Company A is less than Company B, it can be concluded that Company A collects its receivables faster than Company B.

Answer to Question No. 5:
Since APP of Company B is comparatively less than Company A which means average payment time for Company B is less than Company A, it can be concluded that Company A has extended credit for a greater period by the creditors than Company B.

Answer to Question No. 6:
Since Stock holding period of Company B is comparatively less than Company A which means stock holding time for Company B is less than Company A, it can be concluded that Company A is holding its stock before being sold for a greater period than Company B.

Working notes

Given,

Sales	56,00,000	82,00,000
Less: COGS	40,00,000	64,80,000
GP	16,00,000	17,20,000
Less: OE	8,00,000	8,60,000
OP/EBIT	8,00,000	8,60,000
Less: Interest expenses	40,000	80,000
EBT	7,60,000	7,80,000
Income tax	3,80,000	3,90,000
PAT/NP	3,80,000	3,90,000

1. Return on net worth or equity $= \dfrac{\text{NP}}{\text{Net worth or equity}}$

$$= \dfrac{\text{Net Profit}}{(\text{Equity capital} + \text{Reserve \& surplus})}$$

For Company A:

Return on equity $= \dfrac{3,80,000}{(11,00,000 + 9,65,000)}$

Return on equity $= \dfrac{3,80,000}{20,65,000} \times 100$

Return on equity $= 18.40\ \%$

For Company B:

Return on equity $= \dfrac{3,90,000}{(17,50,000 + 5,00,000)}$

Return on equity $= \dfrac{3,90,000}{22,50,000} \times 100$

Return on equity $= 17.33\ \%$

2.1 Current Ratio (CR) $= \dfrac{\text{Current Asset (CA)}}{\text{Current Liability (CL)}}$

For Company A:

$$CR = \dfrac{(2,10,000 + 3,30,000 + 12,30,000)}{9,00,000}$$

$$CR = \dfrac{17,00,000}{9,00,000}$$

$$CR = 1.88$$

For Company B:

$$CR = \dfrac{(3,20,000 + 6,30,000 + 9,50,000)}{10,50,000}$$

$$CR \ = \frac{19,00,000}{10,50,000}$$

$$CR = 1.81$$

2.2 Quick Ratio (QR) $= \frac{\textbf{(Current asset – Stock)}}{\textbf{Current Liability (CL)}}$

    For Company A:

$$QR = \frac{[(2,10,000 + 3,30,000 + 12,30,000) - 12,30,000]}{9,00,000}$$

$$QR = \frac{5,40,000}{9,00,000}$$

$$QR = 0.6$$

    For Company B:

$$QR = \frac{\left[(3,20,000 + 6,30,000 + 9,50,000) - 9,50,000\right]}{10,50,000}$$

$$QR = \frac{9,50,000}{10,50,000}$$

$$QR = 0.9$$

2.3 Cash Ratio $= \frac{\textbf{(Cash + Marketable securities)}}{\textbf{Current Liability (CL)}}$

    For Company A:

$$\text{Cash ratio} = \frac{2,10,000}{9,00,000}$$

$$\text{Cash ratio} = 0.23$$

    For Company B:

$$\text{Cash ratio} = \frac{3,20,000}{10,50,000}$$

$$\text{Cash ratio} = 0.30$$

3.1 Debt service coverage ratio (for fixed charge obligation):

$$\text{Debt service coverage ratio} = \frac{\textbf{EBIT}}{\textbf{Interest expenses}} \quad (\text{Unit – times})$$

    For Company A:

$$\text{Debt service coverage ratio} = \frac{8,00,000}{40,000}$$

$$\text{Debt service coverage ratio} = 20 \text{ times}$$

    For Company B:

$$\text{Debt service coverage ratio} = \frac{8,60,000}{80,000}$$

$$\text{Debt service coverage ratio} = 10.7 \text{ times}$$

3.2 Debt–Equity (D/E) ratio (for principal repayment obligation):

$$\text{D/E ratio} = \frac{\textbf{Long-term debt}}{\textbf{(Equity capital + Reserve \& surplus)}}$$

For Company A:

$$\text{D/E ratio} = \frac{5,00,000}{20,65,000}$$
$$\text{D/E ratio} = 0.24$$

For Company B:

$$\text{D/E ratio} = \frac{10,00,000}{22,50,000}$$
$$\text{D/E ratio} = 0.44$$

4. Average Collection Period (ACP):

$$\text{ACP} = \frac{360 \times \text{Average debtors}}{\text{Credit sales}}$$

For Company A:

$$\text{ACP} = \frac{360 \times 3,30,000}{56,00,000}$$
$$\text{ACP} = \frac{1188}{56}$$
$$\text{ACP} = 21 \text{ days}$$

For Company B:

$$\text{ACP} = \frac{360 \times 6,30,000}{82,00,000}$$
$$\text{ACP} = \frac{2268}{82}$$
$$\text{ACP} = 27 \text{ days}$$

5. Average Payable Period (APP):

$$\text{APP} = \frac{360 \times \text{Average creditors}}{\text{Credit purchases}}$$

For Company A:

$$\text{APP} = \frac{360 \times 9,00,000}{40,00,000}$$
$$\text{ACP} = \frac{36 \times 9}{4}$$
$$\text{APP} = 81 \text{ days}$$

For Company B:

$$\text{APP} = \frac{360 \times 10,50,000}{64,80,000}$$
$$\text{APP} = \frac{37800}{648}$$
$$\text{APP} = 58 \text{ days}$$

6. Stock holding period:

$$\text{Stock holding period} = \frac{360 \times \text{Average stock}}{\text{COGS}}$$

For Company A:

$$\text{Stock holding period} = \frac{360 \times 12,30,000}{40,00,000}$$

$$\text{Stock holding period} = \frac{36 \times 123}{40}$$

Stock holding period = 110 days

For Company B:

$$\text{Stock holding period} = \frac{360 \times 9,50,000}{64,80,000}$$

$$\text{Stock holding period} = \frac{34200}{648}$$

Stock holding period = 53 days

4.8 ADVANTAGES OF RATIO ANALYSIS

- **Financial Health:** Ratio analysis helps in analyzing financial health of the concerned organization from different interested groups' (Suppliers, Lenders, Employees, Management, Government and Investors) point of view.
- **Planning and Forecasting:** Ratio analysis over a period of time for concerned organization helps the management in planning and forecasting future activities.
- **Corrective Measures:** Ratio analysis helps in identifying strength and weaknesses of the concerned organization. It also helps in identifying causes for weakness and thus helps in taking corrective action in time.
- **Decision Making:** Ratio analysis helps in improving operational efficiency of the concerned organization.
- **Usefulness:** Ratio analysis is the simplest tool for fundamental analysis, which is of great help to Investors. Furthermore, information expressed in financial statements and presented through ratio analysis is easily understandable and hence more useful for all those having interest in the organization.

4.9 LIMITATIONS OF RATIO ANALYSIS

- **Reliability:** The accuracy of ratio analysis depends upon the accuracy of data used for ratio analysis. Since for the purpose of ratio analysis, data is taken from financial statements *viz.* income statement and balance sheet, and most of the time financial statements get manipulated, careful interpretation of ratio analysis after thorough investigation is required.
- **Comparative measure:** Ratio analysis depicts only comparative picture of financial health of the concerned organization. It does not give absolute measure of financial health.
- **Distorted result:** Inter-firm comparison on the basis of ratio analysis may be misleading because of different practices followed by different firms in respect of inventory valuation, cost of investments etc.
- **External factor:** Price level changes make ratio analysis difficult.

Exercises

Q. 1. State whether the following statements are 'true' or 'false':

(*a*) A ratio is a quotient.

(*b*) Liquidity ratios indicate financial soundness of a company.

(*c*) Gross profit margin covers administrative and selling expenses.

(*d*) Debt ratios have no implications in overall capital structure of the company.

(*e*) Earning per share shows turnover ratio.

Q. 2. State whether following transactions will result in decline, improvement or have no effect on current ratios.

(*a*) Payment of a current liability.

(*b*) Purchase of fixed assets in cash.

(*c*) Cash collected form debtors.

(*d*) Issue of new shares.

(*e*) Sell 15% debenture.

Q. 3. Give the formula for calculating the following ratios:

(*a*) Current ratio

(*b*) Acid test ratio

(*c*) Debt equity ratio

(*d*) Inventory turnover ratio

(*e*) Gross profit margin

(*f*) Earning per share

(*g*) Return on investment.

Q. 4. Describe three liquidity ratios.

Q. 5. Discuss the important turnover ratios.

Q. 6. Which ratios are used to evaluate financial structure of the company? Discuss.

Q. 7. A firm's current assets and current liabilities are Rs. 600 and 1,500 respectively. How much can the firm borrow from the bank without reducing the current ratio below 1:5?

Q. 8. A company's net profit margin is 5%, total assets turnover ratio is 1.5 times, debt to total assets ratio is 0.7. What is the return for the company?

Q. 9. Which of the following ratios are more likely to be of interest to the short-term creditors and why?

(*a*) Inventory turnover.

(*b*) Debt to equity ratio.

Q. 10. Explain the following financial ratios

(*a*) Acid test ratio

(*b*) Debt equity ratio

(*c*) Stock turnover ratio

Q. 11. Which financial ratios are most likely to be consulted by you if you identify ourself with the following position and why?

(*a*) Equity investor

(*b*) Long term lender

(*c*) Trade creditors

Q. 12. 'The higher the rate of return on investment, the better the corporate management'. Is this statement true for all companies? Explain.

Q. 13. (*a*) A firm's sales are Rs. 4,50,000, cost of goods sold is Rs. 2,40,000 and inventory is Rs. 90,000. What is Stock turnover? Also calculate the gross margins.

(*b*) The only current assets possessed by a firm are cash Rs. 1,05,000, inventories Rs. 5,60,000 and debtors Rs. 4,20,000. If the current ratio for the firm is 2 to 1, determine its current liabilities. Also, calculate the firm's quick ratio.

Q. 14. What ratio would you use to measure profitability of a company?

Q. 15. Discuss the significance and limitations of ratios as tools for decision-making?

Q. 16. Write a short note on the merit and demerit of ratio analysis.

Q. 17. What is the difference between current and acid test ratios?

Q. 18. If a company has sales of Rs. 2,00,000 and average accounts receivable of Rs. 40,000, what are its accounts receivable turnover ratio and average collection period?

Q. 19. A company has sales of Rs. 7,50,000, cost of goods sold of Rs. 4,00,000 and inventory of Rs. 1,50,000. What is its inventory turnover ratio ?

Q. 20. A company's request for a line of credit at a bank was turned down. The bank said company's 2:1 current ratio was not adequate. Give reasons why a 2:1 current ratio was found inadequate.

Q. 21. A company has a gross profit margin of 10% and asset turnover of 3. What is its ROI?

Q. 22. A company has current liabilities of Rs. 2,00,000, mortgage of Rs. 3,00,000 and bonds of Rs. 5,00,000. Its total equity is Rs. 1,50,000. What is its debt equity ratio?

Q. 23. A company has net income after tax of Rs. 4,00,000 and pays cash dividend of Rs. 2,40,000 on its Rs. 2,00,000 shares when the stock is selling for Rs. 20. What is the dividend yield and dividend payout ratio of the company.

Q. 24. The total sales of a firm are Rs. 4,00,000 and it has a gross profit margin of 20 percent. If the company has an average inventory of Rs. 50,000, determine the inventory turnover.

Q. 25. A company has an inventory of Rs. 18,00,000, debtors of Rs. 1,15000 and an inventory turnover of 6. The gross profit margin of the company is 10 percent and its credit sales are 20 percent of total sales. Calculate the average collection period (assume a 360 day year).

Q. 26. A company has shareholders equity of Rs. 2,00,000. Total assets are 160 percent of the shareholders equity while the assets turnover is 4. If the company has an inventory turnover of 5, determine the amount of inventory.

Q. 27. A firm has cost of Rs. 2,00,000, sales of Rs. 2,50,000 and asset turnover of 4. What is the rate of return on asset?

Q. 28. A firm has profit before interest and taxes of Rs. 30,000, total assets of Rs. 5,00,000 and total liabilities Rs. 3,00,000. What is its (1) return of equity (2) interest coverage?

Q. 29. Determine the P/E ratio of a firm that has a net profit after taxes of Rs. 1,50,000 and 30,000 outstanding shares selling at a market price of Rs. 10 per share. What rate of return do share holders expect?

Q. 30. A company has a net profit after taxes of Rs. 1,20,000 and pays a cash dividend of Rs. 48,000 on it and 36,000 outstanding shares when the share is selling for Rs. 12. What is the yield and dividend payout?

Q. 31. The XYZ company financial statement contain the following information.

	Previous Year (Rs)	Current Year (Rs)
Cash	2,00,000	1,60,000
Sundry Debtors	3,20,000	4,00,000
Temporary Investment	2,00,000	3,20,000
Stock	18,40,000	21,60,000
Prepaid Expenses	28,000	12,000
Total Current Asset	25,88,000	30,25,000
Total Asset	56,00,000	64,00,000
Current Liabilities	6,40,000	8,00,000
10% Debentures	16,00,000	16,00,000
Equity Share Capital	20,00,000	20,00,000
Retained Capital	4,68,000	8,12,000

Statement of profit for the year ended June 30, current year

		Rs.
Sales		40,00,000
Less cost of goods sold	–28,00,000	
Less interest	–1,60,000	
Net profit for current year		10,40,000
Less taxes @ 50%	–5,20,000	
Earning after taxes		5,20,000
Dividends declared on Equity shares		2,20,000

From the above appraise the financial position of the company from the point of view
1. Liquidity
2. Solvency
3. Profitability
4. Activity

Q. 32. You have been supplied data for the Royal Plastic Company Ltd. Indicate the company's strengths and weakness in terms of liquidity, solvency and profitability as revealed by your analysis.

Balance Sheet Dec. 31 Current year

Liabilities	Rs.	Assets	Rs.
Equity share capital	1,00,000	Plant and equipment	1,51,000
10% preferences share capital	40,000	Cash	12,300
Retained earnings	27,400	Debtors	36,000

Liabilities	Rs.	Assets	Rs.
Long term debts	34,000	Stock	60,800
Sundry creditors	31,500		
Outstanding expenses	1,200		
Other current liabilities	26,000		
	2,60,100		**2,60,100**

Statement of Profit for the year ending December 31

	Rs.	Rs.	
Sales net		2,25,000	
Less cost of goods sold	52,500		
Selling expensed	29,500		
Administrative expensed	14,800		
Research & development	65,00		
Interest	2,900	2,06,200	
Earnings before tax			18,800
Less income taxes			9,400
Net income			9,400
Dividends paid to equity holders			5000

Q. 33. From the following information of a textile company complete the proforma balance sheet if its sales are Rs. 32,00,000

Sales to net worth	2.3 times
Current debt to net worth	42%
Total debt to net worth	75%
Current ratio	2.9 times
Net sales to inventory	4.7 times
Average collection period	64 days
Fixed asset to net worth	53%

Proforma Balance Sheet

Net worth	?	Fixed asset	?
Long term debt	?	Cash	?
Current debt	?	Stock	?
		Sundry debtors	?

Q. 34. The following is the summary of the financial ratios of a company relating to its liquidity position.

	Year 1	*Year 2*	*Year 3*
Current ratio	2.00	2.13	2.28
Acid test ratio	1.20	1.10	0.90
Debtors turnover	10.00	8.00	7.00
Stock turnover	6.00	5.00	4.00

The current ratio is increasing while is acid test ratio is decreasing. Explain the contributing factors for this apparently divergent trend.