

FINAL : PAPER -

20

SYLLABUS - 2016

**STRATEGIC PERFORMANCE  
MANAGEMENT & BUSINESS  
VALUATION**

FINAL

**STUDY NOTES**



**The Institute of Cost Accountants of India**

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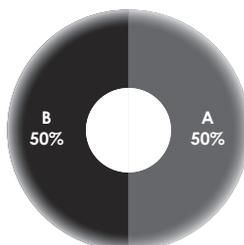
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# Syllabus - 2016

## PAPER 20: STRATEGIC PERFORMANCE MANAGEMENT AND BUSINESS VALUATION

### Syllabus Structure

A	Strategic Performance Management	50%
B	Business Valuation	50%



### ASSESSMENT STRATEGY

There will be examination of three hours.

### OBJECTIVES

To understand the tools for application and measurement of performance for strategic decision making. To develop and present appropriate strategies taking into consideration the risk profile of the organization.  
To gain knowledge of the application of valuation principles and techniques in business environment.

### Learning Aims

The syllabus aims to test the student's ability to:

- Understand the relevance of performance management for strategic decision-making
- Develop skill to interpret, evaluate and recommend strategies for decision making to have competitive advantage.
- Application of Econometric tools for performance management
- Evaluate the risks associated with strategies of an organization
- An easy introduction to the concept of business valuation
- A complete overview of the existing business valuation models
- An understanding of the importance of various assumptions underlying the valuation models
- An easy-to-understand explanation of various business valuation techniques
- A discussion on valuation of assets and liabilities, whether tangible or intangible, apparent or contingent.

### Skill set required

Level C: Requiring skill levels of knowledge, comprehension, application, analysis, synthesis and evaluation.

**Note: Subjects related to applicable statutes shall be read with amendments made from time to time.**

<b>Section A : Strategic Performance Management</b>	<b>50%</b>
1. Conceptual Framework of Performance Management	
2. Performance Evaluation & Improvement Tools	
3. Economic Efficiency of the firm - Impact analysis on Performance	
4. Enterprise Risk Management	
<b>Section B: Business Valuation</b>	<b>50%</b>
5. Business Valuation Basics	
6. Valuation in Mergers and Acquisitions	
7. Fair Value in Accounting Measurement	
8. Valuation of Intangibles	

## SECTION A : STRATEGIC PERFORMANCE MANAGEMENT [50 MARKS]

### 1. Conceptual Framework of Performance Management

- (a) Performance Management - Concept, components
- (b) Performance, Productivity and Efficiency
- (c) Financial Performance Analysis
- (d) Supply Chain Management (SCM)
- (e) Customer Relationship Management (CRM) & Customer Profitability analysis

### (2) Performance Evaluation & Improvement Tools

- (a) Balance Score Card
- (b) Du-Pont-Analysis
- (c) Bench Marking & Bench Trending
- (d) Six Sigma
- (e) Statistical Quality Control (SQL)
- (f) Plan-Do-Check-Action (PDCA)
- (g) Management Information System
- (h) Online Analytical Processing tools
- (i) Tools to Improve Productivity and Profitability - MRP I, MRP II and ERP
- (j) Total Productivity Management
- (k) total Quality Management

### (3) Ecoinomic Efficiency of the Firm - Performance Analysis

- (a) Profit - maximization under different market structure
- (b) Market factors affecting Pricing decisions

### (4) Enterprise Risk Management

#### (a) Risk Management

- (i) Risk Management - Introduction and Objectives
- (ii) Risk Measurement - Pooling, Diversification, Total Loss Distribution, Ruin Probability
- (iii) Risk Analysis - Risk Mapping and Risk Indicators

#### (b) Corporate Risk Management

- (i) Enterprise Risk Management
- (ii) Risk Retention or Reduction
- (iii) Value at Risk (VAR)
- (iv) Introduction to Capital Adequacy Norms in Banking Industry

#### (c) Corporate Failure

- (i) Corporate Distress Analysis - Causes
- (ii) Corporate Distress Prediction Models: Edward Altman's Model, NCAER Models

## SECTION B : BUSINESS VALUATION [50 MARKS]

### (5) Business Valuation Basics

- (a) Meaning of Value, Valuation and Business Valuation
- (b) Principles of Valuation, Valuation Bias, Types of Values
- (c) Role of Business Valuation in Corporate Finance and Business Acquisitions

### (6) Valuation Models

- (a) Non-Discounted Cash Flow Method (DCF) - Accounting Based, Earnings Based, Cash Flow Based
- (b) Discounted Cash Flow Method
- (c) Other Methods of Valuation

**(7) Valuation of Assets and Liabilities**

- (a) Valuation of Inventory
- (b) Valuation of Investments - Bonds and Shares
- (c) Valuation of Intangibles - Copy Rights, Good Will, Brand
- (d) Valuation of Human Resources
- (e) Value Added, Economic Value Added, Market Value Added
- (f) Valuation of Liabilities

**(8) Valuation in Mergers and Acquisitions**

- (a) Meaning of Business Mergers and acquisitions and Types
- (b) Application of Valuation models for business mergers and acquisitions
- (c) Determination of Exchange Ratio (Swap) or Purchase Consideration
- (d) Synergistic benefits and distribution of synergy gains
- (e) Recognition of Interest of various stakeholders
- (f) Selection of appropriate cost of capital for valuation
- (g) Impact of merger on value of share

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**Section A**  
**Strategic Performance Management**  
**(Syllabus - 2016)**

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# Study Note - 1

## CONCEPTUAL FRAMEWORK OF PERFORMANCE MANAGEMENT



### This Study Note includes

- 1.1 Performance Management - Concepts, Components
- 1.2 Performance, Productivity and Efficiency
- 1.3 Financial Performance Analysis
- 1.4 Supply Chain Management
- 1.5 Customer Relationship Management
- 1.6 Customer Profitability Analysis

### 1.1 PERFORMANCE MANAGEMENT - CONCEPTS, COMPONENTS

#### Introduction

Performance management is a continuous process of identifying, measuring and developing performance in organizations by linking each individual's performance and objectives to the organization's overall mission and goals. Let's consider each of the definition's two main components:

1. **Continuous process:** Performance management is ongoing. It involves a never-ending process of setting goals and objectives, observing performance, and giving and receiving ongoing coaching and feedback.
2. **Link to mission and goals:** Performance management requires managers to ensure that employees' activities and outputs are congruent with the organisation's goals and, consequently, help the organisation gain a competitive business advantage. Performance Management therefore creates a direct link between employee performance and organizational goals, and makes the employees' contribution to the organization explicit.

Note that many organizations have what is labeled a 'performance management' system. However, we must distinguish between performance management and performance Appraisal.

"In a knowledge economy, organizations rely heavily on their intangible assets to build value. Consequently, performance management at the individual employee level is essential and the business case for implementing a system to measure and improve employee performance is strong." Management time and effort to increase performance not only meets this goal; it also decreases turnover rates. How do we manage performance within the organization? The most common part of the process, and the one with which we are most familiar, is the process of the performance appraisal, or evaluation. In this chapter, we will use the phrases performance evaluation, performance appraisal, and appraisal interchangeably. However, the performance appraisal process is not the only thing that's done in performance management.

Performance management is the process of identifying, measuring, managing, and developing the performance of the human resources in an organization. Basically we are trying to figure out how well employees perform and then to ultimately improve that performance level. When used correctly, performance management is a systematic analysis and measurement of worker performance (including communication of that assessment to the individual) that we use to improve performance over time.

Performance appraisal, on the other hand, is the ongoing process of evaluating employee performance. Performance appraisals are reviews of employee performance over time, so appraisal is just one piece of performance management.

The terms 'performance management' and 'performance appraisal' are sometimes used

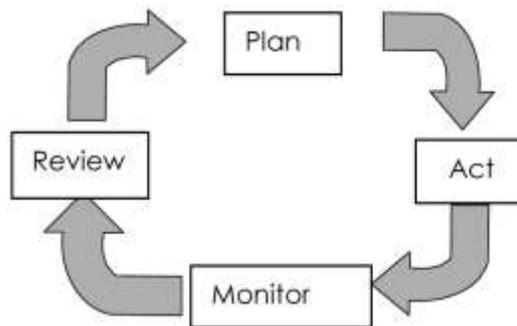
synonymously, but they are different. Performance management is a comprehensive, continuous and flexible approach to the management of organisations, teams and individuals which involves the maximum amount of dialogue between those concerned. Performance appraisal is a more limited approach which involves managers making top-down assessments and rating the performance of their subordinates at an annual performance appraisal meeting.

Performance appraisal	Performance management
Top-down assessment	Joint process through dialogue
Annual appraisal meeting	Continuous review with one or more formal reviews
Use of ratings	Ratings less common
Monolithic system	Flexible process
Focus on quantified objectives	Focus on values and behaviors as well as objectives
Often linked to pay	Less likely to be directly linked to pay
Bureaucratic - complex paperwork	Documentation kept to a minimum
Owned by the HR department	Owned by line managers

**Performance Management - Concept**

Performance management focuses mainly on the achievement of results. It differentiates the aspects, such as being engaged and producing results- which means, being busy should not necessarily be indicating that the results are being produced. There may be times when employees seem to be very busy but in terms of their performance, the results are in contrast to what has been expected. Systematic performance appraisal provides much assistance in assessing the potentials of the employees. Thus, performance management directs and leads the business to the overall achievement with the assessment of employees' effectiveness by the implementation of performance appraisals at regular intervals.

**The Performance Management Cycle**



**Components of Performance Management:**

- 1. Performance Planning:** Performance planning is the first crucial component of any performance management process which forms the basis of performance appraisals. Performance planning is jointly done by the appraiser and the reviewer in the beginning of a performance session. During this period, the employees decide upon the targets and the key performance areas which can be performed over a year within the performance budget, which is finalized after a mutual agreement between the reporting officer and the employee.

Organizations using Balance Score Card (BSC), drill Key Performance Indicators (KPIs) down the hierarchy so that each employee is responsible for definite results (called Key Result Areas or KRAs). Let us consider the following example:



An iron ore mining company excavates iron-ore, crushes over-sized lumps and washes a part of it for higher grade. Thus, there are three grades viz. sized ore (washed & unwashed) and fines, each serving a distinct group of customers. Company's machineries comprise mobile equipments (drills, excavators, loaders, dumpers and dozers), stationery crusher, washing plant and conveyor system connecting crusher, washing plant and stockyard.

KPIs for Managing Director of the above company may include the following :

- (a) Grade-wise production of iron ore in tonnages for the year in question
- (b) Output per man-shift (OMS)
- (c) Equipment utilization %
- (d) Cost per ton of each grade for the year in question
- (e) Average sales revenue per ton for each grade for the year in question
- (f) Order fulfillment % for sales and purchases
- (g) Inventory ceiling for iron ore, spares and consumables (each in quantity & value)
- (h) Ceiling values of debtors and creditors
- (i) Statutory compliance in terms of payment of dues, return filing, etc (Number of show causes received may be used for measuring non-compliance. In such cases, response times may also be included as KPI).
- (j) Time limits for resolving complaints of customers, suppliers, employees, etc.
- (k) Development of mining in new areas within the lease (in terms of iron ore reserve targeted, additional machinery & manpower, Government' clearances, time-schedule, etc)

Above KPIs are drilled-down (cascaded down) through next level to bottom most level. For example –

- General Manager (Operations) is responsible for KPIs (a) to (d) as its KRAs. He drills KPIs (a) & (b) down to Mines Manager and KPI (c) to Equipment Manager. Said Managers in turn drill respective KPIs down to Supervisors under them, each with a definite share.
- General Manager (Marketing) is responsible for KPIs (e) and parts of (f) & (g) relating to sales & iron-ore respectively. He distributes these among subordinates in next level.
- General Manager (Finance) is responsible for KPIs (h) & (i).

Likewise, the rest of the KPIs are drilled down.

**Note the following:**

- a) Above drilling down exercise presupposes standards and/ or budgets for identifying KRAs of each employee at each level. For instance, KPI (d) above is primarily attributed to functionaries in Operations for Mining, Maintenance, Purchase & Stores, etc. It is also attributed to other functionaries e.g. Human Resource Dept (HRD) for wages rates and employee discipline [Employee discipline affects KPI (b)].
- b) It may be difficult for a large organization to implement KRAs for grass-root employees specially when they are unionized. In such cases, negotiation with union is an important task of HRD. Often, drilling down is restricted to Supervisory levels whereby each Supervisor is made responsible for the group of employees supervised.

**2. Performance Appraisal and Reviewing:** The appraisals are normally performed twice in a year in an organization in the form of mid reviews and annual reviews which is held at the end of the financial year. In this process, the appraise first offers the self filled up ratings in the self appraisal form and also describes his/her achievements over a period of time in quantifiable terms. After the self appraisal, the final ratings are provided by the appraiser for the quantifiable and measurable achievements of the employee being appraised. The entire process of review seeks an active participation of both the employee and the appraiser for analyzing the causes of loopholes in the performance and how it can be overcome.



3. **Feedback on the Performance followed by personal counseling and performance facilitation:** Feedback and counseling is given a lot of importance in the performance management process. This is the stage in which the employee acquires awareness from the appraiser about the areas of improvements and also information on whether the employee is contributing the expected levels of performance or not. The employee receives an open and a very transparent feedback and along with this the training and development needs of the employee is also identified. The appraiser adopts all the possible steps to ensure that the employee meets the expected outcomes for an organization through effective personal counseling and guidance, mentoring and representing the employee in training programs which develop the competencies and improve the overall productivity.
4. **Rewarding good performance:** This is a very vital component as it will determine the work motivation of an employee. During this stage, an employee is publicly recognized for good performance and is rewarded. This stage is very sensitive for an employee as this may have a direct influence on the self esteem and achievement orientation. Any contributions duly recognized by an organization helps an employee in coping up with the failures successfully and satisfies the need for affection.
5. **Performance Improvement Plans:** In this stage, fresh set of goals are established for an employee and new deadline is provided for accomplishing those objectives. The employee is clearly communicated about the areas in which the employee is expected to improve and a stipulated deadline is also assigned within which the employee must show this improvement. This plan is jointly developed by the appraise and the appraiser and is mutually approved.
6. **Potential Appraisal:** Potential appraisal forms a basis for both lateral and vertical movement of employees. By implementing competency mapping and various assessment techniques, potential appraisal is performed. Potential appraisal provides crucial inputs for succession planning and job rotation.

## 1.2 PERFORMANCE, PRODUCTIVITY AND EFFICIENCY

The concepts of productivity and efficiency have received a great deal of attention in many countries and organizations and by individuals in recent years. In an organizational context, productivity and efficiency reflects overall performance. This could lead to increases or decreases in shareholders 'wealth. Hence, governments, economists and professionals are concerned with defining and measuring the concepts of productivity and efficiency.

At a basic level, productivity examines the relationship between input and output in a given production process. Thus, productivity is expressed in an output versus input formula for measuring production activities. It does not merely define the volume of output, but output obtained in relation to the resources employed. In this context, the productivity of the firm can be defined as a ratio as shown in equation 1.

$$\text{Productivity} = \frac{\text{Output(s)}}{\text{Input(s)}} \dots\dots\dots (1)$$

The concept of productivity is closely related with that of efficiency. While the terms productivity and efficiency are often used interchangeably, efficiency does not have the same precise meaning as does productivity. While efficiency is also defined in terms of a comparison of two components (inputs and outputs), the highest productivity level from each input level is recognized as the efficient situation. Further suggest that efficiency reflects the ability of a firm to obtain maximum output from a given set of inputs. If a firm is obtaining maximum output from a set of inputs, it is said to be an efficient firm.

Alternative ways of improving the productivity of the firm, for example, are by producing goods and services with fewer inputs or producing more output from the same quantity of inputs. Thus, increasing productivity implies either more output is produced with the same amount of inputs or that fewer inputs are required to produce the same level of output. The highest productivity (efficient point) is achieved when maximum output is obtained for a particular input level. Hence, productivity growth encompasses changes in efficiency, and increasing efficiency definitely raises productivity. Consequently, if the productivity growth of an organization is higher than that of its competitors, or other firms, that firm performs better and is considered to be more efficient.



On the other hand, performance is much bigger and more inclusive. In the business sector it is about improving all the factors that increase the profit—factors that reduce expenditure, increase income, and result in more output per unit input.

In the public sector it is about how you maximise the quality, scope and timeliness (waiting times) of your service delivery while minimising the inputs that are required. Ultimately, performance is about maximising the amount of output energy from a system.

Hence, Performance will be product of efficiency, utilisation and productivity.

### **Efficiency**

Efficiency consists of two main components; technical efficiency and allocative efficiency. Generally, the term efficiency refers to technical efficiency. As discussed in the previous section, technical efficiency occurs if a firm obtains maximum output from a set of inputs.

Allocative efficiency occurs when a firm chooses the optimal combination of inputs, given the level of prices and the production technology. When a firm fails to choose the optimal combination of inputs at a given level of prices, it is said to be allocatively inefficient, though, it may be technically efficient. Technical efficiency and allocative efficiency combine to provide overall efficiency. When a firm achieves maximum output from a particular input level, with utilization of inputs at least cost, it is considered to be an overall efficient firm.

To illustrate the above, let us consider a ferro-alloy plant manufacturing ferro-chrome with chrome ore, coke and limestone as chief inputs. Suppose it can produce 6,000 tons of ferro-chrome of a specific grade in a day with least cost per ton, if 15,000 tons of domestic ore and 3,300 tons of imported coke of appropriate grades are available at agreed prices (assume requisite limestone is sourced from captive mines). Let us consider the following scenarios:

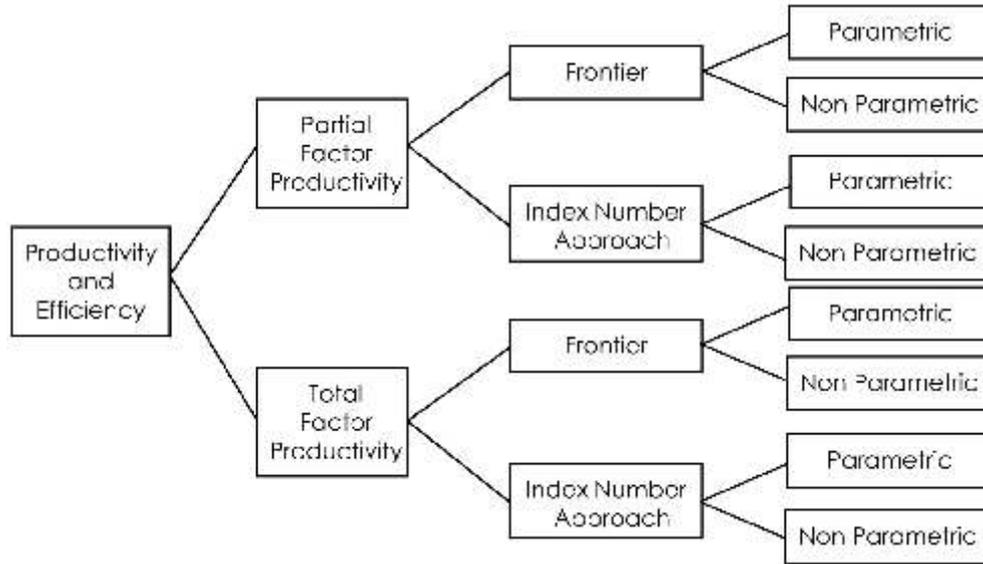
- If inputs as above are available, any adverse deviation in output is attributable to technical inefficiency.
- Suppose, on a particular day imported coke is out of stock and 3,500 tons of domestic coke is purchased as a cheaper substitute though with lower yield. This is an allocative inefficiency resulting in higher cost per ton of ferro-chrome [Note: Higher quantity of domestic coke is required for compensating lower yield, entailing adverse cost. Rush purchases further add to cost].
- Suppose, there is a breakdown of machinery in limestone mines on a day. This would limit ferro-chrome production, if sufficient stock of limestone was not built up. Breakdown could be due to technical inefficiency in preventing it or due to allocative inefficiency in not having requisite spares for machine maintenance. Short production could also be due to insufficient limestone stock which is again an allocative failure.

Improving productivity and efficiency is one of the main goals considered in organizations in recent years, because productivity gains provide overall information about the firm's performance. When considering efficiency analysis in financial institutions, Berger and Humphrey stress that it is important to determine their efficiency because they are in a competitive environment and their strength is vital for solvency. Further, efficiency analysis not only has important ramifications for institutions themselves, as evident in their competitiveness and solvency, it is also important for other interested parties, such as regulatory authorities and the general public. Although the basic concepts of productivity and efficiency are clearly discernible measures that have been presented in the literature are diverse. The selection of the appropriate measurement depends on the purpose of the study.

### **Measurement of Productivity and Efficiency**

Basically, for a single firm that produces one output using a single input, the ratio of output to input is a measure of the productivity level. In this case, productivity is relatively easy to measure. However, in the case of many outputs and many inputs in a production process, the measurement of an output- input ratio is difficult. Hence, many different approaches have been applied by many researchers to the measurement of productivity and efficiency changes in various types of institutions, and levels of DMUs (Decision Making Units) as well. Further, different approaches to productivity measurement give different numeric answers. Therefore, it is essential to select appropriate measurements for productivity and efficiency to avoid measurement bias in the results.

**Partial Factor Productivity and Total Factor Productivity**



**Fig: Approaches to the measurement of Productivity and Efficiency**

The above summarizes the various approaches to the measurement of productivity and efficiency identified from the literature. In general, productivity and efficiency can be measured on a 'Partial' factor or 'Total' factor basis. Partial Factor Productivity (PFP) refers to the change in output owing to the change in the quantity of one input, whereas Total Factor Productivity (TFP) refers to the change in output owing to changes in the quantity of more than one input. Examples of PFP are material yield, output per man-hours, etc. A comprehensive example of TFP is Return On Investment (ROI) or overall profitability index which can be broken up into several parts through product profitability and capital turnover rate.

In general, in an industrial context, goods and services are produced by a combination of many factors or inputs. The output of goods and services cannot be used as a measure of the productivity of any one of the inputs. The output is only a measure of the joint power of inputs to achieve results. This is the main disadvantage of measuring productivity and efficiency using the PFP approach. To overcome this shortcoming of PFP, TFP has been developed. TFP measures overall productivity and efficiency by considering all inputs and all outputs in the production process. With full technical efficiency, producing maximum potential output from the allocated inputs.

**1.3 FINANCIAL PERFORMANCE ANALYSIS**

Financial performance analysis is the process of identifying the financial strengths and weaknesses of the firm by properly establishing the relationship between the items of balance sheet and profit and loss account. It also helps in short-term and long term forecasting and growth can be identified with the help of financial performance analysis. The dictionary meaning of 'analysis' is to resolve or separate a thing in to its element or components parts for tracing their relation to the things as whole and to each other. The analysis of financial statement is a process of evaluating the relationship between the component parts of financial statement to obtain a better understanding of the firm's position and performance. This analysis can be undertaken by management of the firm or by parties outside the firm namely, owners, creditors, investors.

In short, the firm itself as well as various interested groups such as managers, shareholders, creditors, tax authorities, and others seeks answers to the following important questions:

1. **What is the financial position of the firm at a given point of time?**
2. **How is the Financial Performance of the firm over a given period of time?**



These questions can be answered with the help of financial analysis of a firm. Financial analysis involves the use of financial statements. A financial statement is an organized collection of data according to logical and consistent accounting procedures. Its purpose is to convey an understanding of some financial aspects of a business firm. It may show a position at a moment of time as in the case of a Balance Sheet, or may reveal a series of activities over a given period of time, as in the case of an Income Statement. Thus, the term 'financial statements' generally refers to three basic statements: Balance Sheet, Income Statement & Cash-Flow Statement.

**Balance Sheet** shows the financial position (condition) of the firm at a given point of time. It provides a snapshot and may be regarded as a static picture. "Balance sheet is a summary of a firm's financial position on a given date that shows Total assets = Total liabilities + Owner's equity."

**Income Statement** (referred to in India as the profit and loss statement) reflects the performance of the firm over a period of time. "Income statement is a summary of a firm's revenues and expenses over a specified period, ending with net income or loss for the period."

**Cash-Flow Statement** depicts cash accrual for the period under consideration. It can be prepared either by direct method of receipts & payments or by indirect method of adjusting increase or decrease in liabilities & non-cash assets to profit or loss. Direct method is simple and easier to understand while indirect method is more informative (since it combines Balance-Sheet & Income Statement). Indirect method is widely adopted for management information, besides compliances under various Statutes [Indian Companies Act, SEBI rules, FEMA guidelines for share valuation against Foreign Direct Investment (FDI), etc].

For capital projects extending over a number of years (as for modernization, expansion, diversification, etc), year-wise estimation of cash-flows helps management in planning for sourcing of funds through share issue, public deposit (including debentures) and bank loans (long-term or short-term). Cash-flow projections are also helpful for replacement of long-term liability (either on installment basis or on redemption basis). These apart, cash-flow analysis is an useful tool for measuring profitability of a project, share valuation and life cycle costing. We will elaborate the last point as follows:

- Discounting series of future net cash-flows at a given rate (usually interest rate), we get present value (PV) of the series. Such PV is comparable with investment. For example, a machinery of different makes with acceptable technical considerations may be screened on the basis of PV [one having highest Present Gain (=PV-Investment Cost) and fulfilling gain target is preferred]. PV is also adopted in income-based valuation of shares if fresh issue is desirable for financing the project (Note: Share valuation may be necessary for justifying share premium for different statutory purposes).
- Discounting future cash-flows at a rate that breaks even inflows and outflows, we get Internal Rate of Return (IRR) which is comparable with normal rate of return on investment. IRR is also useful in long-term price bidding against tenders that involve capital outlay and periodical revenues (See the illustration given below).

IRR technique can be formulated with net cash-flows over a period (T) discounted at internal rate (R). 'R' below minimum expected rate of return (r) is rejected. If  $I_t$  = net cash - flow in any year 't', mathematical expression for IRR-based DCF is as follows :

$$\sum_{t=1}^T \frac{I_t}{(1+R)^{t-1}} = 0 \quad (t=1,2,3,\dots,T, \quad r \leq R < 1, \quad 0 < r < 1)$$

**Illustration:** Let long-term price = ₹100 per unit with anticipated inflation @ 5% p.a. for a project involving a new machinery which is loan-financed as shown in the table below. 90% of sales are realized every year and balance next year. Rest figures in the table are self-explanatory. The table shows net inflow totaling ₹ 352 lakhs over 10 years with investment of ₹ 1,012 lakhs. Periodicities of these data make  $R = 16\%$ . It follows in this illustration that different prices yields different values of R (11th year with balance realization therein are ignored).

**Discounted Cash-Flow Model For Long-Run Pricing (Figures in lakhs)**

Year	1	2	3	4	5	6	7	8	9	10	Total
Output (Units)		6	22	35	35	35	35	28	12	5	213
Inflows											
Receipts from trade debtors		540	2,139	3,711	4,059	4,280	4,496	3,877	1,950	882	25,933
Receipts from machinery scrapping										122	122
Total Inflow	--	540	2,139	3,711	4,059	4,280	4,496	3,877	1,950	1,004	26,055
Outflows											
Down payment to machinery supplier	150										150
Loan repayments		100	105	112	122	125	140	158			862
Payments to trade creditors		435	1,745	2,934	3,282	3,328	3,409	3,117	1,667	874	20,791
Interest payments		70	65	58	48	45	30	12			328
Other payments (including salaries and taxes)	12	85	295	497	558	576	613	523	266	147	3,572
Total Outflow	162	690	2,210	3,601	4,010	4,074	4,192	3,810	1,933	1,021	25,703
Net Inflow	(162)	(150)	(71)	110	49	206	304	67	17	(17)	352
Receipts from issue of equity shares	150										150
Loan (against machinery)	862										862
Cash Balance	850	700	629	739	787	993	1,297	1,364	1,381	1,364	1,364

However, financial statements do not reveal all the information related to the financial operations of a firm, but they furnish some extremely useful information, which highlights two important factors profitability and financial soundness. Thus analysis of financial statements is an important aid to financial performance analysis. Financial performance analysis includes analysis and interpretation of financial statements in such a way that it undertakes full diagnosis of the profitability and financial soundness of the business.

"The analysis of financial statements is a process of evaluating the relationship between component parts of financial statements to obtain a better understanding of the firm's position and performance.

The financial performance analysis identifies the financial strengths and weaknesses of the firm by properly establishing relationships between the items of the balance sheet and profit and loss account. The first task is to select the information relevant to the decision under consideration from the total information contained in the financial statements. The second is to arrange the information in a way to highlight significant relationships. The final is interpretation and drawing of inferences and conclusions. In short, "financial performance analysis is the process of selection, relation, and evaluation."

**Areas of Financial Performance Analysis**

Financial analysts often assess firm's production and productivity performance, profitability performance, liquidity performance, working capital performance, fixed assets performance, fund flow performance and social performance. Financial health is measured from the following perspectives:

1. Working capital Analysis
2. Financial structure Analysis
3. Activity Analysis
4. Profitability Analysis

**Significance of Financial Performance Analysis**

Interest of various related groups is affected by the financial performance of a firm. Therefore, these groups analyze the financial performance of the firm. The type of analysis varies according to the specific interest of the party involved.

**Trade creditors:** interested in the liquidity of the firm (appraisal of firm's liquidity)

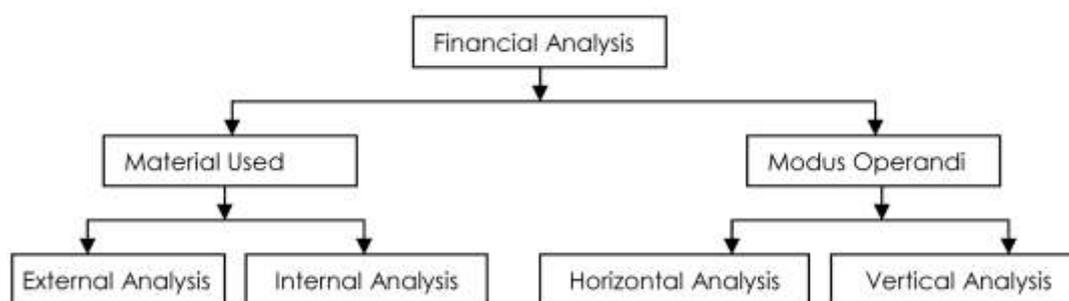
**Bond holders:** interested in the cash-flow ability of the firm (appraisal of firm's capital structure, the major sources and uses of funds, profitability over time, and projection of future profitability)

**Investors:** interested in present and expected future earnings as well as stability of these earnings (appraisal of firm's profitability and financial condition)

**Management:** interested in internal control, better financial condition and better performance (appraisal of firm's present financial condition, evaluation of opportunities in relation to this current position, return on investment provided by various assets of the company, etc).

### Types of Financial Performance Analysis

Financial performance analysis can be classified into different categories on the basis of material used and modes operandi as under:



**A. Material used:** On the basis of material used financial performance can be analyzed in following two ways:

#### 1. External analysis

This analysis is undertaken by the outsiders of the business namely investors, credit agencies, government agencies, and other creditors who have no access to the internal records of the company. They mainly use published financial statements for the analysis and as it serves limited purposes.

#### 2. Internal analysis

This analysis is undertaken by the persons namely executives and employees of the organization or by the officers appointed by government or court who have access to the books of account and other information related to the business.

**B. Modus operandi:** On the basis of modus operandi financial performance can be analyze in the following two ways:

#### 1. Horizontal Analysis

In this type of analysis financial statements for a number of years are reviewed and analyzed. The current year's figures are compared with the standard or base year and changes are shown usually in the form of percentage. This analysis helps the management to have an insight into levels and areas of strength and weaknesses. This analysis is also called Dynamic Analysis as it based on data from various years.

#### 2. Vertical Analysis

In this type of Analysis study is made of quantitative relationship of the various items of financial statements a particular date. This analysis is useful in comparing the performance of several companies in the same group, or divisions or departments in the same company. This analysis is not much helpful in proper analysis of firm's financial position because it depends on the data for one period. This analysis is also called Static Analysis as it based on data from one date or for one accounting period.



## Techniques/Tools of Financial Performance Analysis

An analysis of financial performance can be possible through the use of one or more tools / techniques of financial analysis:

### ACCOUNTING TECHNIQUES

It is also known as financial techniques. Various accounting techniques such as Comparative Financial Analysis, Common-size Financial Analysis, Trend Analysis, Fund Flow Analysis, Cash Flow Analysis, CVP Analysis, Ratio Analysis, Value Added Analysis etc. may be used for the purpose of financial analysis. Some of the important techniques which are suitable for the financial analysis are discussed hereunder:

#### 1. Ratio Analysis

In order to evaluate financial condition and performance of a firm, the financial analyst needs certain tools to be applied on various financial aspects. One of the widely used and powerful tools is ratio or index. Ratios express the numerical relationship between two or more things. This relationship can be expressed as percentages (25% of revenue), fraction (one-fourth of revenue), or proportion of numbers (1:4). Accounting ratios are used to describe significant relationships, which exist between figures shown on a balance sheet, in a profit and loss account, in a budgetary control system or in any other part of the accounting organization. Ratio analysis plays an important role in determining the financial strengths and weaknesses of a company relative to that of other companies in the same industry. The analysis also reveals whether the company's financial position has been improving or deteriorating over time. Ratios can be classified into four broad groups on the basis of items used: (i) Liquidity Ratio, (ii) Capital Structure/Leverage Ratios, (iii) Profitability Ratios, and (iv) Activity Ratios.

#### 2. Common-Size Financial Analysis

Common-size statement is also known as component percentage statement or vertical statement. In this technique net revenue, total assets or total liabilities is taken as 100 per cent and the percentage of individual items are calculated likewise. It highlights the relative change in each group of expenses, assets and liabilities.

### Common Size Financial Statements

Common size ratios are used to compare financial statements of different-size companies or of the same company over different periods. By expressing the items in proportion to some size-related measure, standardized financial statements can be created, revealing trends and providing insight into how the different companies compare.

The common size ratio for each line on the financial statement is calculated as follows:

Common Size Ratio = Item of Interest / Reference Item

For example, if the item of interest is inventory and it is referenced to total assets (as it normally would be), the common size ratio would be:

Common Size Ratio for Inventory = Inventory / Total Assets

The ratios often are expressed as percentages of the reference amount. Common size statements usually are prepared for the income statement and balance sheet, expressing information as follows:

- Income statement items - expressed as a percentage of total revenue.
- Balance sheet items - expressed as a percentage of total assets

The following example income statement shows both the rupee amounts and the common size ratios

Income Statement		Common Size Income Statement
Revenue	70,134	100%
Cost of Goods Sold	44,221	63.1%
Gross Profit	25,913	36.9%
SG&A Expense	13,531	19.3%



Operating Income	12,382	17.7%
Interest Expense	2,862	4.1%
Provision for Taxes	3,766	5.4%
Net Income	5,754	8.2%

For the balance sheet, the common size percentages are referenced to the total assets. The following sample balance sheet shows both the rupee amounts and the common size ratios:

Common Size Balance Sheet		
	Balance Sheet	Common-Size Balance Sheet
<b>ASSETS</b>		
Cash & Marketable Securities	6,029	15.1%
Accounts Receivable	14,378	36.0%
Inventory	17,136	42.9%
Total Current Assets	37,543	93.9%
Property, Plant & Equipment	2,442	6.1%
Total Assets	39,985	100%
<b>LIABILITIES AND SHAREHOLDERS' EQUITY</b>		
Current Liabilities	14,251	35.6%
Long-Term Debt	12,624	31.6%
Total Liabilities	26,875	67.2%
Shareholders' Equity	13,110	32.8%
Total Liabilities & Equity	39,985	100%

The above common size statements are prepared in a vertical analysis, referencing each line on the financial statement to a total value on the statement in a given period.

The ratios in common size statements tend to have less variation than the absolute values themselves, and trends in the ratios can reveal important changes in the business. Historical comparisons can be made in a time-series analysis to identify such trends.

Common size statements also can be used to compare the firm to other firms.

### Comparisons between Companies (Cross-Sectional Analysis)

Common size financial statements can be used to compare multiple companies at the same point in time. A common-size analysis is especially useful when comparing companies of different sizes. It often is insightful to compare a firm to the best performing firm in its industry (benchmarking). A firm also can be compared to its industry as a whole. To compare to the industry, the ratios are calculated for each firm in the industry and an average for the industry is calculated. Comparative statements then may be constructed with the company of interest in one column and the industry averages in another. The result is a quick overview of where the firm stands in the industry with respect to key items on the financial statements.

### Limitation

As with financial statements in general, the interpretation of common size statements is subject to many of the limitations in the accounting data used to construct them. For example:

- Different accounting policies may be used by different firms or within the same firm at different points in time. Adjustments should be made for such differences.
- Different firms may use different accounting calendars, so the accounting periods may not be directly comparable.

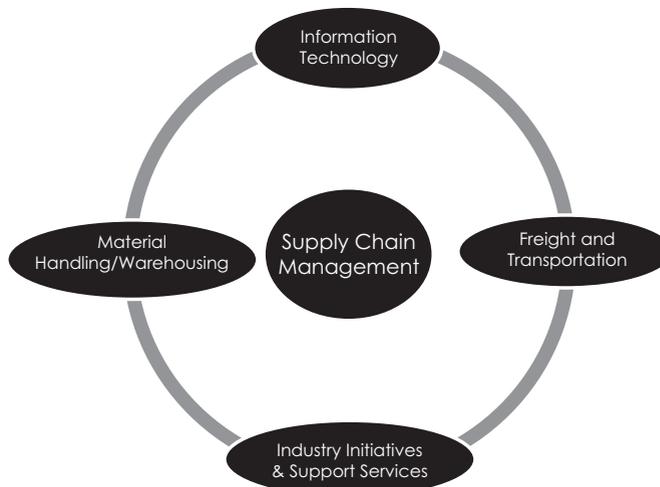
### 3. Trend Analysis

Trend analysis indicates changes in an item or a group of items over a period of time and helps to draw the conclusion regarding the changes in data. In this technique, a base year is chosen and the amount of item for that year is taken as one hundred for that year. On the basis of that the index numbers for other years are calculated. It shows the direction in which concern is going.

#### 1.4 SUPPLY CHAIN MANAGEMENT

Supply Chain Management encompasses the planning and management of all activities involved in sourcing, procurement, conversion and logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, Supply chain Management integrates supply and demand management within and across companies.

The Supply Chain Management Program integrates topics from manufacturing operations, purchasing, transportation, and physical distribution into a unified program. The following figure gives clear view of the Supply Chain Management.



In a typical supply chain, raw materials are procured and items are produced at one or more factories, shipped to warehouses for intermediate storage, and then shipped to retailers or customers. Consequently, to reduce cost and improve service levels, effective supply chain strategies must take into account the interactions at the various levels in the supply chain. The supply chain, which is also referred to as the Logistic Network, consists of suppliers, manufacturing centers, warehouses, distribution centers, and retail outlets, as well as raw material, work-in-process inventory, and finished product that flow between the facilities.

Thus, we can define the Supply Chain Management as follows:

Supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufactures, warehouses and stores, so that merchandise is produce and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system wide costs while satisfying service level requirements.

#### **Objective of Supply Chain Management:**

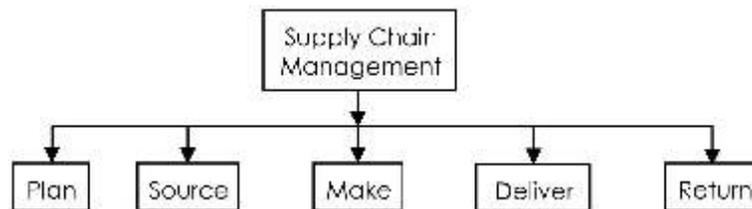
- i. Supply chain Management takes into consideration every facility that has an impact on cost and plays a role in making the product conform to customer requirements: from supplier and manufacturing facilities through warehouses and distribution centers to retailers and stores.
- ii. The supply chain management is to be efficient and cost-effective across the entire system; total system wide costs from transportation and distribution to inventories of raw materials, work-in-process and finished goods

are to be minimized.

- iii. Finally, supply chain management revolves around efficient integration of suppliers, manufacturers, warehouses and stores; it encompasses the firm's activities at many levels, from the strategic level through the tactical to the operational level.

#### Component of Supply Chain Management:

There are five basic components of Supply Chain Management. These are showing in the diagram:



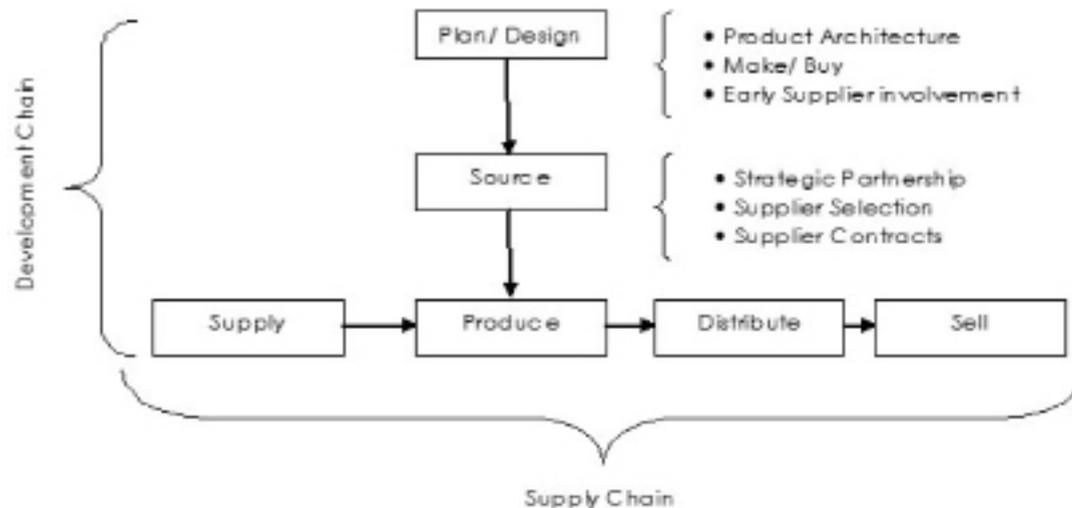
1. **Plan:** This is the strategic portion of SCM. You need a strategy for managing all the resources that go toward the meeting customer demand for your product and services.
2. **Source:** Choose the suppliers that will deliver the goods and services you need to create your product. Develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving the relationships.
3. **Make:** This is the manufacturing step. Schedule the activities necessary for production, testing, packaging and preparation for delivery.
4. **Deliver:** This is the part that many insiders refer to as logistics. Coordinate the receipt of orders from customers, develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.
5. **Return:** The problem part of the supply chain. Create a network for receiving defective and excess products back from customers and supporting customers who have problems with delivered products.

#### Development of Supply Chain Management:

The development of chain is the set of activities and processes associated with new product introduction. It includes the product design phase, the associated capabilities and knowledge that need to be developed internally, sourcing decisions and production Plans. Specifically, the development chain includes decisions such as product architecture; what to make internally and what to buy from outside suppliers, that is, make /buy decisions; supplier selection; early supplier involvement; and strategic partnerships.

The development and supply chains intersect at the production point. It is clear that the characteristics of and decisions made in the development chain will have an impact on the Supply Chain. Similarly, it is intuitively clear that the characteristics of the supply chain must have an impact on product design strategy and hence on the development chain.

To make matters worse, in many organizations, additional chains intersect with both the development and the supply chains. These may include the reverse logistics chain, that is, the chain associated with returns of products or components, as well as the spare – parts chain. We illustrate how the consideration of these characteristics leads to the development of frameworks to assist in matching product strategies.



Global optimization is made even more difficult because supply chains need to be designed for, and operated in, uncertain environments, thus creating sometimes enormous risks to the organization. A variety of factors contribute to this:

1. Matching Supply and Demand: It is a major challenge:
  - a. Boeing Aircraft announced a write-down of \$ 2.6 billion in October 1997 due to "Raw Material Shortages internal and supplier parts shortages and productivity inefficiencies".
  - b. "Second quarter sales at U.S. surgical Corporation declined 25 percent, resulting in a Loss of \$22 million. The sales and earnings shortfall is attributed to larger than anticipated inventories on the shelves of hospitals."
  - c. "Intel, the world's largest chip maker, reported a 38 percent decline in quarterly profit Wednesday in the face of stiff competition from Advanced Micro Devices and a general slowdown in the personal computer market that caused inventories to swell".

Obviously, this difficulty stems from the fact those months before demand is realized; manufacturers have to commit themselves to specific production levels. These advance commitments imply huge financial and supply risks.

2. Inventory and back – Order levels fluctuate considerably across the supply chain: Even when customer demand for specific products does not vary greatly. To illustrate this issue, consider the above figure, which suggests that in typical supply chain, distributors orders to the factory fluctuate far more than the underlying retailer demand.
3. Forecasting does not solve the problem: Indeed, we will argue that the first principle of forecasting is that "Forecasts are always wrong." Thus, it is impossible to predict the precise demand for a specific item, even with the most advanced forecasting technique.
4. Demand is not the only source of uncertainty: Delivery leads times, manufacturing yields, transportation times, and component availability also can have significant chain impact.
5. Recent trends such as lean manufacturing, outsourcing and off shoring that focus on cost reduction increases risk significantly.

For example, consider an automotive manufacturer whose parts suppliers are in Canada and Mexico. With little uncertainty in transportation and a stable supply schedule, parts can be delivered to assembly plants "Just-In-Time" (JIT) based on fixed production schedules. However, in the event of an unforeseen disaster, such as the September '11 terrorist attacks, Port strikes, January, 26, 2001 earth quake in the India, state of Gujarat, etc, JIT is not maintainable.

Although, uncertainty and risk cannot be eliminated, we will explore a variety of examples that illustrate how product design, network modeling, information technology, procurement and inventory strategies are used to minimize uncertainty, and to build flexibility and redundancy in the supply chain in order to reduce risks.

## 1.5 CUSTOMER RELATIONSHIP MANAGEMENT

### Definition of Customer Relationship Management (CRM)

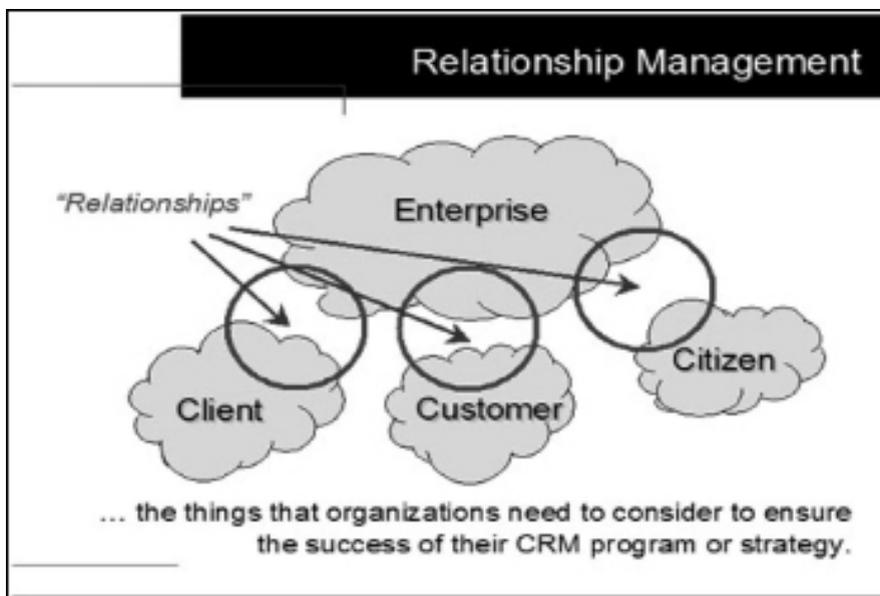
What is Customer Relationship Management (CRM)? There are as many definitions for CRM as there are opinions as to what is going to happen in the stock market the next day. At its basic core, CRM entails initiatives that surround the customer side of the business. An example is initiatives wrapped around the customers in an effort to increase sales, improve customer service, add market share, enhance customer loyalty and reduce operating costs of sales and service. At its more formal definition, CRM is a business strategy comprised of process, organizational and technical change whereby a company seeks to better manage its enterprise around its customer behaviors. It entails acquiring and deploying knowledge about customers and using this information across the various customers touch points to increase revenue and achieve cost reduction through operational efficiencies.

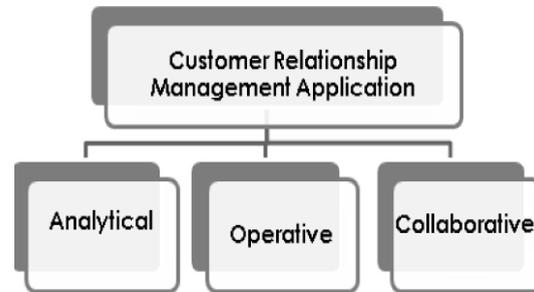
The adoption of CRM is being fuelled by a recognition that long-term relationships with customers are one of the most important assets of an organisation.

It entails all aspects of interaction that a company has with its customer, whether it is sales or service- related. CRM is often thought of as a business strategy that enables businesses to:

- Understand the customer
- Retain customers through better customer experience
- Attract new customer
- Win new clients and contracts
- Increase profitably
- Decrease customer management costs

CRM is an integrated approach to identifying, acquiring and retaining customers. By enabling organizations to manage and coordinate customer interactions across multiple channels, departments, lines of business and geographies, CRM helps organizations maximize the value of every customer interaction and drive superior corporate performance.



**Parts of CRM:**

The complete description of how CRM functions in a company would be too complex, that is why authors only describe basic division into parts and their characterization. Buttle calls this “types” of CRM, but other authors incline to a view by Dohnal that describes this as three parts of CRM application architecture: analytical, operative and collaborative. In order for any action in CRM to be successful it requires consistent data about customers which will be accessible to every employee of a company. That is also highly demanding on a technology providing CRM in a company.

**Analytical CRM**

The purpose of analytical CRM is customer data analysis, its evaluation, modeling and prediction of customer behaviour. In real life situation the analytical CRM can for example gather all the data about customers inquiring a specific product by using data mining (tool for data gathering), what services they purchased right away and what services they purchased eventually. It can find patterns in their behaviour and propose next steps during up-selling or cross-selling. It can evaluate efficiency of a marketing campaign, propose prices or even develop and propose new products. This way analytical CRM serves as some sort of help during decision making, e.g. manuals for employees working in services concerned with how to react to certain customer's behaviour.

**Operative CRM**

Operative CRM mainly supports the actual contact with customers conducted by front office workers and general automation of business processes including sales of products, services and marketing. All communication with the customer is tracked and stored in the database and if necessary it is effectively provided to users (workers). The advantage of this approach being the possibility to communicate with various employees using various channels but creating the feeling that customer is being taken care of by just one person. It can also minimize the time that the worker has to spend typing the information and administrating (the data is shared). This allows the company to increase the efficiency of their employees work and they are then able to serve more customers.

**Collaborative CRM**

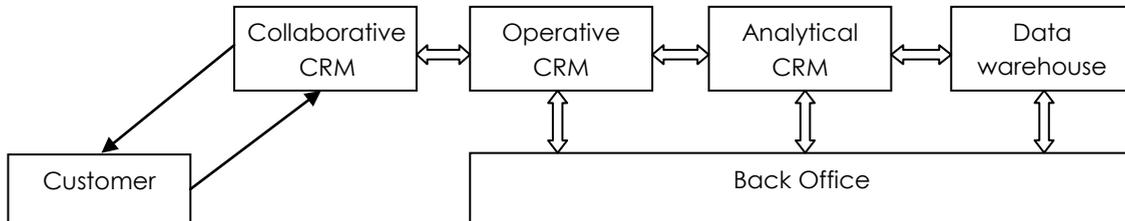
Collaborative CRM enables all companies along the distribution channel, as well as all departments in a company, to work together and share information about customers, even speaks about partner relationship management (PRM). But sometimes we might see a rivalry between departments that undermines efforts of CRM to share relevant data throughout the whole company (e.g. information from help line can help the marketing department choose a point on which it will focus during the next campaign). The goal of collaborative CRM then is maximum sharing of relevant information acquired by all departments with the focus on increasing the quality of services provided to customers. The ultimate outcome of this process should be an increase in customer's utility and his loyalty .

Information technology plays an important role in the concept of CRM. Without its smooth function the modern CRM would be unimaginable. But it is not only the technology that is important. Company must be willing and able to adopt the whole philosophy which puts the main focus on the customer. It must adopt the strategy focused on establishing and supporting long-term relationship with customers. Failure in following this philosophy and strategy leads to a failure of whole CRM implementation.

An example will demonstrate the entire CRM process and its use. The basis of every CRM system is data about customers that is stored transparently by all departments in one huge data warehouse. Analytical CRM works with this data. It processes this data and automatically performs basic tasks, analyses patterns of customer's behavior

and makes predictions. It transforms the data into information. The information is sent to operative component where front office workers put it into use. It allows that information to be used for efficient and personalized interaction with clients. These three steps are observed by back office workers which influence them and are influenced by them (e.g. creation of a new suitable product). Information from operative CRM is readily available to any employee through collaborative CRM. Customer sees this system as an activity geared up to him and reacts to it. This reaction then influences the whole process which thanks to this input continues to work. All this illustrates the diagram below.

**Technological aspects and principles of CRM**

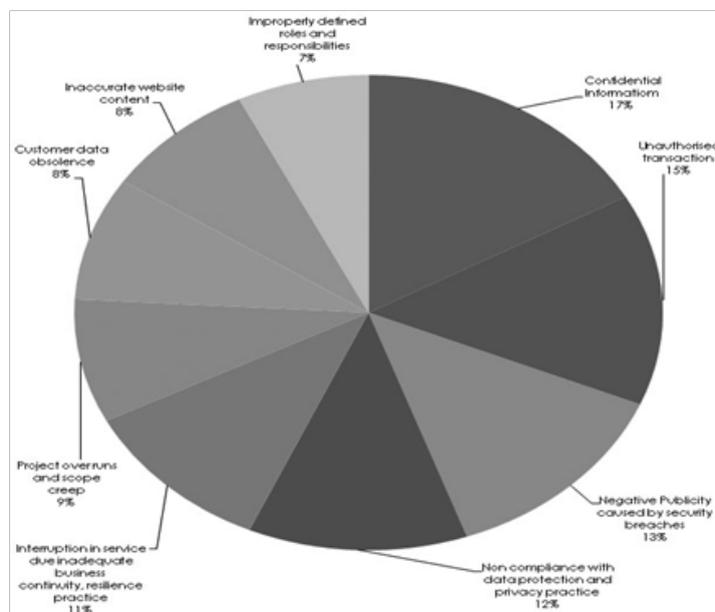


**Objectives for using CRM applications**

Objectives of using CRM Applications, defined in the following line:

- I. To support the customer services
- II. To increase the effectiveness of direct sales force.
- III. To support of business to business activities.
- IV. To support of business to consumer activities.
- V. To manage the call center.
- VI. To operate the In- bound call centre.
- VII. To operate the Out - bound call centre.
- VIII. To operate the Full automated(i.e. no CRM involvement, "lights out")

**Objectives of CRM Applications showing**





### **Advantages and benefits of CRM**

Certainly a benefit for each CRM company is to achieve better economic results thanks to achieving higher value from every interaction with a customer. Competition is very sharp in current market. Companies must take care of a customer in every area of their specialization by using various communication channels. Customer expects perfect services whether he calls a help line, asks a dealer, browses a web site or personally visits a store. It is necessary to assure him in a feeling that he communicates with the same company whatever form of communication, time or place he chooses. According to Matušinská the basic advantages and benefits of CRM are these:

- satisfied customer does not consider leaving
- product development can be defined according to current customer needs
- a rapid increase in quality of products and services
- the ability to sell more products
- optimization of communication costs
- proper selection of marketing tools (communication)
- trouble-free run of business processes
- greater number of individual contacts with customers
- more time for customer
- differentiation from competition
- real time access to information
- fast and reliable predictions
- communication between marketing, sales and services
- increase in effectiveness of teamwork
- increase in staff motivation

Advantages and benefits are almost endless. Unfortunately some negatives exist. One of them is the fact that proper implementation and running of CRM is very difficult (technology, people – employees, initial money investment etc.), another one is the safety of information that companies keep about their customers, sharing information with third party and its overall protection. The entire operating principle of CRM (gathering information, recording calls, analyzing all clients' activities etc.) is invasion of privacy of customers.

For effective relationship management it is necessary for a company to not only hold onto their perspective but also try to understand why it is beneficial for a customer to establish a long term relation. Customer always cares primarily about satisfaction of his needs. If a company wants to establish mutual long-term relationship it must offer him something extra, some "reward" that will give him the desired value. The success rate of company being able to satisfy this desired value represents the quality of CRM. One hundred percent success rate is rarely achieved. However if the success rate in "rewarding" is acceptable then the customer continues in the relationship (makes further purchases).

### **Definition of CRM Risks**

An overwhelming 91 percent of the respondents indicated that risk management is either a very important (55 percent) or moderately important (36 percent) aspect to their CRM projects. Why is it so important? Look at some of the impacts that a CRM initiative may have on an organization:

- Increased expectations from senior management to increase revenues, reduce costs, increase market share and increase business flexibility may put tremendous pressure on the organization and may potentially compromise the internal control structure
- Increased complexity of managing multiple channels, technologies, customer relationships and customer definitions



- Vital and confidential customer information may be transmitted and shared across new networks, systems and platforms
- Significant changes to the organization, attitudes and beliefs, placing heavy reliance on the organization's employees for the successful adoption of the solution.

These factors introduce many risks to the organization, for instance, the potential disruption of vital operations; violations to customer privacy and confidentiality; ineffective, inconsistent or inefficient processes; lack of internal business controls; poor customer service; incorrectly targeted sales and marketing efforts, non acceptance of new systems and processes; and security breaches.

However, since CRM is still an evolving area and the type of CRM projects can vary so vastly between organizations (e.g., data mining, sales force automation, web-enabling sales, call center consolidation), there are many different definitions of CRM risks. When survey respondents were asked their definition of CRM risks, the definitions ranged from customer dissatisfaction, data corruption, privacy, legal, loss of competitive advantage and business benefits as listed below:

#### **Definition of Risks Impacting a CRM Solution**

##### **Customer dissatisfaction/loss of customers (27 percent)**

- "CRM risks can be very simply defined to be the risk of losing customers to competitors' better business practices and strategies and the consequent loss of customer satisfaction and relationship continuance."
- "Inadequate understanding of CRM and wrong system implementation will cause customer dissatisfaction."

##### **Data integrity is compromised/security (15 percent)**

- "Customer data is mismanaged or misused in a way that corrupts data or erodes customer satisfaction or Opinion."
- "CRM risks are those that damage customer's privacy and confidentiality."

##### **Inability to meet objectives/ benefits not realized (13 percent)**

- "The main risk that the implementation of the CRM may cause is the high expectation generated by the potential tool versus the actual possibility of attaining functionality."
- "The implemented solution does not meet the expectation and organization objectives."

##### **Risks to the business in general (13 percent)**

- "CRM risks are risks to the business (especially in sales, service and marketing areas) in terms of financial risk, operational risk, commercial risk and profitability risk, arising from failure to adopt the right processes and technologies."
- "CRM risks amount to the overall operational impact that the new CRM system will bring about to the entire organization."

##### **Events and circumstances that could affect the implementation (12 percent)**

- "Any event, action or circumstance that inhibits the achievement of the business objectives related to the Customer and his interactions with the business."
- "CRM risks are events or circumstances hindering the successful and/or timely completion of the CRM project."

##### **Loss of competitive advantage (6 percent)**

- "CRM risks are risks emanating from customer service and competitive advantage of the overall goal of the organization."
- "The biggest CRM risk is the loss of competitive advantage."

##### **Legal considerations (4 percent)**



- “CRM risks of an engagement could result in legal problems.”
- “With CRM, the organization runs the risk of negative profile/impaired credibility leading to public criticism and erosion of statutory role.”

**Lack of controls (4 percent)**

- “The risk involves the ability to identify any control weaknesses.”
- “The risk of reintroducing or not controlling traditional, manual-based controls for lack of incorporating appropriate controls or mitigating the risk in redefined or automated CRM processes.”

**Negative impact on business reputation (2 percent)**

- “These are risks that affect the reputation of the bank such as fraud or rumors from customers that can cause a run on the bank.”
- “One risk is the negative impact on revenue and organization image.”

**Loss of market share (2 percent)**

- “It is the risk that poor customer service will result in loss of market share.”
- “CRM risk is not knowing exactly the expectation levels of customers and ultimately losing market share.”

**Acceptance of CRM within the organization (2 percent)**

- “The risk here is the inability of the organizational structure to support the CRM system.”
- “Acceptance of the system and added value to the business are key CRM risks.”

But regardless of the definition used to describe CRM risks, one thing is apparent: risk management is considered an important aspect of the success of CRM projects.

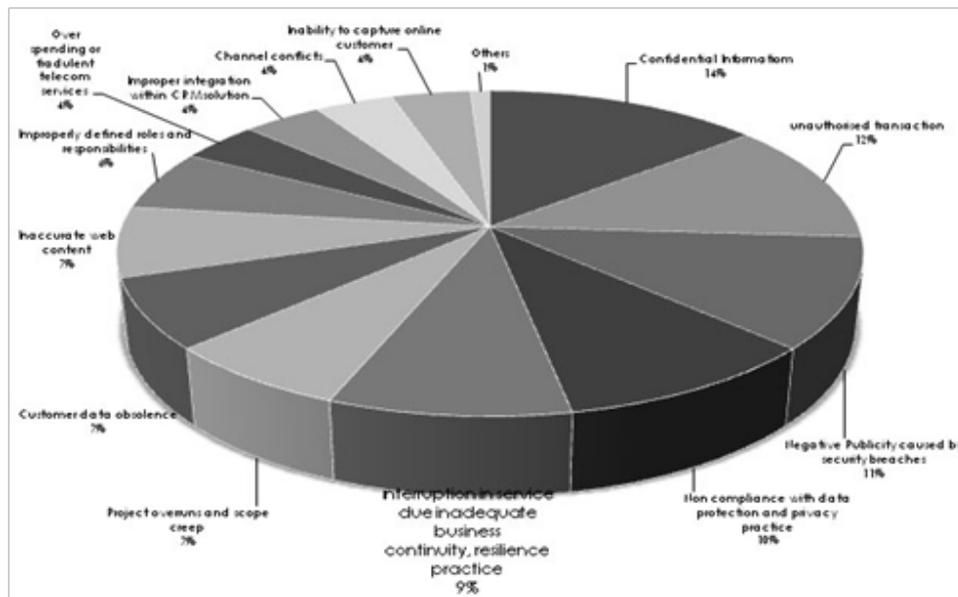
**Determining Risk Tolerances**

Now that risk management has been established as important to organizations, which risks should be tolerated? The methods and approaches to determining the organizations' tolerance to CRM risks are as varied as the organizations themselves. When asked how they determine their risk tolerances, 32 percent of organizations indicated informal methods such as arbitrarily assigning risks a high, medium or low rating based on common sense or their intuition. Surprisingly, 22 percent of the organizations did not determine or calculate their risk tolerance. And on the other side of the spectrum, 14 percent of the organizations use statistical analysis methods. The statistical analysis methods also varied significantly, but some of the more common methods include:

- Ratio of potential losses to the potential plus actual sales revenues generated
- Grade of impact multiplied by the number of times of one action
- Risks multiplied by the costs to prevent the risks
- Cost of total risks divided by the total revenue
- Probability multiplied by impact by timescale to equal risk priority
- Multiplying a factor of the probability of the risk happening and the qualitative estimate of the damage it will cause
- Proper weighting of the qualitative impact that risks will create for the organization

Other methods for determining risk tolerances include determining the maximum acceptable financial risk, scenario analysis, customer responses/feedback and benchmarking.

Those organizations that had determined their risk tolerance were asked to identify the risks that would have the most significant impact on their organization. Most survey respondents indicated traditional risk areas such as security, trust, privacy and internal controls as illustrated in figure below.



**Conclusion**

Definitions of customer relationship management have gradually changed as CRM was becoming more tangible and sizeable strategic management. They evolved from the original focus on technical aspect to current orientation of the whole company on a philosophy of establishing effective long-term relationship with customers. The authors see a big analogy of this approach to the way how business has been done in past millennium. Nowadays the advanced CRM systems allow even global companies to apply the knowledge of an individual customer locally which enables them to get to him as close as possible. The progress subsequently allows small and medium enterprises to get these procedures and know-how of large companies. Thanks to this progress it should even be possible that micro companies can adapt the advantages of CRM systems. The authors perceive this as a final piece of a circle and logical coming to the system that always has had and always will work.

**1.6 CUSTOMER PROFITABILITY ANALYSIS**

**Customer Profitability**

Over the last 10 years, strategic cost management and activity-based costing (ABC) have created a framework for companies to examine more closely the drivers (or causes) of their costs in order to improve management decisions and corporate profitability. Companies initially focused on product profitability are now using ABC and other models to examine further the profitability of distribution channels and customers.

Simultaneously, many companies are exploring the drivers of profit and success through the use of the balanced scorecard. Whichever model is used initially, determining customer profitability requires a clearer understanding of the causes of the revenues and the costs. This guideline provides details of company experiences in examining the causal relationships between the drivers of customer satisfaction and customer revenues as well as in measuring the profitability and costs of servicing existing customers.

Expanding global competition is one reason behind the increased concern for customer profitability. Companies worldwide are being pressured to become more customer focused and to increase shareholder value. Customer profitability analysis is a useful tool in both areas.

**Increasing customer Focus**

Many companies are convinced that improving corporate profitability requires more customer contact and closer customer relationships. Further, many marketing professionals have directed recent attention to increasing customer satisfaction, primarily examining the links between overall satisfaction and revenues. Meanwhile, accountants have traditionally focused on cost reduction. Customer profitability analysis attempts to bring

together marketing and accounting professionals to analyze, manage, and improve customer profitability.

Companies are attempting to understand better and to satisfy present and future customer demands. However, the goal is to increase customer satisfaction profitably. The analysis presented here, relying on ABC and other tools, can direct managerial attention to areas of improvement that can lead to greater customer and corporate profits. An ABC system is not the only means to measure customer profitability, but merely one of several tools that can be used.

Since ABC provides a better understanding of the profitability of products and services, companies have started to use the same approach to understand the profitability of customers. Following an ABC analysis, companies can examine the customer profitability information and determine how to manage customer relationships in order to increase customer satisfaction and the profitability of both individual customers and customer segments. The ABC analysis often provides information leading to such improved relationships that the profitability of both the company and its customers is increased.

Companies have been using improved information technology and large databases to help refine marketing efforts. Marketing tools and IT systems now permit companies to target individual customers and customer groups with pinpoint accuracy and to determine whether or not a customer spends enough to warrant the marketing effort. For example, at Federal Express, customers who spend a lot of money but demand little customer service and marketing investment are treated differently than those who spend just as much but cost more to maintain. In addition, the company no longer markets aggressively to those customers who spend little and show few signs of spending more in the future. This change in strategy has substantially reduced costs.

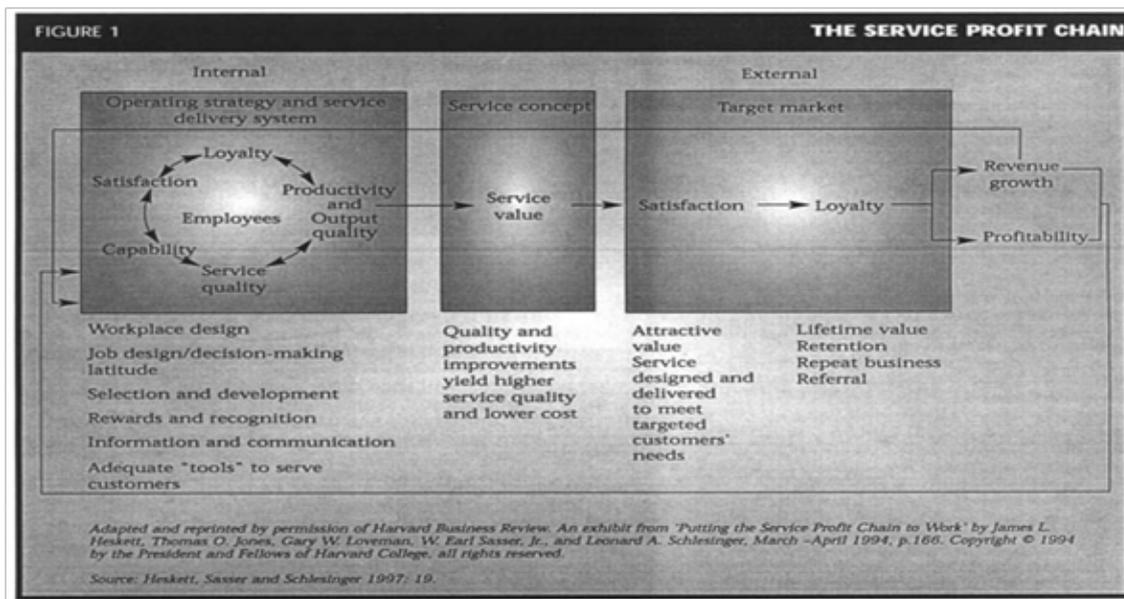
**Increasing shareholder value**

As the interest in increasing customer satisfaction has grown, so has the interest in increasing shareholder value. Companies are competing globally not only for customers, labourers, and suppliers, but also for capital. This has caused companies to concentrate on satisfying investors and lenders through an increase in shareholder value.

**Customer satisfaction, loyalty, and value**

Recently, many companies have looked to the service profit chain model (see Figure below) to help them understand the causal relationships between employees and customers and the impact on revenue growth and firm profitability. Among the relationships that have been documented and measured in this model are:

- Customer satisfaction and loyalty;
- The value of services and goods delivered to customers;
- Employee satisfaction, loyalty, and productivity;
- Employee capabilities that aid in delivering outstanding results to customers.





### Analyzing Customer Profitability

Typically traditional cost accounting is not able to identify product and service costs or distribution and delivery costs for individual customers. ABC can help identify customer activities and track those costs that are allocated to specific customers. This can provide management with unique information about customers and customer segments. The benefit includes:

- protecting existing highly profitable customers;
- reprising expensive services, based on cost-to-serve;
- discounting to gain business with low cost- to-serve customers;
- negotiating win-win relationships that lower service costs to co-operative customers;
- conceding permanent loss customers to competitors; and
- attempting to capture high-profit customers from competitors.

Customer profitability analysis has become an important new management accounting tool based on recognition that each customer is different and that each dollar/pound of revenue does not contribute equally to the firm's profitability. Customers utilize company resources differently; thus customer costs vary from one customer to another. The following issues should be considered when analyzing customer profitability:

- How to develop reliable customer revenue and customer cost information;
- How to recognize future downstream costs of customers;
- How to incorporate a multi-period horizon in the analysis; and
- How to recognize different drivers of customer costs.

This requires a broader examination of the costs associated with customer service. For example, post-sale customer service costs must be included in any analysis of customer costs. Some customers require substantially more post-sale service than others. In addition, future environmental liabilities related to the sales of current products are additional downstream costs that must be included. With management's increased focus on customers, this analysis can provide forward- looking information about individual customers and customer segments and more broadly examine both the revenues and Costs related to customer transactions. Revenues can vary among customers due to variations in volume levels, and differences in price structures, products and services.

Costs can also vary depending on how customers use the company's resources such as marketing, distribution, and customer service. Unless a complete analysis of the benefits and costs of customer relationships is undertaken, companies will unknowingly continue to service unprofitable customers. Only after a thorough analysis of the costs and benefits.

Can a firm decide which customers to service and strategically price its products and services.

There are many costs that are often hidden within the production, support, marketing, and general administrative areas. To better understand customer profitability these costs should be examined and assigned appropriately using ABC methods. These currently hidden customer costs may include items such as:

- Inventory carrying costs;
- Stocking and handling costs;
- Quality control and inspection costs;
- Customer order processing;
- Order picking and order fulfillment;
- Billing, collection and payment processing costs;
- Accounts receivable and carrying costs;
- Customer service costs;
- Wholesale service and quality assurance costs; and
- Selling and marketing costs.

**An example is given following:**

1. Information on four customers using same products:

Sl. No.	Particulars	A	B	C	D
a.	No. of units sold	60,000	80,000	1,00,000	70,000
b.	Selling price net (₹)	2	3	1	2
c.	No. of sales visits	3	3	5	10
d.	No. of purchase order	20	60	50	40
e.	No. of deliveries	12	16	25	15
f.	Kilometers per journey	20	35	10	50
g.	No. of rush deliveries	--	3	1	2

2. Costs of each activity (₹):

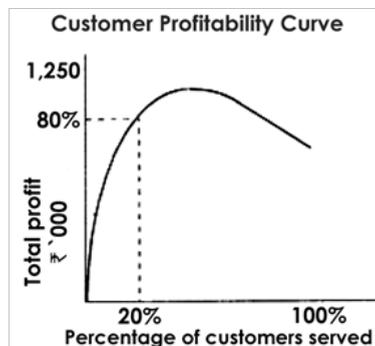
h.	Sales Visit		2,100	Per visit
i.	Order Placing		600	Per order
j.	Product Handling		0.3	Per item
k.	Normal delivery Cost		20	Per kilometer
l.	Rushed Delivery Cost		2,000	Per delivery

**Solution:**

Statement showing the customer profitability

Particulars	Computation	A	B	C	D
Revenue net of discount	(a*b)	1,20,000	2,40,000	1,00,000	1,40,000
Less: Costs:					
Sales Visits	(c*h)	6,300	6,300	10,500	21,000
Order Processing	(d*i)	12,000	36,000	30,000	24,000
Product Handling	(a*j)	18,000	24,000	30,000	21,000
Delivery	(e*f*k)	4,800	11,200	5,000	15,000
Rush Delivery	(g*l)	--	6,000	2,000	4,000
Operating Profit		78,900	1,56,500	22,500	55,000
	Operating Profit/ Net Revenue	66%	65%	23%	39%

From the above computation we get that C and D are less profitable than A and B. Such an analysis may show the Pareto curve effect, i.e., 20% of customer provide 80% of the profit. This 80:20 rule, first observed by Vilfredo Pareto, may vary, say 70:30 for different firms, and for different items like stock holding, costs, cost drivers in Overhead cost.





The curve shows that the last 80% of customers do not all generate profit. The last 50% actually reduce the total Profit. There is no point in serving these customers as the situation stands, but it may be foolish just to refuse to serve them. Instead, it may be better to turn them into profitable customers if this is possible, e.g. introducing a third party wholesaler into the supply chain which might result in the improvement of the product range and service to the small customers who were not so profitable to the firm.

**Short Questions & Answers**

**Fill in the blanks:**

**Question 1.**

The \_\_\_\_\_ System is directed by managers and supervisors but requires active participation by employees.

**Answer:**

Performance Management System

**Question 2.**

While \_\_\_\_\_ is defined in terms of a comparison of two components (inputs and outputs), the highest \_\_\_\_\_ level from each input level is recognized as the efficient situation.

**Answer:**

efficiency, productivity

**Question 3.**

The \_\_\_\_\_ ratios are used to compare financial statements of different-size companies or of the same company over different periods.

**Answer:**

Common size

**Question 4.**

An index number is a statistical measure of \_\_\_\_\_ in a variable arranged in the form of a series and using a base for making comparison

**Answer:**

fluctuations

**Question 5.**

Efficiency consists of two main component \_\_\_\_\_ efficiency and \_\_\_\_\_ efficiency

**Answer:**

technical, allocative

**Question 6.**

The ratio of output to \_\_\_\_\_ is a measure of the productivity level.

**Answer:**

input

**Question 7.**

\_\_\_\_\_ refers to the change in output owing to the change in the quantity of one input.

**Answer:**

Partial Factor Productivity



**Choose the correct answer:**

**Question 8.**

Performance will be product of:

- (a) efficiency and utilisation;
- (b) utilisation and productivity;
- (c) efficiency and productivity;
- (d) efficiency, utilisation and productivity.

**Answer:**

- (d) efficiency, utilisation and productivity.

**Question 9.**

The purpose of supply chain management is

- (a) provide customer satisfaction;
- (b) improve quality of a product;
- (c) integrating supply and demand management;
- (d) increase production.

**Answer:**

- (c) integrating supply and demand management

**Question 10.**

The major decision areas in supply chain management are

- (a) location, production, distribution, inventory;
- (b) planning, production, distribution, inventory;
- (c) location, production, scheduling, inventory;
- (d) location, production, distribution, marketing.

**Answer:**

- (a) location, production, distribution, inventory.

**Question 11.**

The supply chain concept originated in what discipline?

- (a) marketing;
- (b) operations;
- (c) logistics;
- (d) production.

**Answer:**

- (a) marketing

**Question 12.**

Which of the following is not one of the Customer Relationship Management (CRM) business drivers?



- (a) Inventory control
- (b) Increase revenues
- (c) Define information needs and flows
- (d) Automation/productivity/efficiency

**Answer:**

- (c) Define information needs and flows

**Question 13.**

What is operational CRM?

- (a) Supports traditional transactional processing
- (b) Supports day-to-day front-office operations
- (c) Supports operations that deal directly with the customers
- (d) All of the above

**Answer:**

- (d) All of the above

**Question 14.**

Customer Relationship Management is about:

- (a) Acquiring the right customer
- (b) Instituting the best processes
- (c) Motivating employees
- (d) All of the above

**Answer:**

- (d) All of the above

**Question 15.**

Process of managing information about customers to maximize loyalty is said to be

- (a) company relationship management
- (b) supplier management
- (c) retailers management
- (d) customer relationship management

**Answer:**

- (d) customer relationship management

**Question 16.**

A supply chain is made up of a series of processes that involve an input, a \_\_\_\_\_, and an output.

- (a) shipment
- (b) supplier
- (c) customer
- (d) transformation



**Answer:**

(d) transformation

**Question 17.**

\_\_\_\_\_ is the design of seamless value-added processes across organization boundaries to meet the real needs of the end customer.

- (a) Operations
- (b) Supply chain management
- (c) Process engineering
- (d) Value charting

**Answer:**

(b) Supply chain management

**Question 18.**

Which of the following is not an accounting technique to analyse financial performance?

- (a) Trend analysis
- (b) Common-size financial analysis
- (c) Ratio analysis
- (d) Time series analysis.

**Answer:**

(d) Time series analysis

**Question 19.**

Which of the following is not a component of supply chain management?

- (a) Plan;
- (b) Deliver;
- (c) Organising;
- (d) Return.

**Answer:**

(c) Organising

**Question 20.**

Supply Chain Management encompasses the planning and management of all activities involved in —

- (a) sourcing,
- (b) procurement,
- (c) conversion
- (d) logistics management
- (e) All of the above.

**Answer:**

(e) All of the above.

# Study Note - 2

## PERFORMANCE EVALUATION & IMPROVEMENT TOOLS



### This Study Note includes

- 2.1 **Balanced Score Card**
- 2.2 **Du Pont Analysis**
- 2.3 **Benchmarking & Benthrending**
- 2.4 **Statistical Quality Control (SQC)**
- 2.5 **Management Information System**
- 2.6 **On-Line Analytical Processing Tools**
- 2.7 **Tools to Improve Productivity and Profitability - MRP I, MRP II and ERP**
- 2.8 **Total Productivity Management (TPM)**
- 2.9 **Total Quality Management (TQM)**

### 2.1 BALANCED SCORE CARD

#### Definition and Meaning of Balanced Score Card (BSC)

Balanced Score Card (BSC) is a performance management and strategy development methodology that helps executives translate on organization's mission statement and overall business strategy into specific, qualifiable goals and monitors the organization's performance in terms of these goals. BSC also aligns budgets to strategy and helps in developing an enterprise performance management system. It is a set of financial and non-financial measures relating to company's critical success factors. As a management tool it helps companies to assess overall performance, improve operational processes and enable management to develop better plans for improvements. It offers managers a balanced view of their organization upon which they can base real change.

The BSC translates an organization's mission and strategy into a comprehensive set of performance measures that provides the framework for implementing its strategy. The BSC does not focus solely on achieving financial objectives. It is an approach, which provides information to management to assist in strategic policy formulation and achievement. It emphasizes the need to provide the user with a set of information, which addresses all relevant areas of performance in an objective and unbiased manner. It allows managers to look at business from four different perspectives by seeking to provide answers to the following four basic questions:

- |   |                                   |
|---|-----------------------------------|
| (1) How do customers see us ?                     | (Customer perspective)            |
| (2) What must we excel at ?                       | (Internal business perspective)   |
| (3) Can we continue to improve and create value ? | (Learning and growth perspective) |
| (4) How do we look to shareholders ?              | (Financial perspective)           |

The aim of scorecard is to provide a comprehensive framework for translating company's strategic objectives into a coherent set of performance measures.

#### Four Perspectives of BSC

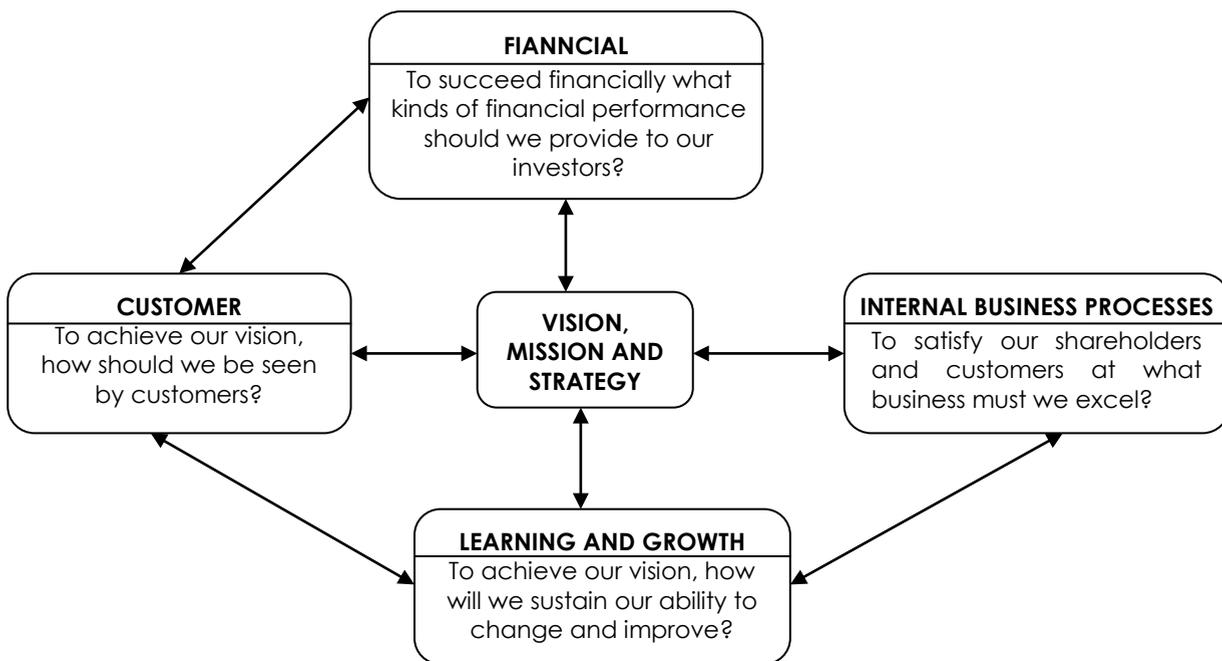
The objectives and measures view organizational performance from four perspectives - (a) Financial, (b) Customers, (c) Internal Business Process, and (d) Learning and Growth.

- (A) **Financial:** The financial perspective serves as the focus for the objectives and measures for the objectives and measures in the other scorecard perspectives. This perspective is concerned for profit of the enterprises. Under this perspective the focus will be on financial measures like operating profit, ROI, residual income, economic

value added concept, revenue growth, cost reduction, asset utilization etc. These financial measures will provide feedback on whether improved operational performance is being translated into improved financial performance.

- (B) **Customer:** This perspective captures the ability of the organization to provide quality goods and services, the effectiveness of their delivery, and overall customer service and satisfaction. Needs and desires of customers have to be attended properly because customer pay for the organization's cost and provided for its profits. This perspective typically includes several core or genetic measures that relate to customer loyalty and the result of the strategy in the targeted segment. They include market share, customer retention, new customer acquisition, customer satisfaction and customer profitability.
- (C) **Internal Business Processes:** This perspective focuses on the internal business results that lead to financial success and satisfied customer. To meet organizational objectives and customers' expectations, organizations must identify the key business processes at which they must excel. Key processes are monitored to ensure that outcomes will be satisfactory. The principal internal business processes include the following:
  - (a) Innovation processes for exploring the needs of the customers.
  - (b) Operation processes with a view to providing efficient, consistent and timely delivery of product/ service.
  - (c) Post service sales processes.
- (D) **Learning and Growth:** This perspective looks at the ability of employees, the quality of information systems, and the effects of organizational alignment in supporting accomplishment of organizational goals. Processes will only succeed if adequately skilled and motivated employees, supplied with accurate and timely information, are driving them. In order to meet changing requirements and customer expectations, employees may be asked to take on dramatically new responsibilities, and may require skills, capabilities, technologies, and organizational designs that were not available before. The learning and growth perspective identifies the infrastructure that the business must build to create long-term growth and improvement. There will be focus on factors like employee capability, employee productivity, employee satisfaction, employee retention.

These four perspectives provided the framework for BSC as shown in figure below.





### Steps in Developing BSC

The steps in the process of developing a BSC are:

- Identify the key outcomes to the success of the organization.
- Identify the process that leads to these outcomes.
- Develop key performance indicators for these processes.
- Develop reliable data capture and measurement systems.
- Develop a mechanism for reporting these to the relevant managers and staff.
- Enact improvement programs to ensure that performance improves.

### Types of Information Required for BSC

BSC emphasizes that financial and non-financial measures must be part of the information system for employees at all levels of the organization. BSC can be used to improve strategic performance in several ways:

- The process of developing activity measures will make individuals and divisions more aware of how their work fits in with the strategy of the business.
- Individuals and divisions should receive regular reports of their performance against BSC measures relevant to their area of work. This will help them moderate their own performance.
- Senior management should receive regular information on the organization's overall accomplishments against BSC measures to ensure that strategy is being followed.
- Outside stakeholders may also have access to BSC measures help them form a more full impression of the organization's value.

The large volume of data gathering manipulation and reporting caused by BSC should be put into computerised form. The manner of information display is usually in readily understandable graphs. It is now generally accepted that performance measures should be an integral part of modern internal reporting system. The performance indicators should:

- be linked with corporate strategy
- mirror both internal and external concerns
- include financial and non-financial dimensions
- be both leading and lagging indicators of performance.

### Information required for Performance Measurement under BSC

The main types of information required by the managers to implement the balanced scorecard approach to performance measurement are:

Customer Perspective - How do customer see us ? - Price, quality, delivery, customer support etc.

Internal Perspective- Where we must excel at ? - Efficiency of manufacturing process, sales penetration, new production introduction, skilled manpower etc.

Learning and Growth Perspective - Can we continue to improve and create value ? - Technology leadership, cost leadership, market leadership, research and development, cost reduction, etc.

Financial Perspective - How do we look to the shareholders? - Sales, cost of sales, return on capital employed, profitability, prosperity etc.

### Benefits and Limitations of BSC

**Benefits:** An organization can derive the following benefits by implementation of BSC:

- It avoids management reliance on short-term financial measures.
- It can successfully communicate corporate strategy to the functional heads and organization's subunits and



forcing them to develop their own goals to achieve the corporate mission and goals.

- It can assist stakeholders in evaluating the firm, if measures are communicated externally.
- It helps in focusing the whole organization on the few key things needed to create breakthrough performance.
- It helps to integrate various corporate programs like re-engineering, customer service initiatives.
- It breaks down strategic measures towards lower levels, so that unit managers, operators and employees can see what is required at their level to achieve excellent overall performance.
- It helps in clarifying and updating budgets.
- It helps in identifying and aligning strategic initiatives.
- It helps in conduct of periodic performance reviews to learn about and improve strategy.

**Limitations:** BSC is subject to following limitations

- There is no clear relation between BSC and shareholder value.
- It does not lead to a single aggregate summary of control.
- The measures may give conflicting signals and confuse management.
- It involves substantial shifts in corporate culture.

## 2.2 DU PONT ANALYSIS

The company's return on assets, ROA (=net income/assets), can be expressed as:

$$\text{ROA} = (\text{Net Income}/\text{Revenue}) \times (\text{Revenue}/\text{Assets}) = \text{Profit Margin} \times \text{Asset Turnover}$$

And the company's return on equity, ROE (=net income/equity), can be expressed as

$$\text{ROE} = (\text{Net Income}/\text{Revenue}) \times (\text{Revenue}/\text{Assets}) \times (\text{Assets}/\text{Equity}) = \text{ROA} \times \text{Equity Multiplier}$$

Both the company's profitability (as measured in terms of profit margin) and efficiency (as measured in terms of asset turnover) determine its ROA. This ROA, along with the company's financial leverage (as measured in terms of its equity multiplier), contributes to its ROE. As the company's use of leverage magnifies its ROE, students are required to examine ROE carefully. The changes in the company's ROE are to be noted and explained through its profit margin, asset turnover, and equity multiplier over time. The objective is to identify the company's strong area that can be capitalized upon and/or its weak area that must be improved upon. See Table (below) for a sample Du Pont analysis for ABC Co.

**Table: Du Pont Analysis of ABC Co.**

Item / Ratio	2015-16	2014-15	2013-14	2012-13	Evaluation
Net Income, ₹ in million (from Income statements)	6,068	6,945	5,157	3,566	
Revenue, ₹ in million (from Income statements)	26,273	25,070	20,847	16,202	
Assets, ₹ in million (from balance sheets)	31,471	28,880	23,735	17,504	
Equity, ₹ in million (from balance sheets)	23,377	19,295	16,872	12,140	
Profit Margin % (Net Income/Revenue)	23.1	27.7	24.7	22.0	Drop in profitability during 2015-16
Asset Turnover (Revenue/Assets)	0.835	0.868	0.878	0.926	Lower efficiency since 2012-13
Return on Assets % (Profit Margin× Asset Turnover)	19.3	24	21.7	20.4	Drop in ROA during 2015-16
Equity Multiplier (Assets/Equity)	1.35	1.50	1.41	1.44	Decrease in leverage during 2015-16
Return on Equity % (ROA× Equity Multiplier)	26.0	36.0	30.6	29.4	Sharp decline in ROE during 2015-16

## 2.3 BENCHMARKING & BENCHTRENDING

**Benching Marking:** Traditionally control involves comparison of the actual results with an established standard or target. The practice of setting targets using external information is known as 'Bench marking'.

Benching marking is the establishment - through data gathering of targets and comparatives, with which performance is sought to be assessed.

After examining the firm's present position, benchmarking may provide a basis for establishing better standards of performance. It focuses on improvement in key areas and sets targets which are challenging but evidently achievable. Bench marking implies that there is one best way of doing business and orients the firm accordingly. It is a catching-up exercise and depends on the accurate information about the comparative company - be it inside the group or an outside firm.

Benchmark is the continuous process of enlisting the best practices in the world for the process, goals and objectives leading to world-class levels of achievement.

### Types of Benchmarking:

The different types of Benchmarking are:

- i. Product Benchmarking (Reverse Engineering)
- ii. Competitive Benchmarking
- iii. Process Benchmarking
- iv. Internal Benchmarking
- v. Strategic Benchmarking
- vi. Global Benchmarking

- i. **Product Benchmarking (Reverse Engineering):** is an age old practice of product oriented reverse engineering. Every organization buys its rival's products and tears down to find out how the features and performances etc., compare with its products. This could be the starting point for improvement.
- ii. **Competitive Benchmarking:** This has moved beyond product-oriented comparisons to include comparisons of process with those of competitors. In this type, the process studied may include marketing, finance, HR, R&D etc.,
- iii. **Process Benchmarking:** is the activity of measuring discrete performance and functionality against organization through performance in excellent analogous business process e.g. for supply chain management - the best practice would be that of Mumbai Dubbawallas.
- iv. **Internal Benchmarking:** is an application of process benchmarking, within an organization by comparing the performance of similar business units or business process.
- v. **Strategic Benchmarking:** differs from operational benchmarking in its scope. It helps to develop a vision of the changed organizations. It will develop core competencies that will help sustained competitive advantage.
- vi. **Global Benchmarking:** is an extension of Strategic Benchmarking to include benchmarking partners on a global scale. E.g. Ford Co. of USA benchmarked its A/c payable functions with that of Mazda in Japan and found to its astonishment that the entire function was managed by 5 persons as against 500 in Ford.

### The stages in the process of Bench Marking

The process of benchmarking involves the following stages:



Stage	Description
1	Planning -
	a) Determination of Benchmarking goal statement,
	b) Identification of best performance
	c) Establishment of the benchmarking or process improvement team, and
	d) Defining the relevant benchmarking measures
2	Collection of Data and Information
3	Analysis of the findings based on the data collected in Stage 2
4	Formulation and implementation of recommendations
5	Constant monitoring and reviewing

**Stage 1: Planning**

- (a) Determination of benchmarking goal statement: This requires identification of areas to be benchmarked, which uses the following criteria -

Benchmark for Customer Satisfaction	Benchmark for improving Bottom line (Profit)
• Consistency of product or service	• Waste and reject levels
• Process cycle time	• Inventory levels
• Delivery performance	• Work-in-progress
• Responsiveness to customer requirements	• Cost of Sales
• Adaptability to special needs	• Sales per employee

- b) **Identification of best performance:** The next step is seeking the “best”. To arrive at the best is both expensive and time consuming, so it is better to identify a Company which has recorded performance success in a similar area.
- c) **Establishment of the benchmarking or process improvement team:** This should include persons who are most knowledgeable about the internal operations and will be directly affected by changes due to benchmarking.
- d) **Defining the relevant benchmarking measures:** Relevant measures will not be restricted to include the measures used by the Firm today, but they will be refined into measures that comprehend the true performance differences. Developing good measurement is key or critical to successful benchmarking.

**Stage 2: Collection of data and information:** This involves the following steps -

- Compile information and data on performance. They may include mapping processes.
- Select and contact partners.
- Develop a mutual understanding about the procedures to be followed and, if necessary, prepare a Benchmarking Protocol with partners.
- Prepare questions and agree terminology and performance measures to be used.
- Distribute a schedule of questions to each partner.
- Undertake information and data collection by chosen method for example, interviews, site-visits, telephone fax and e-mail.
- Collect the findings to enable analysis.

**Stage 3: Analysis of findings:**

- Review the findings and produce tables, charts and graphs to support the analysis



- b) Identify gaps in performance between our Firm and better performers.
- c) Seek explanations for the gaps in performance. The performance gaps can be positive, negative or zero.
- d) Ensure that comparisons are meaningful and credible
- e) Communicate the findings to those who are affected.
- f) Identify realistic opportunities for improvements. The negative performance gap indicates an undesirable competitive position and provides a basis for performance improvement. If there is no gap it may indicate a neutral position relative to the performance being benchmarked. The zero position should be analysed for identifying means to transform its performance to a level of superiority or positive gap.

#### Stage 4: Recommendations:

Making recommendations	Implementing recommendations
<ul style="list-style-type: none"> <li>• Deciding the feasibility of making the improvements in the light of conditions that apply within own Firm</li> </ul>	Implement the action plans
<ul style="list-style-type: none"> <li>• Agreement on the improvements that are likely to be feasible</li> </ul>	Monitor performance
<ul style="list-style-type: none"> <li>• Producing a report on the Benchmarking in which the recommendations are included</li> </ul>	Reward and communicate success.
<ul style="list-style-type: none"> <li>• Obtaining the support of owners/management for making the changes needed.</li> </ul>	Keep owners/management formed of progress
<ul style="list-style-type: none"> <li>• Developing action plan(s) for implementation.</li> </ul>	

#### Stage 5: Monitoring and reviewing: This involves -

- a) Evaluating the benchmarking process undertaken and the results of the improvements against objectives and success criteria plus overall efficiency and effectiveness.
- b) Documenting the lessons learnt and make them available to others.
- c) Periodically re-considering the benchmarks for continuous improvement.

#### Pre-requisites of Bench Marking

- a) **Commitment:** Senior Managers should support benchmarking fully and must be committed to continuous improvements.
- b) **Clarity of Objectives:** The objectives should be clearly defined at the preliminary stage. Benchmarking teams have a clear picture of their Firm's performance before approaching others for comparisons.
- c) **Appropriate Scope:** The scope of the work should be appropriate in the light of the objectives, resources, time available and the experience level of those involved.
- d) **Resources:** Sufficient resources must be available to complete projects within the required time scale.
- e) **Skills:** Benchmarking teams should have appropriate skills and competencies.
- f) **Communication:** Stakeholders, and also staff and their representatives, are to be kept informed of the reasons for benchmarking.

#### Difficulties in implementation of Bench Marking

- a) **Time consuming:** Benchmarking is time consuming and at times difficult. It has significant requirement of staff time and Company resources. Companies may waste time in benchmarking non-critical functions.
- b) **Lack of management Support:** Benchmarking implementation requires the direct involvement of all managers. The drive to be best in the industry or world cannot be delegated.
- c) **Resistance from employees:** It is likely that there may be resistance from employees.



- d) **Paper Goals:** Companies can become pre-occupied with the measures. The goal becomes not to improve process, but to match the best practices at any cost.
- e) **Copy-paste attitude:** The key element in benchmarking is the adaptation of a best practice to tailor it to a company's needs and culture. Without that step, a company merely adopts another company's process. This approach condemns benchmarking to fail leading to a failure of benchmarking goals.

**Bench Trending and its difference from Benchmarking:** Continuous monitoring of specific process performance with a selected group of benchmarking is a systematic and continuous measurement process of comparing through measuring an organization business processes against business leaders (role models) anywhere in the world, to gain information that will help organization take action to improve its performance. The continuous process of enlisting the best practices in the world for the processes, goals and objectives leading to world class levels of achievement.

Benchmarking is the process of comparing the cost, time or quality of what one organization does against what another organization does. The result is often a business case for making changes in order to make improvements.

Benchmarking is a powerful management tool because it overcomes "paradigm blindness". Paradigm Blindness can be summed up as the mode of thinking, "the way we do it is the best because this is the way we've always done it". Bench Marking opens organizations to new methods, ideas and tools to improve their effectiveness. It helps crack through resistance to change by demonstrating other methods of solving problems than the one currently employed and demonstrating that they work, because they are being used by others.

- a) Identify your problem areas.
- b) Identify other industries that have similar processes.
- c) Identify organizations that are leaders in these areas.
- d) Survey companies for measures and practices
- e) Visit the "best practice" companies to identify leading edge practices.
- f) Implement new and improved business practices.

## 2.4 STATISTICAL QUALITY CONTROL (SQC)

The application of statistical techniques to measure and evaluate the quality of a product, service, or process is termed as SQC.

### Two Basic Categories:

- I. Statistical Process Control (SPC):
  - the application of statistical techniques to determine whether a process is functioning as desired
- II. Acceptance Sampling:
  - the application of statistical techniques to determine whether a population of items should be accepted or rejected based on inspection of a sample of those items.

### Quality Measurement: Attributes vs. Variables Attributes:

Characteristics that are measured as either "acceptable" or "not acceptable", thus have only discrete, binary, or integer values.

### Variables:

Characteristics that are measured on a continuous scale.

### Statistical Process Control (SPC) Methods



Statistical process control (SPC) monitors specified quality characteristics of a product or service so as:

To detect whether the process has changed in a way that will affect product quality and

To measure the current quality of products or services

- Control is maintained through the use of control charts. The charts have upper and lower control limits and the process is in control if sample measurements are between the limits.
- Control chart for Attributes
  - P Charts - measures proportion defective.
  - C Charts - measures the number of defects/unit.
- Control chart for Variables
  - X bar and R charts are used together - control a process by ensuring that the sample average and range remain within limits for both.
- Basic Procedure
  1. An upper control limit (UCL) and a lower control limit (LCL) are set for the process.
  2. A random sample of the product or service is taken, and the specified quality characteristic is measured.
  3. If the average of the sample of the quality characteristic is higher than the upper control limit or lower than the lower control limit, the process is considered to be "out of control".

### Control Charts for Attributes

#### p - Charts for Proportion Defective

p-chart: a statistical control chart that plots movement in the sample proportion defective (p) over time

#### Procedure:

1. take a random sample and inspect each item.
2. determine the sample proportion defective by dividing the number of defective items by the sample size.
3. plot the sample proportion defective on the control chart and compare with UCL and LCL to determine if process is out of control.

The underlying statistical sampling distribution is the binomial distribution, but can be approximated by the normal distribution with:

mean =  $\bar{u} = np$  (Note - add the bars above the means used in all the equations in this section)

Standard deviation of p:  $\sigma_p = \sqrt{(p(1-p) / n)}$

where p = historical population proportion defective and n = sample size

#### Control Limits:

$UCL = \bar{u} + z \sigma_p$   $LCL = \bar{u} - z \sigma_p$

z is the number of standard deviations from the mean. It is set based how certain you wish to be that when a limit is exceeded it is due to a change in the process proportion defective rather than due to sample variability. For example:

If  $z = 1$  if p has not changed you will still exceed the limits in 32% of the samples (68% confident that mean has changed if the limits are exceeded).



$z = 2$  - limits will be exceeded in 4.5 (95.5 % confidence that mean has changed)

$z = 3$  - limits will be exceeded in .03 (99.7% confidence)

### **c-Charts for Number of Defects Per Unit**

c-chart: a statistical control chart that plots movement in the number of defects per unit.

#### **Procedure:**

1. randomly select one item and count the number of defects in that item
2. plot the number of defects on a control chart
3. compare with UCL and LCL to determine if process is out of control

The underlying sampling distribution is the Poisson distribution, but can be approximated by the normal distribution with:

mean =  $c$

standard deviation = square root of  $c$

where  $c$  is the historical average number of defects/unit Control Limits:

$UCL = c + z c$

$LCL = c - z c$

### **Control Charts for Variables**

Two charts are used together: R-chart ("range chart") and X bar chart ("average chart")

Both the process variability (measured by the R-chart) and the process average (measured by the X bar chart) must be in control before the process can be said to be in control.

Process variability must be in control before the X bar chart can be developed because a measure of process variability is required to determine the -chart control limits.

#### **R-Chart for Process Variability:**

$UCLR = D4(R)$

$LCLR = D3(R)$

Where  $\bar{R}$  is the average of past R values, and D3 and D4 are constants based on the sample size

#### **Chart for Process Average:**

$UCLR = \bar{X} + A2(R)$

$LCL = \bar{X} - A2(R)$

Where  $\bar{X}$  is the average of several past values, and A2 is a constant based on the sample size

### **Other Types of Attribute-Sampling Plans**

#### **Double –Sampling Plan**

Specifies two sample sizes ( $n_1$  and  $n_2$ ) and two acceptance levels ( $c_1$  and  $c_2$ )

1. if the first sample passes (actual defects  $\leq c_1$ ), the lot is acceptable
2. if the first sample fails and actual defects  $> c_2$ , the lot is rejected



3. if first sample fails but  $c_1 < \text{actual defects}$   $c_2$ , the second sample is taken and judged on the combined number of defectives found.

### Acceptance Sampling

Goal: To accept or reject a batch of items. Frequently used to test incoming materials from suppliers or other parts of the organization prior to entry into the production process.

Used to determine whether to accept or reject a batch of products. Measures number of defects in a sample. Based on the number of defects in the sample the batch is either accepted or rejected. An acceptance level  $c$  is specified. If the number of defects in the sample is  $c$  the batch is accepted, otherwise it is rejected and subjected to 100% inspection.

## 2.5 MANAGEMENT INFORMATION SYSTEM

Management Information System is a systematic process of providing relevant information in right time in right format to all levels of users in the organization for effective decision making. MIS is also defined to be system of collection, processing, retrieving and transmission of data to meet the information requirement of different levels of managers in an organization.

### According to CIMA-

MIS is a set of procedures designed to provide managers at different levels in the organization with information for decision making, and for control of those parts of the business for which they are responsible.

MIS comprises of three elements viz., management, information and system. The concept of MIS is better understood if each element of the term MIS is defined separately.

Management: A manager may be required to perform following activities in an organisation:

- (i) Determination of organisational objectives and developing plans to achieve them.
- (ii) Securing and organising human beings and physical resources so as to achieve the laid down objectives.
- (iii) Exercising adequate controls over the functions performed at the lower level.
- (iv) Monitoring the results to ensure that accomplishments are proceeding according to plans.

Thus, management comprises of the processes or activities that describe what managers do while working in their organisation. They in fact plan, organise, initiate, and control operations. In other words, management refers to a set of functions and processes designed to initiate and co-ordinate group efforts in an organised setting directed towards promotion of certain interests, preserving certain values and pursuing certain goals. It involves mobilisation, combination, allocation and utilisation of physical, human and other needed resources in a judicious manner by employing appropriate skills, approaches and techniques.

**Information:** Information is data that have been organised into a meaningful and useful context. It has been defined by Davis and Olson - "Information is data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in current or progressive decision". For example, data regarding sales by various salesmen can be merged to provide information regarding total sales through sales personnel. This information is of vital importance to a marketing manager who is trying to plan for future sales.

Data is the input, information is the output. Data-analysis or information-processing converts data into information. Therefore, quality of data influences quality of information based on which management makes business decisions and translates these into actions through appropriate processes. Today, Information & Communication Technology (ICT) also partakes in various processes with interfacial digital devices and local & global networks. Some of these are stated below:

- Bar Coding & Decoding (used in inventory management).



- Programmable Logic Controller or PLC (used for monitoring work-flow and machine conditions).
- General Pocket Radio system or GPRS (used in LAN for controlling fleet of mobile equipments. Sometimes vehicles are provided with sensors for recording work load, fuel stock, etc).
- Face Recognition System or FRS (used for recording attendance of employees by recognizing faces photographed in the system).
- Computer Aided Designing or CAD and Digital Surveying.
- Computer Aided Manufacturing or CAM.
- e-Commerce (used in online bidding, ordering, invoicing, banking, etc), etc.
- Enterprise Resource Planning (ERP) : Integrated information has achieved a different dimension with the advent of ERP systems by the end of 20th century. Several data (financial and non-financial) including those downloaded online or offline from the above systems, can be integrated into ERP system. Let us take the following examples –
  - a) Online invoicing and inventory records are facilitated by e-Commerce and Bar Coding & Decoding.
  - b) Order fulfillment in both Purchasing and Selling can be monitored on integration of purchase orders and sales orders with goods receipts and issues in inventory records for stores and finished goods. Likewise, indents for stores and finished goods can be tracked against respective orders.
  - c) FRS can be used to migrate attendance data into Pay Roll system for calculation of employee-wise wages & salary including overtime and for updating leave records.
  - d) Plenty of data downloaded from PLC and GPR systems can be built-up in integrated information (e.g. work completed, work-in-progress, equipment running hours, power or fuel & lubricant consumptions, vehicle trips, breakdowns, machine conditions in terms of temperature, stress, vibrations, noise level, etc).

Thus, 21st century is rightly called the beginning of information-age.

**System:** System may be defined as a composite entity consisting of a number of elements which are interdependent and interacting, operating together for the accomplishment of an objective. One can find many examples of a system. Human body is a system, consisting of various parts such as head, heart, hands, legs and so on. The various body parts are related by means of connecting networks of blood vessels and nerves. This system has a main goal which we may call "living". Thus, a system can be described by specifying its parts, the way in which they are related, and the goals which they are expected to achieve. A business is also a system where economic resources such as people, money, material, machines, etc. are transformed by various organisation processes (such as production, marketing, finance, etc.) into goods and services.

Thus, MIS can be defined as a network of information that supports management decision making. The role of MIS is to recognise information as a resource and then use it for effective and timely achievement of organisational objectives.

#### **Potential impact of computers and MIS on different levels of management**

The potential impact of computers on top level management may be quite significant. An important factor which may account for this change is the fast development in the area of computer science. It is believed that in future computers would be able to provide simulation models to assist top management in planning their work activities. For example, with the help of a computer it may be possible in future to develop a financial model by using simulation technique, which will facilitate executives to test the impact of ideas and strategies formulated on future profitability and in determining the needs for funds and physical resources. By carrying sensitivity analysis with the support of computers, it may be possible to study and measure the effect of variation of individual factors to determine final results. Also, the availability of a new class of experts will facilitate effective communication with computers. Such experts may also play a useful role in the development and processing of models. In brief, potential impact of computers would be more in the area of planning and decision making.

Futurists believe that top management will realise the significance of techniques like simulation, sensitivity analysis



and management science. The application of these techniques to business problems with the help of computers would generate accurate, reliable, timely and comprehensive information to top management. Such information will be quite useful for the purpose of managerial planning and decision making. Computerised MIS will also influence in the development, evaluation and implementation of a solution to a problem under decision making process.

Potential impact of Computers and MIS on middle management level will also be significant. It will bring a marked change in the process of their decision making. At this level, most of the decisions will be programmed and thus will be made by the computer, thereby drastically reducing the requirement of middle level managers. For example, in the case of inventory control system; computer will carry records of all items in respect of their purchase, issue and balance. The reorder level, reorder quantity etc. for each item of material will also be stored in computer after its predetermination. Under such a system, as soon as the consumption level of a particular item of material will touch reorder level, computer will inform for its purchase immediately. The futurists also foresee the computer and the erosion of middle management as the vehicles for a major shift to recentralisation. The new information technology will enable management to view an operation as a single entity whose effectiveness can only be optimised by making decisions that take into account the entity and not the individual parts.

The impact of Computers and MIS today at supervisory management level is maximum. At this level managers are responsible for routine, day-to-day decisions and activities of the organisation which do not require much judgement and discretion. In a way, supervisory manager's job is directed more towards control functions, which are highly receptive to computerisation. For control, such managers are provided with accurate, timely, comprehensive and suitable reports. A higher percentage of information requirements of executives is met out at this level.

Potential impact of Computers and MIS on supervisory level will completely revolutionise the working at this level. Most of the controls in future will be operated with the help of computers. Even the need of supervisory managers for controlling the operations will be substantially reduced. Most of the operations/activities now performed manually will be either fully or partially automated.

### **Objectives of MIS**

- To provide the managers at all levels with timely and accurate information for control of business activities
- To highlight the critical factors in the operation of the business for appropriate decision making
- To develop a systematic and regular process of communication within the organization on performance in different functional areas
- To use the tools and techniques available under the system for programmed decision making
- To provide best services to customers
- To gain competitive advantage
- To provide information support for business planning for future

**Strategic-level information systems** help senior management to tackle and address strategic issues and long-term trends, both within the firm and external environment. Their principal concern is matching changes in the external environment with existing organisational capability - What will be the cost- trends, where will our firm fit in, what products should be made etc ? In other words, these systems are designed to provide top-management with information that assists them in making long -range planning decisions for the organization.

**Tactical-level information systems** serve middle level managers and help in taking decisions for a period of 2-3 years. The managers are typically concerned with planning, controlling and use summaries of transactions to aid their decision- making. In other words, these systems provide middle-level managers with the information they need to monitor and control operations and to allocate resources more effectively. In tactical systems, transactions data are summarized, aggregated, or analysed. Their purpose is not to support the execution of operational tasks but to help the manager control these operations.

**Operational-level information systems** are typically transaction processing systems and help in the operational



level managers to keep track of elementary activities and transactions of the organisations such as sales, receipts, cash deposits, flow of materials etc. Their purpose is to answer routine questions and to track flow of transactions. Thus, the primary concern of these systems is to collect, validate, and record transactional data describing the acquisition or disbursement of corporate resources.

Thus, each type of information system serves the requirements of a particular level in the organisation, providing the needed basis for decision making.

## 2.6 ON-LINE ANALYTICAL PROCESSING TOOLS

### On-Line Analytical Processing (OLAP)

On-Line Analytical Processing (OLAP) is a category of software technology that enables analysts, managers and executives to gain insight into data through fast, consistent, interactive access to a wide variety of possible views of information that has been transformed from raw data to reflect the real dimensionality of the enterprise as understood by the user.

OLAP functionality is characterized by dynamic multi-dimensional analysis of consolidated enterprise data supporting end user analytical and navigational activities including:

- calculations and modeling applied across dimensions, through hierarchies and/or across members
- trend analysis over sequential time periods
- slicing subsets for on-screen viewing
- drill-down to deeper levels of consolidation
- reach-through to underlying detail data
- rotation to new dimensional comparisons in the viewing area

OLAP is implemented in a multi-user client/server mode and offers consistently rapid response to queries, regardless of database size and complexity. OLAP helps the user synthesize enterprise information through comparative, personalized viewing, as well as through analysis of historical and projected data in various "what-if" data model scenarios. This is achieved through use of an OLAP Server.

### OLAP Server

An OLAP server is a high-capacity, multi-user data manipulation engine specifically designed to support and operate on multi-dimensional data structures. A multi-dimensional structure is arranged so that every data item is located and accessed based on the intersection of the dimension members which define that item. The design of the server and the structure of the data are optimized for rapid ad-hoc information retrieval in any orientation, as well as for fast, flexible calculation and transformation of raw data based on formulaic relationships. The OLAP Server may either physically stage the processed multi-dimensional information to deliver consistent and rapid response times to end users, or it may populate its data structures in real-time from relational or other databases, or offer a choice of both. Given the current state of technology and the end user requirement for consistent and rapid response times, staging the multi-dimensional data in the OLAP Server is often the preferred method.

Executives of business have to make crucial decision for the future of their enterprise. The plethora of business data (customers, products, etc) lead us to store them in a place and then to retrieve the suitable information according to some rules. Databases solved one part of the problem that is the data storage. To retrieve the appropriate information from the business data a variety of tools, using different techniques, exist that performs simple or complex tasks involving mathematical and statistical operations. These tools are lying under the notion of Decision Support Systems (DSS) technology.

The core of any OLAP system is an OLAP cube (also called a 'multidimensional cube' or a hypercube). It consists of numeric facts called measures which are categorized by dimensions. The measures are placed at the intersections of the hypercube, which is spanned by the dimensions as a Vector space. The usual interface to manipulate an



OLAP cube is a matrix interface like Pivot tables in a spreadsheet program, which performs projection operations along the dimensions, such as aggregation or averaging.

The cube metadata is typically created from a star schema or snowflake schema of tables in a relational database. Measures are derived from the records in the fact table and dimensions are derived from the dimension tables.

Each measure can be thought of as having a set of labels, or meta-data associated with it. A dimension is what describes these labels; it provides information about the measure.

A simple example would be a cube that contains a store's sales as a measure, and Date/Time as a dimension. Each Sale has a Date/Time label that describes more about that sale.

Any number of dimensions can be added to the structure such as Store, Cashier, or Customer by adding a foreign key column to the fact table. This allows an analyst to view the measures along any combination of the dimensions.

### **Multidimensional databases**

Multidimensional structure is defined as "a variation of the relational model that uses multidimensional structures to organize data and express the relationships between data". The structure is broken into cubes and the cubes are able to store and access data within the confines of each cube. "Each cell within a multidimensional structure contains aggregated data related to elements along each of its dimensions". Even when data is manipulated it remains easy to access and continues to constitute a compact database format. The data still remains interrelated. Multidimensional structure is quite popular for analytical databases that use online analytical processing (OLAP) applications (O'Brien & Marakas, 2009). Analytical databases use these databases because of their ability to deliver answers to complex business queries swiftly. Data can be viewed from different angles, which gives a broader perspective of a problem unlike other models.

### **Aggregations**

It has been claimed that for complex queries OLAP cubes can produce an answer in around 0.1% of the time required for the same query on OLTP relational data. The most important mechanism in OLAP which allows it to achieve such performance is the use of aggregations. Aggregations are built from the fact table by changing the granularity on specific dimensions and aggregating up data along these dimensions. The number of possible aggregations is determined by every possible combination of dimension granularities.

The combination of all possible aggregations and the base data contains the answers to every query which can be answered from the data.

Because usually there are many aggregations that can be calculated, often only a predetermined number are fully calculated; the remainders are solved on demand. The problem of deciding which aggregations (views) to calculate is known as the view selection problem. View selection can be constrained by the total size of the selected set of aggregations, the time to update them from changes in the base data, or both. The objective of view selection is typically to minimize the average time to answer OLAP queries, although some studies also minimize the update time. View selection is NP-Complete. Many approaches to the problem have been explored, including greedy algorithms, randomized search, genetic algorithms and A\* search algorithm.

### **Types**

OLAP systems have been traditionally categorized using the following taxonomy.

#### **Multidimensional**

MOLAP is a "multi-dimensional online analytical processing". 'MOLAP' is the 'classic' form of OLAP and is sometimes referred to as just OLAP. MOLAP stores this data in an optimized multi-dimensional array storage, rather than in a relational database. Therefore it requires the pre-computation and storage of information in the cube - the operation known as processing. MOLAP tools generally utilize a pre-calculated data set referred to as a data cube. The data cube contains all the possible answers to a given range of questions. MOLAP tools have a very fast response time and the ability to quickly write back data into the data set.



### Relational

ROLAP works directly with relational databases. The base data and the dimension tables are stored as relational tables and new tables are created to hold the aggregated information. Depends on a specialized schema design. This methodology relies on manipulating the data stored in the relational database to give the appearance of traditional OLAP's slicing and dicing functionality. In essence, each action of slicing and dicing is equivalent to adding a "WHERE" clause in the SQL statement. ROLAP tools do not use pre-calculated data cubes but instead pose the query to the standard relational database and its tables in order to bring back the data required to answer the question. ROLAP tools feature the ability to ask any question because the methodology does not limit to the contents of a cube. ROLAP also has the ability to drill down to the lowest level of detail in the database.

### Hybrid

There is no clear agreement across the industry as to what constitutes "Hybrid OLAP", except that a database will divide data between relational and specialized storage. For example, for some vendors, a HOLAP database will use relational tables to hold the larger quantities of detailed data, and use specialized storage for at least some aspects of the smaller quantities of more-aggregate or less- detailed data. HOLAP addresses the shortcomings of MOLAP and ROLAP by combining the capabilities of both approaches. HOLAP tools can utilize both pre-calculated cubes and relational data sources.

### Comparison

Each type has certain benefits, although there is disagreement about the specifics of the benefits between providers.

- Some MOLAP implementations are prone to database explosion, a phenomenon causing vast amounts of storage space to be used by MOLAP databases when certain common conditions are met: high number of dimensions, pre-calculated results and sparse multidimensional data.
- MOLAP generally delivers better performance due to specialized indexing and storage optimizations. MOLAP also needs less storage space compared to ROLAP because the specialized storage typically includes compression techniques.
- ROLAP is generally more scalable. However, large volume pre-processing is difficult to implement efficiently so it is frequently skipped. ROLAP query performance can therefore suffer tremendously.
- Since ROLAP relies more on the database to perform calculations, it has more limitations in the specialized functions it can use.
- HOLAP encompasses a range of solutions that attempt to mix the best of ROLAP and MOLAP. It can generally pre-process swiftly, scale well, and offer good function support.

### Other types

The following acronyms are also sometimes used, although they are not as widespread as the ones above:

- WOLAP - Web-based OLAP
- DOLAP - Desktop OLAP
- RTOLAP - Real-Time OLAP

### Appendix: Econometrics Basic Concepts

Endogenous Variable and Exogenous Variable:

They are the observable variables and usually there are more variables than the number of equations in the model. Some of the variables are supposed to be determined by forces completely outside the model and their values are assumed to be given. Such variables are called "Exogenous Variables". Variables like "government policy, population etc. are the example of exogenous variables. It is treated like a parameter in solving the equations of a model.



The variable whose values are determined by the system when parameters disturbances and exogenous variables are given are called "Endogenous Variables". Endogenous variables cannot affect the value of exogenous variables. But the values of exogenous variables influence the value of endogenous variables.

### **Type 1 Error**

The decision to accept or reject the null hypothesis  $H_0$  is made on the basis of information supplied by the sample observations. It is possible the conclusion drawn on the basis of a particular sample may not be true in aspect of population. When the test procedure rejects a hypothesis when it ought to have been accepted, it is called "type 1 error".

### **Null Hypothesis**

It implies a neutral or non-committal attitude of the statistician in testing the hypothesis. It is a hypothesis of absence of relationship or absence of difference between sample static and population parameters.

$\beta_0 = 0$  is the null hypothesis.

### **Level of Significance**

The validity of a hypothesis  $H_0$  is against the alternative hypothesis  $H_1$  is tested at a certain level. The Level of Significance determines the confidence within which a statistician accepts a null hypothesis. 5% is the level of significance and 95% is the level of confidence.

### **$R^2$ (R Square) and $R^2$ (R Bar Square)**

R Square is the Measure of "Goodness of Fit: It Measures How Well the Regression Line Fits the Observed Data.  $R^2$  Lies Between 0 And 1

i.e.  $0 < R^2 < 1$

When there is Inclusion of Additional Explanatory Variables in the Function it can never reduce  $R^2$  and will Usually Increase it. To correct for this Defect, we adjust  $R^2$  by taking into Account the Degree of Freedom, which Clearly Decrease as New Independent Variable, Known as (R Bar Square). It is also known as "Loss of Degree of Freedom".

### **Type 2 Error**

When the test leads to acceptance of a false hypothesis, it is called type 2 error.

### **Critical Region**

While Accepting or Rejecting a Null Hypothesis at a Given Level of Significance the Region of Rejection is called as Critical Region Whereas the Other Region is Called as Region of Acceptance.

### **Problem of Identification**

Problem of Identification implies out whether Numerical Estimates of the Parameters of the structural Equation can be obtained from the Estimated Reduced form of Coefficient. If this is possible then we say that the equation is identified. Identification Problem arises only for those Equations, which have coefficients which have to be Estimated Statistically.

### **Order Condition and Rank Condition**

**Order Condition:** For an Equation to be Identified the Total No. of Variables Excluded from it but included in other Equations of the Model Must be atleast as Great as the no of Equations of the System Minus One.

**Rank Condition:** In a System of G Equations any Particular Equation is identified if and only if it is possible to construct at least one Non-Zero Determinant of Order (G-1) from the Co-Efficient of the Variables Excluded from that Particular Equation but Contained in the other Equations of the Model.

### **Structural form and Reduced form of Simultaneous Equation Model**

The equations appearing in a simultaneous equation model are called structural or behavioral equations. They describe the structure or behaviour of the economy or a producing firm in an econometric model. The parameters



of these equations are called "structural parameters". The number of such equations in a model is equal to the no. of endogenous or jointly dependent variables.

Reduced form equations are those equations, which express the endogenous variables only in terms of the predetermined variables and the stochastic disturbances. Reduced form equations can be obtained in 2 ways -

1. Express the endogenous variables directly as functions of the predetermined variables.
2. Solve the structural system of endogenous variables in terms of predetermined variables, the structural parameters and disturbances.

## 2.7 TOOLS TO IMPROVE PRODUCTIVITY AND PROFITABILITY - MRP I, MRP II AND ERP

### **MATERIALS REQUIREMENT PLANNING (MRP or MRP I):**

MRP is a technique which aims at to ensure that material resources - raw materials bought-in components and in-house sub-assemblies - are made available just before they are needed by the next stage of production or despatch. It is basically a system which controls system of inventory so that up-to-date records of the status of a large number of items in inventory can be kept. An MRP system works out outputs from the master production schedule, orders for external components, sales demand forecast, inventory or stock records and Bill of Materials.

MRP takes care of the timely phasing of requirements, planned order releases, generation of component level requirements and rescheduling capability. The ability of the MRP system is to deliver what is required in correct place at the correct time will be dependent on the quality of the information which is put into the computer model. The core data requirements for operating an MRP system are: (a) Master production schedule, (b) Bill of material file, (c) Inventory file, (d) Routings file, and (e) Master parts file.

### **Aims of MRP**

The aims of MRP are to use of computers in order to:

- Determine for final products what should be produced and at what time.
- Calculate the required production of sub-assemblies.
- Determine the requirements for material based on an up-to-date Bill of Materials (BOM).
- Calculate inventories, work-in-progress, batch sizes and manufacturing and packaging lead times.
- Generally control inventory by ordering bought-in components and raw material in relation to the orders received or forecast rather than the more usual practice of ordering from stock-level indicators.

### **Objectives of MRP**

The basic objective of MRP are as follows:

- It determines the quality and timing of finished goods demanded.
- It determines time phased requirements of the demand for materials, components and sub-assemblies over a specified planning time horizon.
- It computes the inventories, work-in-progress batch sizes and manufacturing and packing lead times.
- It controls inventory by ordering components and materials in relation to orders received rather than ordering them from stock level point of view.

### **Features of MRP**

The notable features of MRP system include:

- Material requirements for each assembly and sub-assembly are determined on the basis of 'master production schedule', thus termed as 'backward technique'.
- Updating of material requirements is done regularly to take stock of the changes in production schedule on



account of receipt of new orders, cancellation of orders, machine breakdown, unanticipated scrap, vendor delivery problems etc.

- The order points for each assembly and sub-assembly are determined in advance on the basis of delivery date and lead time. The materials are made available when needed and not prior to their use. This aspect of MRP had helped to reduce investments.
- Very little safety stocks are maintained under MRP system. Under EOQ model, the safety stocks are maintained to protect the manufacturing operations against future uncertainties.
- Constant check is being exercised to see that the items have been ordered and received in time. The delay is expedited by resorting to emergency measures. Forward planning to forecast the future demand is also made.

### **Data Requirements for MRP**

MRP originated in the early 1960s as a computerised approach for co-ordinating the planning, acquisition and production of materials. Important requirements for the operation of a MRP system are as follows:

- Master Production Schedule - It specifies the quantity of each finished unit of products to be produced along with the time at which each unit will be required.
- Bill of Material File- This file specifies the sub-assemblies, components and materials requirement for each item of finished goods.
- Inventory File - It maintains details of items in hand for each sub-assemblies, components and materials required.
- Routing File - This file specifies the sequence of operations required to manufacture components, sub-assemblies and finished goods.
- Master Parts File - It contains information about the production time of sub-assemblies and components produced internally and lead time for externally procured items.

### **Prerequisites for Successful Operation of MRP**

The prerequisites for successful operation of MRP are as follows:

- The latest production and purchasing schedules prepared should be strictly adhered to day to day change from predetermined schedules will cause chaos.
- Raw materials, sub-assemblies and components required for production should be pre-determined in quantifiable terms. Standard should be set for the consumption quantity, quality, mix and yield of raw materials for every unit of finished product.
- Work-force must be appraised of the system and the need for absolute adherence to the schedules prepared.
- Necessary internal control system should be developed to ensure total adherence to the schedule.
- Accuracy of the data supplied is vital to the MRP system.

### **Method of Operation of MRP**

MRP systems consolidate the firm and predicted production targets. They then calculate what materials are needed assuming a fixed relation of products, raw materials and manufacturing lead times. Finally, they compare the required raw materials and components with the available, ordered and committed raw materials or components to determine what materials and components have to be bought in from suppliers.

The information provided by a MRP system includes the following:

- Gross Requirements - The demand for the components or assembly, comprising firm customer orders and forecasts,
- Scheduled Receipts - The expected delivery dates and quantities of shop or purchase orders already put in hand.



- Projected Available Balance - The number of items projected to be in inventory at the end of each period (opening balance plus receipts minus issues),
- Planned Order Release - The order quantities required to ensure that the projected available balance does not drop below zero at any preset safety level.

The benefits of MRP are that a detailed forecast of the inventory position is produced period by period which, together with the planned order release entries, enables future production to be planned more accurately and better control to be maintained of inventory.

### Benefits of MRP

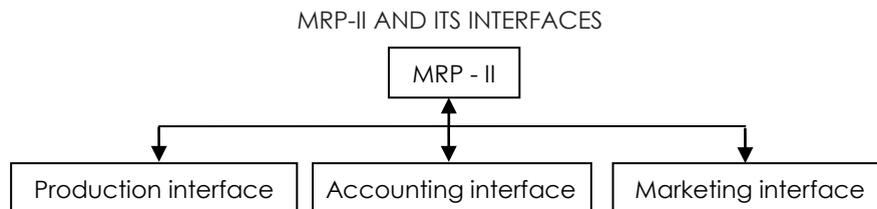
The benefits of a successful MRP system include:

- Significantly decreased inventory levels and corresponding decreases in inventory carrying costs.
- Fewer stock shortage, which cause production interruptions and time-consuming schedule juggling by managers.
- Increased effectiveness of production supervisors and less production chaos.
- Better customer service - an increased ability to meet delivery schedules and to set delivery dates earlier and more reliably.
- Greater responsiveness to change. MRP gives manufacturing a better feel for the effects of economic swings and changes in woodcut demand can be translated into schedule changes quickly.
- Closer coordination of the marketing, engineering, and finance activities with the manufacturing activities.

## MANUFACTURING RESOURCE PLANNING (MRP II)

### Operating System of MRP II

MRP II utilizes software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution. MRP II is a method for the effective planning of all the resources of a manufacturing company. It also addresses operational planning in units and its financial planning. MRP II is made up of a variety of functions, each linked together: business planning, sales and operations planning, demand management, production planning, master scheduling, material requirement planning, capacity requirement planning, and the execution support systems for capacity and material. Output from these systems is integrated with financial reports such as the business plan, purchase commitment report, shipping budget, inventory projections etc.



### Essential Elements of MRP II

- The essential elements of MRP II system are as follows:
- Demand Forecast - which takes into account firm orders and sales forecasts.
- Production Planning - which converts the demand forecast into a broad statement of output requirements and the necessary production program.
- Resource Planning - which determines the manufacturing resources (materials and bought-in components etc.) required to meet the production program.



- Rough-cut Capacity Planning - which is used to test the feasibility of meeting the production program, taking into account the capacity available.
- Master Production Schedule - which is prepared on the basis of the information obtained from the demand forecasting, production planning, resource planning and rough-cut capacity planning processes.
- Bills of Material - it is storage of basic data for defining products, i.e., lists of the components and material required to produce the end-product or assembly.
- Materials Requirement Planning - which determines component and material requirements on the basis of information from the master production schedules and the purchasing and inventory control function,
- Detailed Material and Capacity Plans - which set out the detailed schedules for providing material and capacity as derived from the material requirement plans and detailed capacity planning - only if capacity is available is the plan allowed to proceed.
- Shop and Purchase Order Release - which activate production and purchasing.
- Shop-floor Control - which monitors production against the plan and feeds back which enables the master production schedule and capacity and material plans to be updated.
- Purchase and Inventory Control - which monitors purchasing against the material plans and feeds back to the master production schedules and material plans to enable updating to take place as required, Inventory control are also maintained on the basis of shop-floor usage.

## **ENTERPRISE RESOURCE PLANNING (ERP)**

### **Operating System of ERP**

ERP means the techniques and concepts for integrated management of business as a whole from the view point of the effective use of management resources to improve the efficiency of enterprise management. ERP provides integrated business software modules to support functional units of an enterprise. It has a process oriented approach in the sense that it focuses on core processes like order fulfillment, materials procurement, balance sheet preparation etc. and attempts to integrate various functions of an enterprise involved the execution of these processes. ERP owes its origin to two earlier planning systems: MRP and MRP II. The strength of ERP lies in its ability to go beyond the fulfillment of needs of specific departments or functions and address the needs of an enterprise as a whole. The process-oriented perspective of ERP breaks departmental barriers in the integration, transmission and processing of data which may be accessed by any department as and when needed.

Before the emergence of ERP, only the stand-alone informations are sufficient for different types of functions. The main reason for the growth of ERP are that it enabled improved business performance, supported business growth requirements, provide flexible, integrated, real-time decision support and eliminated limitations in legacy systems. ERP uses multi-module application software for improving the performance of the internal business processes. ERP software systems may include application modules for supporting marketing, finance, production, purchases, stores, accounting and human resources.

ERP systems provide firms with transaction-processing modules that are integrated with other activities of the firm such as production planning and human resources. With ERP systems, much information is gathered at the source and placed directly into the computer. As a result, information is available on-line to others and in real-time. ERP systems provide integration across multiple locations and functional areas. ERP systems permit organizational standardization across different locations. ERP system brings with time-tested and successful business practices that will help the organization to become more competitive. ERP system put all the information into the same underlying database, eliminating many information asymmetries, redundancies and duplication. ERP also facilitates communication and collaboration with outside organizations like suppliers, customers, logistic agents, insurance companies, market enquiries, service outlets, warehouses, retail and wholesale outlets etc.

### **Characteristics of ERP**



An ERP system is not only the integration of various functional systems/processes in the organization, but has few more characteristics as stated below to qualify as a full-fledged ERP solution:

- Flexibility - An ERP system is flexible enough to respond fast to the changing needs of the organization. The Client Server technology enables ERP to run across various databases at the back-end using Open database connectivity.
- Modular and Open - ERP system has the open architecture i.e. any modules can be interfaced or detached without affecting the use of rest of the modules. It should support multiple hardware platforms as well as third party add-on solutions.
- Comprehensive - It supports various organizational functions and is suitable for wide range of business organizations.
- Beyond the company - It is not confined to the organizational boundaries rather it is extended to the external business entities connected to the organization with online connectivity.
- Best business practice - It has inbuilt best business practices applicable worldwide and imposes its own strategies and logics over existing culture and processes of the organization.

### **Features of ERP**

Some of the major features of an ERP are:

- It provides multi-platform, multi-facility, multi-mode of manufacturing, multi-currency and multi-lingual facilities.
- It supports strategic and business planning activities, operational planning and execution activities, material and resource planning.
- It has end-to-end supply chain management to optimize the overall demand and supply.
- It facilitates integrated information systems covering all functional areas like manufacturing, procurement, sales, distribution, payables, receivables, human resources, inventory, finance etc.
- It enhances customer services through increased efficiency in core activities thus augmenting the corporate image.
- It bridges the information gap across organization.
- ERP is the solution for better project management.
- It allows introduction of latest technologies like Electronic funds transfer, Electronic data Interchange, Internet, Intranet, E-commerce etc.
- It eliminates business problems like material shortages, productivity, customer service, cash management, quality and prompt delivery.
- It provides intelligent business tools like Decision support system, Executive information system, data mining etc.

### **Evaluation of ERP Package and Its Applications**

Evaluation of the right ERP package is considered as more crucial step. Evaluation and selection involves:

- Checking whether all functional aspects of the business are duly covered.
- Checking whether all the business functions and processes are fully integrated.
- Checking whether all the latest Information Technology (IT) trends are covered.
- Checking whether the vendor has customizing and implementing capabilities.
- Checking whether the business can absorb both the capital investment in hardware and software and maintenance costs.
- Checking whether the return on investment is optimum.



Investment required in ERP is very high and an inappropriate selection of ERP could prove to be a nightmare for the company. Meticulous planning is therefore required in the selection process.

### **Benefits from ERP**

Benefits from ERP is of two kinds, tangible and intangible. Tangible benefits are those benefits which can be quantified in monetary terms and intangible benefits cannot be quantified in monetary terms but they do have a very positive and significant business impact.

#### **Tangible Benefits**

- Lowering the cost of products and services purchased
- Significant paper and postage cost reductions
- Improve the productivity of process and personnel
- Inventory reduction
- Lead time reduction
- Reduced stock obsolescence
- Faster product/service lookup and ordering saving time and money
- Automated ordering and payment, lowering payment processing and paper costs

#### **Intangible Benefits**

- Can reach more vendors, producing more competitive bids
- Accurate and faster access to data for timely decisions
- Saves enormous time and effort in data entry
- More controls thereby lowering the risk of misutilization of resources
- Facilitates strategic planning
- Uniform reporting according to global standards
- Improved customer response
- Increases organizational transparency and responsibility

#### **Reasons for Failure of ERP**

An organization cannot reap desired benefits from ERP system under the following circumstances:

- Lack of effective project management
- Inability to resolve issues and make decisions in timely manner
- Resources not available when needed
- Perceived or real lack of executive support
- Software fails to meet business needs
- Under estimated levels of Change Management
- Improper communication
- Insufficient end user training
- Failure in gap analysis
- Failure to identify future business needs
- Technological obsolescence
- Failure to make available user-friendly checklist/guidelines.



## 2.8 TOTAL PRODUCTIVITY MANAGEMENT (TPM)

Total Productive Management (TPM) provides a system for coordinating all the various improvement activities for the company so that they contribute to the achievement of corporate objective. Starting with a corporate vision and broad goals, these activities are developed into supporting objectives, or targets, throughout the organisation. The targets are specifically and quantitatively defined. This Study Note emphasizes how to improve the competitiveness of products and services in quality, price, cost and customer responsiveness, thereby increasing the profitability, market share, and return on investment in human, material, capital, and technology resources.

TPM originated as an extension of Total Quality Management (TQM) principles to operations whereby each machine operator is sufficiently trained and motivated to operate and maintain the machine in question. Operators working in groups, report to groups' supervisors or engineer in-charge. Being trained in maintenance, an operator can himself diagnose many problems and solve these with maintenance kits at his disposal. Complex problems are intimated to maintenance team for solution.

TPM approach establishes some kind of bondage between machine and its operator who is made to feel like owning the machine. It drives an operator to ensure machine availability, efficiency and reliability. The approach reduces wastes of different forms like idleness due to breakdown, stock-out of some of regular spares, additional manpower otherwise required for storing some of the regular spares and for regular machine inspection & general maintenance. Thus, TPM favors 'lean' manufacturing.

[Notes : (1) 'Lean' manufacturing or 'lean' enterprise refer to right manpower size in manufacturing or enterprise. These are brought about through multi-skilling, clustered jobs, empowerment, reward system (including merit-based promotions), flatter organization and often by re-engineering of processes (2) Average age of employees is an indicator which is also used as a KPI. This often rouse organizational conflicts which are being addressed through golden hand-shakes or voluntary retirement schemes (3) Technology, plant layout, ergonomics, working methods, control systems, etc also have influences on productivity and size of manpower].

### **Total Productive Maintenance (TPM)**

Originated in Japan in 1971 as a method for improved machine availability through better utilization of maintenance and production resources.

Whereas in most production settings the operator is not viewed as a member of the maintenance team, in TPM the machine operator is trained to perform many of the day-to-day tasks of simple maintenance and fault-finding. Teams are created that include a technical expert (often an engineer or maintenance technician) as well as operators. In this setting the operators are enabled to understand the machinery and identify potential problems, righting them before they can impact production and by so doing, decrease downtime and reduce costs of production.

TPM is a critical adjunct to lean manufacturing. If machine uptime is not predictable and if process capability is not sustained, the process must keep extra stocks to buffer against this uncertainty and flow through the process will be interrupted. Unreliable uptime is caused by breakdowns or badly performed maintenance. Correct maintenance will allow uptime to improve and speed production through a given area allowing a machine to run at its designed capacity of production.

One way to think of TPM is "deterioration prevention": deterioration is what happens naturally to anything that is not "taken care of". For this reason many people refer to TPM as "total productive manufacturing" or "total process management". TPM is a proactive approach that essentially aims to identify issues as soon as possible and plan to prevent any issues before occurrence. One motto is "zero error, zero work-related accident, and zero loss

TPM is a management process developed for improving productivity by making processes more reliable and less wasteful. TPM is an extension of TQM (Total Quality Management). The objective of TPM is to maintain the plant or equipment in good condition without interfering with the daily process. To achieve this objective, preventive and predictive maintenance is required. By following the philosophy of TPM we can minimize the unexpected failure of the equipment.



To implement TPM the production unit and maintenance unit should work jointly. Original goal of total productive management:

“Continuously improve all operational conditions, within a production system; by stimulating the daily awareness of all employees” (by Seiichi Nakajima, Japan, JIPM)

TPM focuses primarily on manufacturing (although its benefits are applicable to virtually any “process”) and is the first methodology Toyota used to improve its global position (1950s). After TPM, the focus was stretched, and also suppliers and customers were involved (Supply Chain), this next methodology was called lean manufacturing. This sheet gives an overview of TPM in its original form.

An accurate and practical implementation of TPM, will increase productivity within the total organization, where:

- (i) a clear business culture is designed to continuously improve the efficiency of the total production system
- (ii) a standardized and systematic approach is used, where all losses are prevented and/or known.
- (iii) all departments, influencing productivity, will be involved to move from a reactive to a predictive mindset.
- (iv) a transparent multidisciplinary organization in reaching zero losses.
- (v) steps are taken as a journey, not as a quick menu.

Finally TPM will provide practical and transparent ingredients to reach operational excellence.

### Goals

TPM has basically 3 goals - Zero Product Defects, Zero Equipment Unplanned Failures and Zero Accidents. It sets out to achieve these goals by Gap Analysis of previous historical records of Product Defects, Equipment Failures and Accidents. The Gap Analysis may be done with techniques like Fishbone diagram, Cause-Effect Analysis, Why-Why analysis, etc. Based on such analysis, investigation may be undertaken to discover latent problems underlying the gaps.

Many companies struggle to implement TPM due to 2 main reasons. First is having insufficient knowledge and skills especially in understanding the linkages between the 8 Pillar-Activities in TPM.[1] It does not help in that most TPM books are long on the theories but scanty on the implementation details. The second reason is that TPM requires more time, resources and efforts than most of these companies believe they can afford. A typical TPM implementation requires company-wide participation and full results can only be seen after 3 years and sometimes 5 years. The main reason for this long duration is due to the basic involvement and training required for Autonomous Maintenance participation where operators participate in the restoring the equipment to its original capability and condition and then improving the equipment.

An effective Fast-Track TPM Implementation Approach has been successful in a Paper Mill and Electronics Industries and documented. It circumvented this problem by assigning Project Teams to do Autonomous Maintenance for the AM Steps of 1) Initial Cleaning and 2) Eliminating Sources of Contamination and Improving Equipment Accessibility. Production Operators take over the Autonomous Maintenance after the AM Step 3 (Initial Maintenance Standards) has been established. This has been proven to reduce TPM implementation time by about 50%.

TPM success measurement - A set of performance metrics which is considered to fit well in a lean manufacturing/TPM environment is overall equipment effectiveness, or OEE. For advanced TPM world class practitioners, the OEE cannot be converted to costs using Target Costing Management (TCM) OEE measurements are used as a guide to the potential improvement that can be made to an equipment. and by identifying which of the 6 losses is the greater, then the techniques applicable to that type of loss. Consistent application of the applicable improvement techniques to the sources of major losses will positively impact the performance of that equipment.

Using a criticality analysis across the factory should identify which equipments should be improved first, also to gain the quickest overall factory performance.

The use of Cost Deployment is quite rare, but can be very useful in identifying the priority for selective TPM deployment.



### Steps to Start TPM

The Steps are –

- Identify the key people
- Management should learn the philosophy.
- Management must promote the philosophy.
- Training for all the employees.
- Identify the areas where improvement are needed.
- Make an implementation plan.
- Form an autonomous group.

### Benefits

With the adoption of TPM at the enterprise level, your organisation would benefit from the following aspect:

- A set of new management goals will be developed by the Management, using the skills and training provided during the implementation of the TPM
- Team bonding and better accountability
- Improved quality and total cost competitiveness
- Productivity and quality team training for problem solving
- Earlier detection of factors critical to maintaining equipment “uptime”
- Measure impact of defects, sub-optimal performance, and downtime using OEE (Overall Equipment Effectiveness)
- Motivated people function better all the time

## 2.9 TOTAL QUALITY MANAGEMENT (TQM)

Quality is considered a by-product of the manufacturing system i.e., each individual process has some variation that will lead to the production of some defective units. If the resulting defective rate is too high, compared to the established quality standards, quality inspectors will identify and send them for rework. The approach is expensive and does not guarantee the desired quality, because quality maintaining and ensuring itself cannot be inspected into a product. This approach assigns the responsibility for quality to quality control managers.

A more unlighted approach to quality emphasizes building quality into the product by studying and improving activities that affect quality, from marketing through design to manufacturing. This new approach is referred to as Total Quality Management (TQM). It is an active approach encompassing a company-wide operating philosophy and system for continuous improvement of quality. It demands cooperation from everyone in the company, from the top management down to workers.

The principles of TQM are as follows:

- a) Customer Focus
- b) Managerial Leadership
- c) Belief in continuous improvement.

The current thinking of TQM is moving from Quality of product and service to Quality of people to embrace also Quality of environment. ISO 14000 standard supports this.



TQM seeks to increase customer satisfaction by finding the factors that limit current performance. The TQM approach highlights the need for a customer-oriented approach to management reporting, eliminating some or more of traditional reporting practices.

The emphasis of TQM is to design and build quality in the product, rather than allow defectives and then inspect and rectify them. The focus is on the causes rather than the symptoms of poor quality.

The three core concepts of TQM are -

- Quality Control (QC):** It is concerned with the past and deals with data obtained from previous production, which allow action to be taken to stop the production of defective units.
- Quality Assurance (QA):** It deals with the present and focuses to create and operate appropriate systems to prevent defects from occurring.
- Quality Management (QM):** It concerned with the future and manages people in a process of continuous improvement to the products and services offered by the firm.

The various stages/steps to be taken in the implementation of TQM

Stage	Description
1	Identification of customers/customer groups.
2	Identification of customer expectations
3	Identification of customer decision-making requirements and product utilities
4	Identification of perceived problems in decision making process and product utilities
5	Comparison with other organizations and Benchmarking
6	Customer Feedback
7	Identification of improvement opportunities
8	Quality Improvement Process through - a) Determination of new strategies, b) Elimination of deficiencies, and c) Identifying solutions.

- Stage 1: Identification of customers / customer groups:** Through a team approach (a technique called Multi-Voting), the firm should identify major customer groups. This helps in generating priorities in the identification of customers and critical issues in the provision of decision - support information.
- Stage 2: Identifying customer expectations:** Once the major customer groups are identified, their expectations are listed. The question to be answered is - What does the customer expect from the Firm?
- Stage 3: Identifying customer decision-making requirements and product utilities:** By identifying the need to stay close to the customers and follow their suggestions, a decision - support system can be developed, incorporating both financial and non-financial information, which seeks to satisfy used requirements. Hence, the Firm finds out the answer to - What are the customer's decision-making requirements and product utilities? The answer is sought by listing out managerial perceptions and not by actual interaction with the customers.
- Stage 4: Identifying perceived problems in decision-making process and product utilities:** Using participative processes such as brainstorming and multi-voting, the firm seeks to list out its perception of problem areas and shortcomings in meeting customer requirements. This will list out areas of weakness where the greatest impact could be achieved through the implementation of improvements. The firm identifies the answer to the question - What problem areas do we perceive in the decision-making process?
- Stage 5: Comparison with other Firms and benchmarking:** Detailed and systematic internal deliberations allow the Firm to develop a clear idea of their own strengths and weaknesses and of the areas of most significant deficiency. Benchmarking exercise allows the Firm to see how other Companies are coping with similar problems and opportunities.
- Stage 6: Customer Feedback:** Stages 1 to 5 provide a information base developed without reference to the customer. This is rectified at Stage 6 with a survey of representative customers, which embraces their views on



perceived problem areas. Interaction with the customers and obtaining their views helps the Firm in correcting its own perceptions and refining its process.

7. **Stage 7 & 8: Identification of improvement opportunities and implementation of Quality Improvement Process:** The outcomes of the customer survey, benchmarking and internal analysis, provides the inputs for stages 7 and 8. i.e., the identification of improvement opportunities and the implementation of a formal improvement process. This is done through a six-step process called PRAISE, for short.

### Various Quality Tools

#### Control Charts

Control charts as a means of maintaining a process in statistical control were pioneered by Dr. W.A. Shewhart, an engineer in the Bell Telephone Laboratories, USA with a view to eliminate abnormal variations in process output by distinguishing variations due to special causes from those due to common causes.

Understanding variation is at the heart of much quality work. If you can control variation then you can deliver consistent products and services. If you can reduce variation, then you can deliver higher quality and hence sell more, at higher prices. There are two types of measurement which you can measure and plot on a Control Chart.

- Variables answer the question 'how much?' and are measured in quantitative units, for example weight, voltage or time.
- Attributes answer the question 'how many?' and are measured as a count, for example the number of defects in a batch of products

The Histogram is a common tool used for showing the distribution of a set of measures and often appears in a bell-shaped 'Normal' or 'Gaussian' graph, where the majority of measures are clustered around the centre. What the Histogram does not show, however, is the way in which those measurements changed over time.

#### Six Sigma Methodologies

Six Sigma has two key methodologies: DMAIC and DMADV, both inspired by W. Edwards Deming's Plan-Do-Check-Act Cycle: DMAIC is used to improve an existing business process, and DMADV is used to create new product or process designs for predictable, defect-free performance.

##### DMAIC

- ◆ Basic methodology consists of the following five (5) steps:
- ◆ Define the process improvement goals that are consistent with customer demands and enterprise strategy.
- ◆ Measure the current process and collect relevant data for future comparison.
- ◆ Analyze to verify relationship and causality of factors. Determine what the relationship is, and attempt to ensure that all factors have been considered.
- ◆ Improve or optimize the process based upon the analysis using techniques like Design of Experiments.
- ◆ Control to ensure that any variances are corrected before they result in defects. Set up pilot runs to establish process capability, transition to production and thereafter continuously measure the process and institute control mechanisms.

##### DMIADV

- ◆ Basic methodology consists of the following five steps:
- ◆ Define the goals of the design activity that are consistent with customer demands and enterprise strategy.
- ◆ Measure and identify CTQs (critical to qualities), product capabilities, production process capability, and risk assessments.
- ◆ Analyze to develop and design alternatives, create high-level design and evaluate design capability to select the best design.



- ◆ Design details, optimize the design, and plan for design verification. This phase may require simulations.
- ◆ Verify the design, set up pilot runs, implement production process and handover to process owners.

Some people have used DMAICR (Realize). Others contend that focusing on the financial gains realized through Six Sigma is counter-productive and that said financial gains are simply byproducts of a good process improvement.

### Key roles required for successful implementation of Six Sigma

Six Sigma identifies several key roles for its successful implementation:

- a) Executive Leadership includes CEO and other key top management team members. They are responsible for setting up a vision for Six Sigma implementation. They also empower the other role holders with the freedom and resources to explore new ideas for breakthrough improvements.
- b) Champions are responsible for the Six Sigma implementation across the organization in an integrated manner. The Executive Leadership draws them from the upper management. Champions also act as mentors to Black Belts. At GE this level of certification is now called "Quality Leader".
- c) Master Black Belts, identified by champions, act as in-house expert coaches for the organization on Six Sigma. They devote 100% of their time to Six Sigma. They assist champions and guide Black Belts and Green Belts. Apart from the usual rigour of statistics, their time is spent on ensuring integrated deployment of Six Sigma across various functions and departments.
- d) Experts this level of skill is used primarily within Aerospace and Defense Business Sectors. Experts work across company boundaries, improving services, processes, and products for their suppliers, their entire campuses, and for their customers. Raytheon Incorporated was one of the first companies to introduce Experts to their organizations. At Raytheon, Experts work not only across multiple sites, but across business divisions, incorporating lessons learned throughout the company.
- e) Black Belts operate under Master Black Belts to apply Six Sigma methodology to specific projects. They devote 100% of their time to Six Sigma. They primarily focus on Six Sigma project execution, whereas Champions and Master Black Belts focus on identifying projects/functions for Six Sigma.
- f) Green Belts are the employees who take up Six Sigma implementation along with their other job responsibilities. They operate under the guidance of Black Belts and support them in achieving the overall results.
- g) Yellow Belts are employees who have been trained in Six Sigma techniques as part of a corporate-wide initiative, but have not completed a Six Sigma project and are not expected to actively engage in quality improvement activities.

### Six Sigma process in Quality Control Process

Six Sigma is a set of practices originally developed by Motorola to systematically improve processes by eliminating defects. A defect is defined as non-conformity of a product or service to its specifications.

While the particulars of the methodology were originally formulated by Bill Smith at Motorola in 1986, Six Sigma was heavily inspired by six preceding decades of quality improvement methodologies such as quality control, TQM, and Zero Defects. Like its predecessors, Six Sigma asserts the following:

- a) Continuous efforts to reduce variation in process outputs is key to business success
- b) Manufacturing and business processes can be measured, analyzed, improved and controlled
- c) Succeeding at achieving sustained quality improvement requires commitment from the entire organization, particularly from top-level management.

The term "Six Sigma" refers to the ability of highly capable processes to produce output within specification. In particular, processes that operate with six sigma quality produce at defect levels below 3.4 defects per (one) million opportunities (DPMO). Six Sigma's implicit goal is to improve all processes to that level of quality or better.

### 5 S's concept in Quality Management

The Five S's are:

SEIRI - Organization or re-organization.



- SEITON - Neatness
- SEISO - Cleaning
- SEIKETSU - Standardization
- SHITSUKE - Discipline

1. **SEIRI:** The literal meaning of the Japanese word 'SEIRI' is to "straighten and contain". It can be understood as discard unnecessary things i.e., get rid of waste and put things in such a way as to have quick access. This is how 'straighten and contain' can be interpreted.
2. **SEITON:** While 'SEIRI' helps us to decide what are the items needed, 'SEITON' helps to decide the way things are to be placed so that our working is smooth. 'SEITON' involves safety and productivity.
3. **SEISO:** The literal meaning of the word 'SEISO' is clean up. It means take up the job of cleaning. Such cleaning is not restricted merely to the machines, table, kitchen cabinet etc., i.e., whichever we have taken up. It should be extended to the entire surroundings.
4. **SEIKETSU:** Seiri, Seiton and Seiso are easy to do once, but it is very difficult to maintain. To maintain, we have to standardize the system. Seiketsu is nothing but standardization. In five, 'S' means ensuring whatever cleanliness and orderliness have been achieved through Seiri, Seiton and Seiso, they are maintained. We should keep a strict control over the situation.
5. **SHITSUKE:** Shitsuke means discipline. Discipline is following a system, which calls for changing from our present unsystematic way of adherence to set procedures. Systems function in an orderly manner.

**Different types of Quality Costs**

Quality costs can be analyzed under two major categories.

- a) Costs of quality assurance incurred by the manufacturer.
- b) Costs of quality assurance at the user's end which are called "user quality costs".

**Internal Quality Costs**

There is a measure of all costs directly associated with the achievement of complete conformance to product quality requirements. These are not just the cost of quality management or inspection function. Specifically quality costs are the sum total of

- a) Prevention Costs - (Quality Engineering, Quality planning).
- b) Appraisal Costs - Cost of appraising product for conformance to requirements.
- c) Failure Costs - Costs incurred by failure to conform to requirements.

**User Quality Costs:**

In this approach an attempt is made to determine the costs incurred by the user when the purchased materials or equipment has problems. Such non - quality costs can be broadly grouped under seven categories as given below:

Category of user Quality Cost	Example	Categories of User Quality Costs
Cost of repairs	1A	Parts and material for failed items and any associated items which also must be replaced.
	1B	Labour for replacing the failed items and Sociated items.
Cost of effectiveness loss	2A	Idle direct labour before and during a shutdown and during startup of a process



	2B	Extra defective product made before, during the immediately after process shutdown.
Cost of maintaining extra capacity because of expected failure	3A	Equipment parts and materials
	3B	Direct and indirect labour
Cost of damages caused by a failed item	4A	Injuries to personnel
	4B	Training new personnel when a replacement is required.
Lost income	5A	Profit on production lost during downtime of failed item

### Quality Circle:

Quality Circle is a small group of 6 to 12 employees doing similar work who voluntarily meet together on a regular basis to identify improvements in their respective work areas using proven techniques for analysing and solving work related problems coming in the way of achieving and sustaining excellence leading to mutual upliftment of employees as well as the organisation. It is "a way of capturing the creative and innovative power that lies within the work force".

### Attributes of Quality Circle Concept:

The concept of Quality Circle is primarily based upon recognition of the value of the worker as a human being, as someone who willingly activates on his job, his wisdom, intelligence, experience, attitude and feelings. It is based upon the human resource management considered as one of the key factors in the improvement of product quality & productivity. Quality Circle concept has three major attributes:

- Quality Circle is a form of participation management.
- Quality Circle is a human resource development technique.
- Quality Circle is a problem solving technique.

### Objectives of Quality Circles:

The objectives of Quality Circles are multi-faced.

#### a) Change in Attitude.

From "I don't care" to "I do care"

Continuous improvement in quality of work life through humanisation of work.

#### b) Self Development

Bring out 'Hidden Potential' of people People get to learn additional skills.

#### c) Development of Team Spirit

Individual Vs Team - "I could not do but we did it" Eliminate inter departmental conflicts.

#### d) Improved Organisational Culture

Positive working environment.

Total involvement of people at all levels.

Higher motivational level.

Participate Management process.

### "Zero Defects" and "Rights First Time" - Philip Crosby

Philip Crosby prompted the phrases, "Zero Defects" does not mean mistakes never happen, rather than there is



no allowable number of errors built into a product or process and that it is to be got right first time. He believes that management should take prime responsibility for quality and worker only follow their managers example.

**His four absolute quality management:**

- a) Quality is conformance to requirements
- b) Quality prevention is preferable to quality inspection
- c) Zero defects is quality performance standard.
- d) Quality is measured in monetary terms - the price of non- conformance.

**Steps to quality improvement:**

- a) Committed to quality.
- b) Creation of quality improvement teams representing all the departments.
- c) Measure processes to determine current and potential quality issues.
- d) Calculate cost of (poor) quality.
- e) Raise quality awareness of all employees.
- f) Take action to correct quality issues.
- g) Monitor progress of quality improvement.
- h) Train supervisions in quality improvement.
- i) Hold "Zero Defects" days.
- j) Encourage employees to create their own quality improvement goals.
- k) Encourage employee communication with management about obstacles quality.
- l) Recognize participants' effort.
- m) Create quality councils.
- n) Do it all over again - quality improvements does not end.

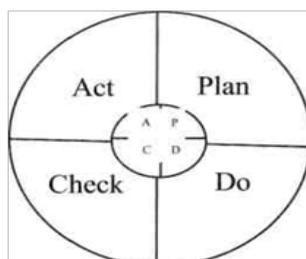
**Quality improvement steps conceptualized by Philip Crosby**

The following are the ten steps of Quality improvement, as per Philip Crosby:

- a) Management is committed to quality and this is clear to all.
- b) Create quality improvement teams, with representatives from all departments.
- c) Measure processes to determine current & potential quality issues.
- d) Calculate the cost of poor quality.
- e) Raise quality awareness of all employees.
- f) Take action to correct quality issues.
- g) Monitor progress of quality improvement-Establish a zero-defect committee.
- h) Train supervisors in Quality improvement.
- i) Encourage employees to create their own quality improvement goals.
- j) Recognize participants' efforts.

### Shewhart Cycle or Plan-Do-Check-Act (PDCA)

Shewhart Cycle or PDCA or Deming Cycle or Deming wheel or PDSA is explained as follows:



#### PLAN:

Establish the objectives and processes necessary to deliver results in accordance, with the specifications.

#### DO:

Implement the processes.

#### CHECK:

Monitor and evaluate the processes and results as agent objectives and specifications and report the out come.

#### ACT:

Apply actions to the outcome for necessary improvement. That means reviewing all steps (plan, Do, Check, Act) and modifying the process to improve it before its next implementation.

#### Illustration 1:

A company manufactures a single product, which requires two components. The company purchases one of the components from two suppliers: X Limited and Y Limited. The price quoted by X Limited is ₹180 per hundred units of the component and it is found that on an average 3 per cent of the total receipt from this supplier is defective. The corresponding quotation from Y Limited is ₹174 per hundred units, but the defective would go up to 5 per cent. If the defectives are not detected, they are utilized in production causing a damage of ₹180 per 100 units of the component.

The company intends to introduce a system of inspection for the components on receipt. The inspection cost is estimated at ₹24 per 100 units of the component. Such as inspection will be able to detect only 90 per cent of the defective components received. No payment will be made for components found to be defective in inspection.

Required:

- (i) Advise whether inspection at the point of receipt is justified ?
- (ii) Which of the two suppliers should be asked to supply? (Assume total requirement is 10,000 units of the component.)

#### Solution:

Estimated defectives if not inspected

$$X \text{ Ltd.} = 10,000 \times 3/100 = 300 \quad Y \text{ Ltd.} = 10,000 \times 5/100 = 500$$

Calculation of Cost per 100 units of good components (in ₹)

Particulars	X Ltd.	Y Ltd.
Purchase price	18,000	17,400



Production damage	540	900
Total cost	18,540	18,300
Good components	9,700	9,500
Cost per 100 good components	191.13	192.63

Estimated defectives if inspection is done at the point of receipt

(Units)

Particulars	X Ltd.	Y Ltd.
Defectives not detected	30	50
Defectives detected	270	450
Components paid for	9,730	9,550

Calculation of cost per 100 units of good components (₹)

Particulars	X Ltd.	Y Ltd.
Purchase cost	17,514	16,617
Inspection cost	2,400	2,400
Production damage	54	90
Total cost	19,968	19,107
Good components	9,700	9,500
Cost per 100 good components (₹)	205.86	201.13

### Illustration 2:

TQ Ltd. implemented a quality improvement program and had the following results: (₹ '000)

Particulars	2011	2012
Sales	6,000	6,000
Scrap	600	300
Rework	500	400
Production inspection	200	240
Product warranty	300	150
Quality training	75	150
Materials inspection	80	60

You are required to:

- Classify the quality costs as prevention, appraisal, internal failure and external failure and express each class as a percentage of sales.
- Compute the amount of increase in profits due to quality improvement.

### Solution:

- Classification of quality costs (₹ '000)

Particular	2011	% of Sales	2012	% of Sales
Sales	6000		6000	
(a) Prevention Costs: Quality training	75	1.25	150	2.50

(b) Appraisal Costs:				
Product inspection	200		240	
Material inspection	80		60	
	280	4.67	300	5.00
(c) Internal failure costs:				
Scrap	600		300	
Rework	500		400	
	1,100	18.33	700	11.67
(d) External failure Costs: Product warranty	300	5.00	150	2.50
Total quality costs (a+ b + c +d)	1,755	29.25	1,300	21.67

(ii) Cost reduction was effected by 7.58% (i.e. 29.25% - 21.67%) of sales, which is an increase in profit by ₹4,55,000 (i.e. ₹17,55,000- ₹13,00,000).

### Illustration 3:

Carlton Ltd. makes and sells a single product, the unit specifications are as follows:

Direct material X	8 sq. meter at ₹40 per square meter
Machine time	0.6 Running hours
Machine cost per gross hour	₹ 400
Selling price	₹1,000

Carlton Ltd. requires to fulfill orders for 5,000 product units per period. There is no stock of product units at the beginning or end of the period under review. The stock level of material X remains unchanged throughout the period.

Carlton Ltd. is planning to implement a Quality Management Program (QMP). The following additional information regarding costs and revenues are given as of now and after implementation of quality management program.

Before the implementation of QMP		After the implementation	
1	5% of incoming material from suppliers scrapped due to poor receipt and storage organization.	1	Reduced to 3%
2	4% of Material X input to the machine process is wasted due to processing problems.	2	Reduced to 2.5%
3	Inspection and storage of Material X costs ₹1 per square meter purchased,	3	No change in the unit rate
4	Inspection during the production cycle, calibration checks on inspection equipment vendor rating and other checks cost ₹2,50,000 per period.	4	Reduction of 40% of the existing cost
5	Production quantity is increased to allow for the down grading of 12.5% of the production units at the final inspection stage. Down graded units are sold as seconds at a discount of 30% of the standard selling price	5	Reduction to 7.5%
6	Production quantity is increased to allow for return from customers (these are replaced free of charge) due to specification failure and account for 5% of units actually delivered to customer.	6	Reduction to 2.5%
7	Product liability and other claims by customers is estimated at 3% of sales revenue from standard product sale.	7	Reduction to 1%
8	Machine idle time is 20% of gross machine hours used (i.e. running hour = 80% of gross/hrs.).	8	Reduction to 12.5%



9	Sundry costs of administration, selling and distribution total – ₹6,00,000 per period.	9	Reduction by 10% of the existing
10	Prevention program costs ₹2,00,000.	10	Increase to ₹6,00,000

The total quality management program will have a reduction in machine run time required per product unit to 0.5 hr.

Required:

- (a) Prepare summaries showing the calculation of (i) Total production units (pre-inspection), (ii) Purchase of materials X (square meters), (iii) Gross machine hours.

In each case, the figures are required for the situation both before and after the implementation of the quality management program so that orders for 5,000 product units can be fulfilled.

- (b) Prepare Profit and Loss account for Carlton Ltd. for the period showing the profit earned both before and after the implementation of the total quality program.

**Solution:**

(a)

Particulars	Before implementation of QMP	After implementation of QMP
(i) Calculation of Total production (pre-inspection)	(Units)	(Units)
Sales required to fulfill orders	5,000	5,000
Add: Specification losses (@ 5%); (@ 2.5%)	250	125
	5,250	5,125
Add: Downgrading at inspection $\left(5,250 \times \frac{12.5}{87.5}\right); \left(5,125 \times \frac{7.5}{92.5}\right)$	750	416
Total production before inspection	6,000	5,541
(ii) Calculation of purchase of Material 'X'	(Sq. Meters)	(Sq. Meters)
Material required (6,000 units × 8); (5,541 units × 8)	48,000	44,328
Add: Processing loss $\left(48,000 \times \frac{4}{96}\right); \left(44,328 \times \frac{2.5}{97.5}\right)$	2,000	1,137
	50,000	45,465
Add: Scrapped material (50,000 × 5/95); (45,465 × 3/97)	2,632	1,406
Total material required to purchase	52,632	46,871
(iii) Calculation of Gross Machine Hours	(Machine Hrs.)	(Machine Hrs.)
Machine hrs. required for total production (6,000 × 0.6); (5,541 × 0.5)	3,600	2,771
Add: Idle Time (3,600 × 20/80); (2,771 × 12.5/87.5)	900	396
Total gross machine hours required	4,500	3,167

(b) Profit and Loss Account showing profit earned before and the implementation of QMP (₹)

Particulars	Before implementation of QMP		After implementation of QMP	
Sales	(5,000 units × ₹1,000)	50,00,000	(5,000 units × ₹1,000)	50,00,000
Sales downgraded	(750 units × ₹700)	5,25,000	(416 units × ₹700)	2,91,200
	(a)	55,25,000		52,91,200



Costs:				
Materials	(52,632 S. M. × ₹40)	21,05,280	(46,871 S. M. × ₹40)	18,74,840
Inspection & storage	(52,632 S. M. × ₹1)	52,632	(46,871 S. M. × ₹1)	46,871
Machine Cost	(4,500 hrs. × ₹400)	18,00,000	(3,167 hrs. × ₹400)	12,66,800
Inspection & other cost	(Actual)	2,50,000	(₹2,50,000 × 60/100)	1,50,000
Product Liability	(₹50,00,000 × 3/100)	1,50,000	(₹50,00,000 × 1/100)	50,000
S&D and Admn. Costs	(Actual)	6,00,000	(₹6,00,000 × 90/100)	5,40,000
Preventive program cost		2,00,000		6,00,000
	(b)	51,57,912		45,28,511
Net profit	(a) – (b)	3,67,088		7,62,689

### Short Questions & Answers

#### Choose the correct answer:

**Q.1.** Benchmarking is:

- (a) The analytical tool to identify high cost activities based on the 'Pareto Analysis';
- (b) The search for industries best practices that lead to superior performance;
- (c) The simulation of cost reduction schemes that help to build commitment and improvement of actions;
- (d) The process of marketing and redesigning the way a typical company works;
- (e) The framework that earmarks a linkage with suppliers and customers.

**Answer:**

(b) The search for industries best practices that lead to superior performance.

**Q.2.** Consultant/s who contributed to the concept of TQM (Total Quality Management):

- (a) W. Edwards Deming;
- (b) Joseph Juran;
- (c) A. V. Feigenbaum;
- (d) All of the above.

**Answer:**

(d) All of the above

**Q.3.** Which of the following does not form part of Benchmarking process?

- (a) Redesign;
- (b) Planning;
- (c) Analysis;
- (d) Integration;
- (e) Action.

**Answer:**

(a) Redesign

**Q.4.** Which one of the following is not a measure related to Balanced Score Card?



- (a) Financial;
- (b) Customer satisfaction;
- (c) Internal processes;
- (d) Gap analysis;
- (e) Innovation.

**Answer:**

(d) Gap analysis

**Q.5.** Benchmarking Focuses on:

- (a) Production;
- (b) Best practices;
- (c) Best performance;
- (d) Supply chain management;
- (e) Profit.

**Answer:**

(b) Best practices

**Q.6.** The Balanced Scoreboard is about:-

- (a) Creating the Vision, Communicating and Linking, Business Planning and Target Setting, Feedback and Learning;
- (b) Translating the Vision, Communicating and Linking, Business Planning and Target Setting, Feedback and Learning;
- (c) Translating the Vision, Coordinating, Business Planning and Target Setting, Feedback and Learning;
- (d) Creating the Vision, Coordinating, Business Planning and Target Setting, Feedback and Learning;
- (e) Creating the Vision, Communicating and Linking, Business Planning and Target Setting, Feedback and Learning.

**Answer:**

(b) Translating the Vision, Communicating and Linking, Business Planning and Target Setting, Feedback and Learning.

**Q.7.** Total Quality Management emphasises:

- (a) the responsibility of the Quality Control staff to identify and solve all quality-related problems
- (b) a commitment to quality that goes beyond internal company issues to suppliers and customers
- (c) a system where strong managers are the only decision makers
- (d) a process where mostly statisticians get involved

**Answer:**

(b) a commitment to quality that goes beyond internal company issues to suppliers and customers

**Q.8.** A successful TQM program incorporates all of the following except :

- (a) continuous improvement
- (b) employment involvement
- (c) benchmarking
- (d) centralized decision making authority



**Answer:**

(d) centralized decision making authority

**Q.9.** The six sigma DMAIC process consist of:

- (a) define, measure, analyze, improve, control;
- (b) define, manage, analyze, improve, control;
- (c) define, measure, analyze, improve, co-ordination;
- (d) deliver, measure, analyze, improve, control.

**Answer:**

(a) define, measure, analyze, improve, control.

**State if each of the following statements is True or False:**

**Q.10.** The BSC (Balanced Scorecard) puts more stress on financial parameters than on non-financial parameters since its objective is the growth of the organization.

**Answer:**

False.

**Q.11.** Balance Score Card is a performance measurement tool for controlling individual productivity.

**Answer:**

False. The correct statement is - Balanced Score Card is not a performance measurement tool.

**Q.12.** ROA (return on assets), can be expressed as — Profit Margin × Asset Turnover

**Answer:**

True.

**Q.13.** Expand the following:

- (i) MRP
- (ii) MRP-II
- (iii) ERP
- (iv) BSC
- (v) TQM

**Answer:**

- (i) Material Requirement Planning
- (ii) Manufacturing Resources Planning
- (iii) Enterprise Resource Planning
- (iv) Balanced Score Card
- (v) Total Quality Management

**Fill in the blanks:**

**Q.14.** P Charts measures \_\_\_\_\_ defective in Statistical Process Control (SPC) Methods.



**Answer:**

proportion

**Q.15.** Information is \_\_\_\_\_ that have been organised into a meaningful and useful context.

**Answer:**

data

**Q.16.** MOLAP is a \_\_\_\_\_ online analytical processing.

**Answer:**

multi-dimensional

**Q.17.** The Balanced Scorecard is a management system — not a \_\_\_\_\_ system.

**Answer:**

measurement

**Q.18.** \_\_\_\_\_ Benchtrading which is used to identify technological trends and steps initiated to bridge the gaps in current performance levels.

**Answer:**

Operations or Process

**Q.19.** \_\_\_\_\_ is thus used for scheduling, inventory management and capacity management.

**Answer:**

Materials Requirement Planning

**Q.20. Match the following:**

(i) PDCA	A. Kaplan & Norton
(ii) Balanced Scorecard	B. ROLAP
(iii) Total Productivity Management	C. help senior management
(iv) Online analytical processing	D. Plan, Do, Check, Act
(v) Strategic-level information systems	E. zero product defects

**Answer:**

(i) → D.

(ii) → A.

(iii) → E.

(iv) → B.

(v) → C.

# Study Note - 3

## ECONOMIC EFFICIENCY OF THE FIRM - PERFORMANCE ANALYSIS



### This Study Note includes

- 3.1 Profit Maximization under Different Market Structure
- 3.2 Market Factors affecting Pricing Decisions

### 3.1 PROFIT MAXIMIZATION UNDER DIFFERENT MARKET STRUCTURE

#### Concepts of Market and Demand

The concept of demand seeks to establish the relationship between the quantity demanded of a commodity and its price. "The demand for anything at a given price is the amount of it which will be bought per unit of time at a given price". Thus, the demand for any commodity always involves two things:

- i) Price, and
- ii) Unit of time.

Demand has no significance unless related to both these factors. Unit of time may be a day, a week, a month, etc. The Statement that demand for Sugar is 1 kg at ₹50 per kg carries no meaning unless we state explicitly the period for which this quantity is demanded. "Desire or need becomes a demand only when it is backed by willingness and ability to pay." The quantity demanded by an individual purchaser at a given price is known as **individual demand** where as the total quantity demanded by all the buyers are known as total demand or **market demand**.

**Demand Schedule:** The demand schedule explains the relationship between price and demand. Demand schedules are two types.

- a) Individual Demand Schedule,
- b) Market Demand Schedule

**Individual Demand Schedule:** Various quantities of commodity that would be purchased by an individual consumer at different prices is called individual demand schedule.

Price (in ₹)	Demand (in units)
5	1
4	2
3	3
2	4
1	5

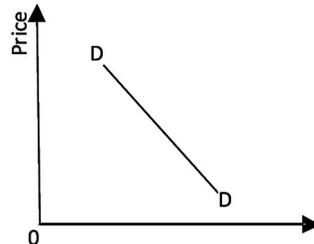
In the table at ₹5 price the consumer is demanding 1 unit of commodity at ₹4 price the demand is 2 units, at 3, 2 and 1 rupee price the demand is 3, 4 and 5 units respectively.

**Market Demand Schedule:** Various quantities of goods that would be purchased by all the consumers in the market is called market demand schedule.

Price (in ₹)	Demand of					Market Demand (in units)
	A	B	C	D	E	
1	35	30	25	20	15	135
2	30	25	20	20	10	105
3	25	20	15	20	0	80
4	20	15	10	20	0	65
5	15	10	0	20	0	45

In the table at ₹1 price the market demand is 135 units (i.e., demand of A+B+C+D+E (35+30+25+20+15=135 units). Similarly at ₹2 price the market demand is 100 units, at ₹3, ₹4 and ₹5 prices the market demand is 80, 65, 45 units respectively.

**Demand Curve:** As there is inverse relationship between price and demand the individual demand curve slopes downwards from left to right.



In the Diagram DD is the Demand Curve. It slopes downwards from left to right.

**Derived Demand:**

The commodities, which are not needed for direct consumption but are demanded to help in the production of other commodities which have direct demand, are said to have derived demand. For example, the demand for raw materials, labour, machines, etc., has a derived demand.

**Determinants of demand or factors on which demand depends:**

The quantity demanded per unit of time of a commodity X by a consumer denoted by  $D_x$  mainly depends on:

- (i) Price of the commodity (P)
- (ii) Prices of substitutes ( $P_s$ )

Substitutes are those goods which can be used in place of each other. For example: Tea and Coffee.

- (iii) Price of complements ( $P_c$ )

Complementary goods are those goods which are related to each other in such a way that an increase (or decrease) in demand for one leads to an increase (or decrease) in the demand of the other. For example: Pen and ink, petrol and car etc.

- iv) Income of household (I)
- v) Tastes and preferences of the households (T), and
- vi) The amount annually spent on advertisement of the product and sales promotion (A)

Mathematically,

$$D_x = f (P, P_s, P_c, I, T, A)$$

**Law of Demand:**

The Law of Demand simply expresses the relation between quantity of a commodity demanded and its price. The law states that “demand varies inversely with price, not necessarily proportionately”. If the price falls, demand will extend, and vice versa. The law of demand indicates this inverse relationship between price and quantity demanded. “Other things remaining same, higher will be demanded at a lower price and lower will be demanded at a higher price” - Prof. Benham.

**The exceptions of Law of Demand:**

1. **Giffen Paradox:** According to the Law of demand when the price rises demand decreases and vice-versa. But, according to Sir Robert Giffen even though the price, for necessary goods rise, the demand for them will not decrease. These goods are called Giffen goods.



2. **Prestigious goods:** The law of demand will not operate in case of prestige goods like diamonds, cars etc. The demand for these goods does not decrease with the rise in the price as these goods are attached with prestige.
3. **Speculative Business:** The law of demand do not operate in case of the speculative business. If people think that the prices of goods increase in the future, now they will buy more units of that commodity. This is against to the law of demand. This is another limitation to the law of demand.
4. **Trade cycles:** The law of demand do not operate in periods of trade cycles. During the prosperity period people may buy more goods at higher prices. In periods of depression, people buy fewer goods even though the prices are less.
5. **Ignorance of the consumers:** The law of demand is not applicable in case of the ignorant consumers. By ignorance people think that high priced goods are qualitative goods. Therefore the consumers may buy the goods even at high prices.

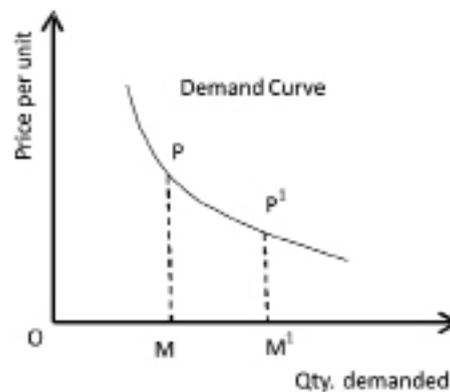
### Demand Function and Demand Curve:

Other factors remaining constant the quantity demanded ( $x$ ), for any commodity is a function of its price ( $p$ ) per unit, i.e.,

$$x = f(p)$$

This is called the demand function, the graph between the quantity demanded on x-axis and price on y-axis is a down ward sloping (falling) curve (called demand curve) having negative slope, showing that the demand is a decreasing function of price.

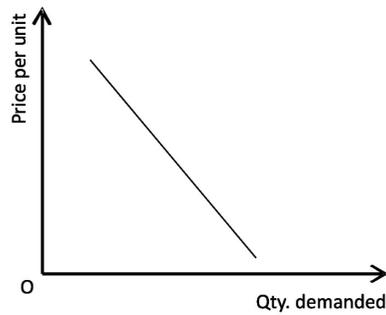
The demand curve concentrates exclusively on the price-quantity relationship. The relationship between quantity demanded and other factors which influence demand is not shown by demand curve. The demand curve shows:



- (i) The maximum quantity of a commodity a consumer will purchase at a particular price.
- (ii) The maximum price for a particular quantity.

### Notes:

- i. If the relation between the quantity demanded ( $x$ ) and the price per unit ( $p$ ) is a linear relation of the form
 
$$X = \alpha - \beta p$$
- ii. Where  $\alpha$ ,  $\beta$  are positive constants, the demand curve is a straight line.
- iii. The equation of straight line in slope form is  $y = mx + c$ . If the slope is negative the equation becomes
 
$$Y = c - mx$$
- iv. The slope of the demand curve is always negative.



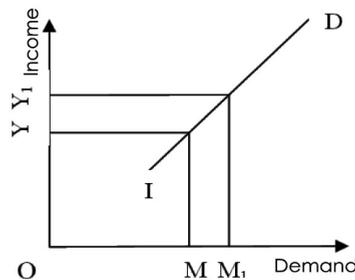
**INCOME DEMAND**

Income demand explains the relationship between the income and demand. Various quantities of goods that would be purchased by the consumer at different levels of income is called income demand. Other things remaining the same, when the income increases the demand for the commodities will also increase. Thus, direct relationship existed between income and demand. This can be explained with the help of the following table.

Income (in ₹)	Demand (In units)
100	50
200	100
300	150

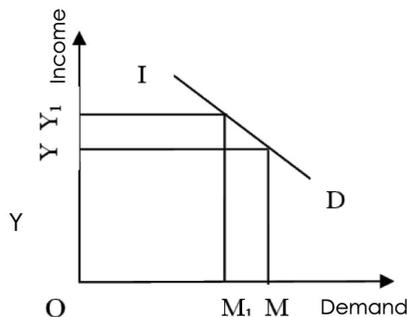
In the table at ₹100/- income per unit, the consumer purchased 50 units of a commodity, at ₹300/- he purchased 150 units of commodity.

**Diagrammatic Representation:** In case of the superior goods the income demand curve is upward rising from left to right as shown in the given figure.



In the diagram on the X – axis demand and on the Y-axis income are shown. ID is the income demand curve. When the income increases from OY to OY<sub>1</sub> the demand for superior goods is also increases from OM to OM<sub>1</sub>

**Inferior goods:** In case of inferior goods when the income increases, the demands for inferior goods decrease. For example: If the income of the people increases, they purchase superior quality of food grains like wheat & rice instead of inferior food grains. So, the income demand curve for inferior goods slopes downwards from left to right as shown under.

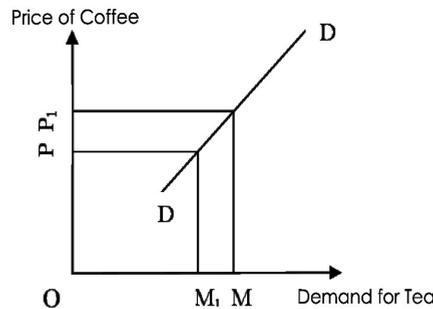


In the diagram on the X – axis demand and on the Y-axis income are shown. ID is the income demand curve. If the income, increases from  $OY$  to  $OY_1$ , the demand for inferior goods is decreased from  $OM$  to  $OM_1$

**CROSS DEMAND**

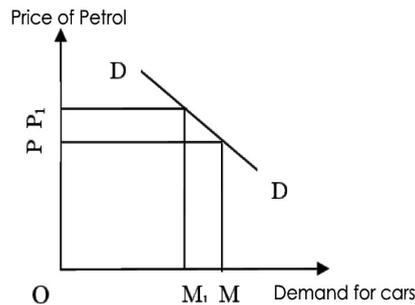
The change in the demand for one commodity due to the changes in the prices of related goods like substitutes and complementary goods is called cross demand.

**Substitutes:** In the case of substitutes, if the price of one commodity increases, the demand for its substitutes will increase. For example if the price of coffee increases the demand for its substitute i.e., tea's demand will increase. So, the demand curve for substitutes will be an upward sloping from left to right as it is shown in the following diagram.



In the diagram on the X – axis demand for tea and on the Y-axis price of coffee are shown. DD is the demand curve for substitutes. When the price of coffee increases from  $OP$  to  $OP_1$ , the demand for its substitute i.e., tea will increase from  $OM$  to  $OM_1$ .

**Complementary goods:** In the case of complementary goods, if the price of a commodity decreases the demand for its complementary goods will increase. For example car and petrol if the price of petrol decreases the demand for cars will increase. So, the demand curve for complementary goods is falling from left to right.



In the diagram on the X – axis demand for cars and on the Y-axis price of petrol are shown. DD is the demand curve for complementary goods. When the price of petrol increases from  $OP$  to  $OP_1$ , the demand for cars will decrease from  $OM$  to  $OM_1$

**EXPANSION, CONTRACTION OF DEMAND:**

Expansion or contraction of demand indicates the change in quantity demanded due to change in the factors except price. Now factors other than price include change in income, change in price of a substitute or complementary goods or change in habits, change in taste, technological changes etc.

**ELASTICITY OF DEMAND:**

The Quantitative responsiveness of demand to the change in the price called Elasticity of Demand. The rate of change in demand to a change in price is called elasticity of demand. If the change in the demand is more than the change in the price it is called elastic demand. If the change in the demand is less than the change in the price it is called inelastic demand.

**Definition:**

“The elasticity of demand in a market is great or small according to the amount demanded increases much or little for a given fall in the price and diminishes with much or little for a given rise in price”. – Marshall. “Elasticity is the degree of change in demand as a result of change in price”. – Samuelson.

The elasticity of demand explains the relationship between proportionate change in demand to a proportionate change in price.

$$\text{Elasticity of demand} = \frac{\text{Proportionate change in Demand}}{\text{Proportionate change in Price}}$$

**Types of Elasticity of Demand:** Elasticity of demand is of 3 types:

1. Price elasticity of demand
2. Income elasticity of demand.
3. Cross elasticity of demand

**PRICE ELASTICITY OF DEMAND:**

Price Elasticity of Demand ( $E_d$ ) explains the proportionate or percentage change in demand to a proportionate or percentage change in price.

$$E_d = \frac{\text{Proportionate change in Demand}}{\text{Proportionate change in Price}}$$

(or)

$$E_d = \frac{\text{Percentage change in Demand}}{\text{Percentage change in Price}}$$

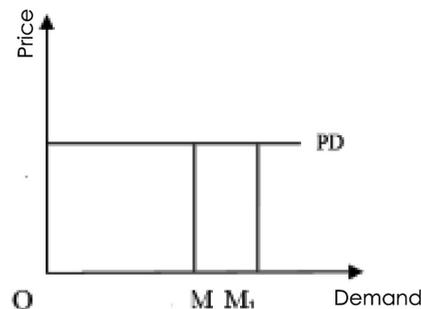
$$E_d = \frac{\frac{\text{Change in Quantity Demanded}}{\text{Quantity demanded at original price}}}{\frac{\text{Change in Price}}{\text{Original Price}}}$$

$$E_d = \frac{\Delta x}{x} \div \frac{\Delta p}{p} = \frac{p}{x} \times \frac{\Delta x}{\Delta p}$$

**Types of Price Elasticity of Demand:** The price elasticity of demand is of 5 types.

1. Perfectly elastic demand.
2. Perfectly inelastic demand
3. Relatively elastic demand
4. Relatively inelastic demand
5. Unitary elastic demand

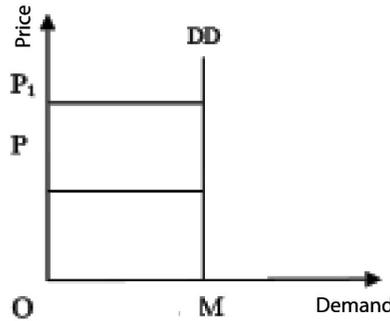
1. **Perfectly Elastic Demand:** A small change in the price brings an infinite change in the demand is known as perfectly elastic demand. The perfectly elastic demand curve is a line parallel to the X-axis as shown in the following diagram. ( $E_d = \infty$ )





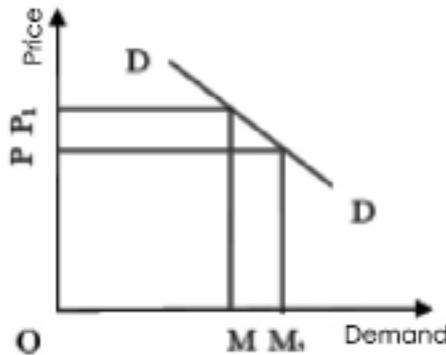
In the diagram on the X – axis demand and on the Y-axis Price are shown. DD is the perfectly elastic demand curve. At OP price level the demand increases to OM<sub>1</sub> to OM. This shows any amount is demanded at a given price.

**2. Perfectly Inelastic demand:** If a change in price does not bring any change in demand, it is called perfectly inelastic demand. In the case of perfectly inelastic demand, the demand curve is parallel to Y – axis ( $E_d = 0$ )



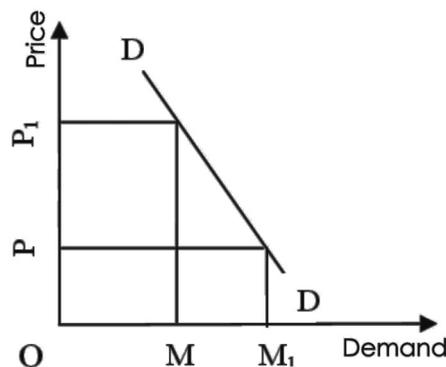
In the diagram on the X – axis demand and on the Y-axis Price are shown. DD is the perfectly inelastic demand curve. Even though price increases from OP to OP<sub>1</sub>, the demand remains the same at OM.

**3. Relatively Elastic Demand:** If the proportionate change in the demand is more than the proportionate change in the price, it is called relatively elastic demand. Here the elasticity of demand is more than one ( $E_d > 1$ )



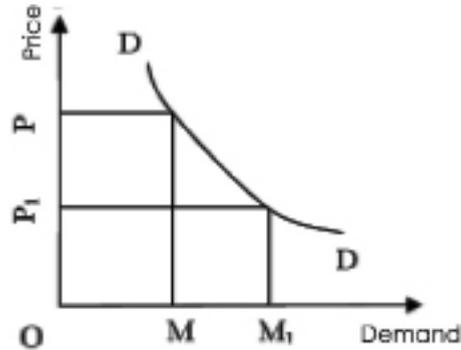
In the diagram on the X – axis demand and on the Y-axis Price are shown. DD is the demand curve. When the price is decreased from OP to OP<sub>1</sub>, the demand has increased from OM to OM<sub>1</sub>. Here the change in the demand (MM<sub>1</sub>) is more than the change in the price (PP<sub>1</sub>). So the demand is elastic.

**4. Relatively Inelastic demand:** If the proportionate change in the price is more than the proportionate change in the demand, it is called relatively inelastic demand. The demand is less elastic ( $E_d < 1$ )



In the diagram on the X – axis demand and on the Y-axis Price are shown. DD is the demand curve. When the price is decreased from OP to OP<sub>1</sub>, the demand has increased from OM to OM<sub>1</sub>. The change in the price (PP<sub>1</sub>) is more than the change in the demand (MM<sub>1</sub>). So, the demand is less elastic.

**5. Unitary Elastic demand:** If the proportionate change in the demand and the proportionate change in the price are equal, it is called unitary elastic demand. ( $E_d = 1$ )



In the diagram DD is the demand curve. It is a rectangular hyperbola. When the price is decreased from OP to OP<sub>1</sub>, the demand has increased from OM to OM<sub>1</sub>. Here, the change in the price (PP<sub>1</sub>) and the change in the demand (MM<sub>1</sub>) are equal.

**Summary of the characteristics of various types of price elasticity of demand:**

Type	Numerical Expression	Description	Shape of Curve
1. Perfectly Elastic	$\infty$	Infinite	Horizontal
2. Perfectly Inelastic	0	Zero	Vertical
3. Unity Elasticity	1	One	Rectangular Hyperbola
4. Relatively Elastic	$>1$	More than one	Flat
5. Relatively Inelastic	$<1$	Less than one	steep

**INCOME ELASTICITY OF DEMAND:**

The income elasticity of demand explains the proportionate change in income and proportionate change in demand. The rate of change in the demand due to the change in the income is called income elasticity of demand.

$$\text{Income elasticity of demand} = \frac{\text{Proportionate change in Demand}}{\text{Proportionate change in Income}}$$

**Types of income elasticity of demand:**

- 1. Zero income elasticity of demand:** If the change in the income fails to bring any change in demand, it is called zero income elasticity of demand. ( $E_y=0$ ).
- 2. Negative income elasticity of demand:** If the demand decreases with the increase in the income is called negative income elasticity of demand.
- 3. Unitary income elasticity of demand:** If the proportionate change in the demand is equal to proportionate change in the income, it is called unitary income elasticity of demand ( $E_y=1$ )
- 4. Income elasticity of demand is greater than one:** If the proportionate change in the demand is more than the proportionate change in income, it is called relatively income elastic of demand ( $E_y>1$ ).
- 5. Income elasticity of demand is less than one:** If the proportionate change in the demand is less than the proportionate change in the income, it is called relatively income inelastic demand ( $E_y<1$ ).



### CROSS ELASTICITY OF DEMAND:

The rate of change in the demand for one commodity due to the change in the price of its substitutes and complementary goods is called cross elasticity of demand.

$$\text{Cross Elasticity of Demand} = \frac{\text{Percentage change in the Demand for commodity X}}{\text{Percentage change in the Price of Y}}$$

If the percentage change in the demand for commodity X is more than the percentage change in the price of Y, then the cross elasticity of demand is greater than one ( $E_d > 1$ ). If the percentage change in the demand for commodity X is less than percentage change in the price of commodity Y, then the cross elasticity of demand is less than one ( $E_d < 1$ ). If the percentage change in the demand for commodity X is equal to percentage change in the price of commodity Y, then the cross elasticity of demand is equal to one ( $E_d = 1$ ).

### Measurement of Elasticity of Demand:

The elasticity of demand can be measured by using 3 methods.

1. Percentage method,
  2. Total outlay (or) Expenditure method
  3. Diagrammatic method:
    - (a) Point method
    - (b) Arc method
- 1. Percentage method:** With this method the elasticity of demand can be measured by comparing the percentage change in the price and percentage change in demand.

$$E_d = \frac{\text{Percentage change in Demand}}{\text{Percentage change in Price}}$$

### 2. Total outlay (or) Expenditure method:

$$\begin{aligned} \text{Total outlay} &= \text{Price per unit} \times \text{Quantity bought} \\ &= \text{Price per unit} \times \text{Quantity demanded} \\ &= \text{Total revenue} \end{aligned}$$

If the demand is inelastic, i.e., if the elasticity of demand is  $< 1$ , the total outlay falls with fall in price and rises with increase in price.

If the demand is unit elastic, the total outlay remains unchanged with the change in price, i.e., for a fall in price, the demand increases proportionately and for a rise in price the demand decreases proportionately.

If the demand is elastic, i.e., elasticity of demand is  $> 1$  the total outlay increases with fall in price and decreases with rise in price because the quantity demanded changes in greater proportion than the change in price.

- 3. Diagrammatic Method:** The elasticity computed at a single point on the demand curve for an infinitesimal change in price is called point elasticity. The elasticity between two separate points of demand curve is called arc elasticity.

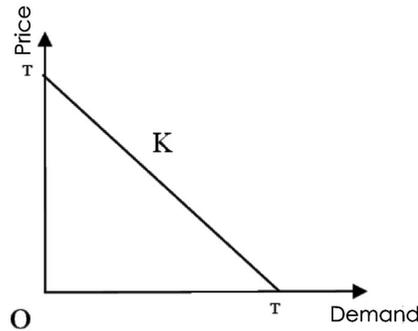
**a) Point Elasticity:** In this method the elasticity of demand at a particular point on the demand curve can be calculated. The point elasticity of demand is equal to distance between the points on X-axis divided by the distance between point on Y-axis. This can be explained in the following. In the diagram, on X-axis demand and on Y-axis price are shown. K is the price demand curve. At that point we can know the elasticity of demand by the following formula.

Point elasticity of demand can be found out:

$$\frac{\text{Marginal Quantity Demanded}}{\text{Average Quantity Demanded}} = \frac{dx/x}{dp/p} = \frac{dx/x}{dp/p}$$

$$\text{Point Elasticity} = \frac{KT_{\text{Lower Segment}}}{KT_{\text{Upper Segment}}}$$

$$E_d = \frac{\Delta q}{\Delta p} \times \frac{p}{q}$$



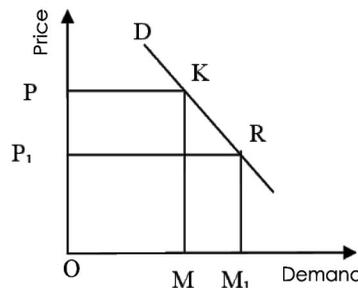
After application of this formula if we get the result more than one, it is elastic demand. If the result is less than one, it is inelastic demand and if the result is equal to one then it is unitary elastic demand.

Thus point elasticity is defined as the proportionate change in quantity demanded resulting from a very small change in the price of commodity. It also expressed:

$$E_d = \frac{dQ}{dp} \times \frac{p}{Q}$$

Where  $E_d$  is Point Price Elasticity of demand,  $\left[\frac{dQ}{dp}\right]$  is the first order derivative of demand equation and  $\frac{P}{Q}$  is the ratio of price to quantity. Point elasticity can be calculated with the help of Differential calculus.

**b) Arc Elasticity:** In arc elasticity we calculate the elasticity of demand between two points on the demand curve.



In the diagram on X-axis the demand and ON Y-axis the price are taken. K and R are the two points on the demand curve. We can measure the elasticity of demand between these points by using the following formula.

$$\text{Arc Elasticity of Demand} = \frac{\text{Change in Demand}}{\text{1st demand} + \text{2nd demand}} \times \frac{\text{Change in Price}}{\text{1st Price} + \text{2nd Price}}$$

$$\text{In diagram Arc elasticity of demand} = \frac{MM_1}{OM + OM_1} \times \frac{PP_1}{OP + OP_1}$$

$$E_d = \left[\frac{\Delta q}{\Delta p}\right] \times \left[\frac{P_1 + P_2}{Q_1 + Q_2}\right]$$

After application of the above formula if we get result more than one then it is elastic demand, if the result is less than one then it is inelastic demand and if the result is equal to one then it is unitary demand.



### Consumer's Surplus:

In the words of Marshall, "The excess of the price which he (i.e., consumer) would be willing to pay rather than go without the thing over that which he actually does pay is the economic measure of this surplus satisfaction ..... It may be called Consumer's Surplus." To use Hicks words "It is the difference between the marginal valuation of a unit and the price which is actually paid for it".

In short, consumer's surplus is what we are prepared to pay minus what we actually pay. As will be clear from the following section, the consumer's surplus is measured by the difference between total utility and the amount spent.

### Producer's Surplus:

It is the difference between the amount that a producer of a good receives and the minimum amount that he or she would be willing to accept for the good. The difference, or surplus amount, is the benefit that the producer receives for selling the good in the market.

### Demand Forecasting:

Expecting future demand for a product is called "Demand Forecasting". This estimate is made considering various factors like controllable and non-controllable and present and anticipated market conditions. Accurate forecasting is essential for a firm to enable it to produce the required quantities at the right time and arrange well in advance for the various factors of production viz., material, money, men, management, machinery etc. Demand forecasting is not a speculation. It cannot be hundred per cent correct. But it gives a reliable information and estimation of future demand. It is based on mathematical law of probability. Business planning is based on forecasting of sales or demand. Most of the business decisions depend on the basis of expected sales in future. The success of business is also influenced by the accuracy of forecasted reports. A firm can maximise profits only when it produces on the basis on the demand for its products. There will be no problem of over and under production if the figure of sales forecasts or demand forecasts is accurate. As it will reduce or have control over costs, the profits will certainly go up. Hence, the importance of forecasting is more or less depends upon the nature of business.

### Factors involved in Demand Forecasting:

1. **Time factor:** Forecasting may be done for short-term or long-term. Short-term forecasting is generally taken for one year while long-term forecasting covering a period of more than 1 year.
2. **Level factor:** Demand forecasting may be undertaken at three different levels.
  - a. **Macro level:** It is concerned with business conditions over the whole economy.
  - b. **Industry level:** Prepared by different industries.
  - c. **Firm-level:** Firm-level forecasting is the most important from managerial view point.
3. **General or specific purpose factor:** The firm may find either general or specific forecasting or both useful according to its requirement.
4. **Product:** Forecasting varies type of product i.e., new product or existing product or well established product.
5. **Nature of the product:** Goods can be classified into
  - (i) consumer goods and (ii) producer goods.

Demand for a product will be mainly dependent on nature of the product. Forecasting methods for producer goods and consumer goods will be different accordingly.
6. **Competition:** While making forecasting, market situation and the product position in particular market should be analyzed.
7. **Consumer Behaviour:** What people think about the future, their own personal prospects and about products and brands are vital factors for firm and industry.



**Methods of Forecasting:** Demand forecasting is not a speculation. It cannot be hundred per cent correct. But it gives a reliable information and estimation of future demand. It is based on mathematical law of probability.

Demand Forecasting methods can be broadly categorized into two types

- (1) Opinion Survey Methods or Qualitative Techniques and
- (2) Statistical Methods or Quantitative Techniques.

### 1. Opinion Survey Methods or Qualitative Techniques:

Opinion Survey Methods are also called as Qualitative Techniques. These are based on subjective assessment. When available data is irrelevant, then researcher requires primary data. Consumer plays a dominant role in creating demand for a product. If the businessman wants to know the expected demand in future, he has to get the information based on consumers opinions. Opinion survey methods are most popular in "Demand Forecasting." Managerial decisions that are taken after analyzing opinions, made a favourable impact on sales progress.

The opinion survey methods further classified into three types:

- a. **100% Enumerator Survey:** This is the most direct method of forecasting demand in the short-run. Customers will be asked questions like what they are planning to buy for the forthcoming time period-usually a year. But it is observed fact that complete 100% enumerator survey will not be possible and at the same time a number of biases may creep into the surveys. It is very expensive, when it compared with other methods.
- b. **Delphi Method:** Delphi method is a group process and aims at achieving 'consensuses' of the members. Herein experts in the field of marketing research and demand forecasting are engaged in
  - analyzing economic conditions
  - carrying out sample surveys of market
  - conducting opinion polls

Based on the above, demand forecast is worked out in following steps:

- i) Co-coordinator sends out a set of questions in writing to all the experts co-opted on the panel who are requested to write back a brief prediction.
- ii) Written predictions of experts are collated, edited and summarized together by the Co-coordinator.
- iii) Based on the summary, Co-coordinator designs a new set of questions and gives them to the same experts who answer back again in writing.
- iv) Co-coordinator repeats the process of collating, editing and summarizing the responses.
- v) Steps 3 and 4 are repeated by the Co-coordinator to experts with diverse backgrounds until consensus is reached.

If there is divergence of opinions and hence conclusions, Co-ordinator has to sort it out through mutual discussions. Co-ordinator has to have the necessary experience and background as he plays a key role in designing structured 'questionnaires and synthesising the data.

Direct interaction among experts is avoided nor their identity is disclosed. Procedures also neither avoid inter-personnel conflicts nor are strong-willed experts able to dominate the group. This method is also used for technology forecasting.

**Sales Force Opinion Survey or Collective Opinion:** Salesman is expected to estimate expected sales in their respective territories and zones. The rationale of this method is that salesmen, being the closest to the customers are likely to have the most intimate feel of the market i.e., customer response to the product of the firm. This method is based on historical data and consumer's opinion. This method is known as the "Collective Opinion Method" as it takes advantages of the collective wisdom of salesman, managerial economist, marketing manager and personnel relating to sales department.



“Opinion Survey Methods” are purely based on data collected from consumer’s opinions which are always volatile. So decisions made with the help of opinion survey methods may not be successful in future. Hence, statistical analysis should be considered for expecting future, because past experience may represent future performance.

## 2. Statistical Methods or Quantitative Techniques:

### a) Simple Average Method

Among the quantitative techniques for demand analysis, simple Average Method is the first one that comes to one’s mind. Herein, we take simple average of all past periods - simple monthly average of all consumption figures collected every month for the last twelve months or simple quarterly average of consumption figures collected for several quarters in the immediate past. Thus,

$$\text{Simple Average} = \frac{\text{Sum of Demands of all periods}}{\text{Number of periods}}$$

### b) Moving Average Method

Method of Simple Average is faulted on account of the fact that all past periods are given same importance whereas it is justifiable to accord higher importance to recent past periods. Moving Average Method takes a fixed number of periods and after the elapse of each period, data for the oldest time period is discarded and the most recent past period is included. Whatever the period selected, it must be kept constant - it may be three, four or twenty periods by once it decided, we must continue with same number of periods.

$$\text{Moving Average} = \frac{\text{Sum of Demands of Chosen periods}}{\text{Number of Chosen periods}}$$

### c) Weighted Moving Average

In Moving Average Method, weighted given to the selected number of periods is same. This has been refined to include the Weighted Moving Average which allows varying weightages for demands in old periods. Depending upon the age of the period, with-age can be varied:

$$\text{Weighted Moving Average} = W_1D_1 + W_2D_2 + \dots + W_n D_n$$

where  $W_1, W_2, \dots, W_n$  are the weightages for the different periods in percentages so that

$$W_1 + W_2 + \dots + W_n = 1$$

This method has the advantage that it allows forecaster to compensate for some known trend in demand or seasonality of demand by carefully fitting appropriate co-efficient of weighted to those periods. The weightages have to be decided by the forecast analysts and this decision is critical to the accuracy of demand forecast.

**d) Time Series:** Trend analysis or Time series relating to sales represent the past pattern of effective demand for a particular product. The most popular method of analysis of time series is to project the trend of the time series. This method is very simple and inexpensive. The basic assumption is that the trend will persist in future also.

**e) Linear Trend:** Linear trend is appropriate when the time series reveal a rising trend in sales, in other words there is direct relation between sales and time.

Mathematically:

$$Y = a + bx$$

Y = annual sales

a = constant, intercept value on the graph

b = trend or slope or a constant rate of increase



$x$  = time or unit or no. of years

by the method of Least Squares for above equation to find out the value of  $a$  and  $b$  are

$$\sum Y = na + b \sum X$$

$$\sum XY = a \sum X + b \sum X^2$$

- f) Regression Analysis:** Regression equation establishes the relationship between dependent variable and independent variable, assuming the relationship to be linear. For some commodities independent variable may be only one. But for some products independent variables may more than two. In such a case, multiple regression analysis can be used.

Hence, demand for any product can be estimated at a given value of price.

**Simple Regression Equation:**

This equation will be form of  $Y = a + bx$ , for

Independent variable :  $x$

Dependent variable :  $y$

**Multiple-Regression Model:**

The equation in the case of multiple regression

$$Y = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

Independent variables:  $x_1, x_2, \dots, x_n$

Dependent variable :  $y$

**Limitations:**

1. It is difficult to find out inter-dependence relationship between the variables.
2. Sometimes it may be difficult to identify dependent and independent variable.
3. Indicators are based on historical data. But the relationship cannot be established for the future.

- g) Simultaneous Equation:** Establishing relation between two variables with the help of equation, we can estimate demand for a product. These equations are mathematical linear equations to arrive the results.

**Example 1:**  $4a + 3b = 15$

$$3a + 4b = 20$$

By solving these equations we can find the values of  $a, b$ .

**Limitations:**

1. It is difficult to find out an appropriate equation and relationship between variables.
2. For new products it not suitable, as no past data are available.
3. A few indicators always correctly indicate changes in another variable.

- h) Barometric Method:** Based on index numbers i.e., economic indicators like Wholesale Price Index (WPI), Consumer Price Index (CPI) estimations will be made. It is also known as leading indicators forecasting. The researcher should try to understand and establish relationship between products and indices.

**Limitations:**

1. It is difficult to find out an appropriate indicator.
2. For new products it is not suitable, as no past data are available.



3. A few indicators always correctly indicate changes in another variable.
4. Indicators are based on historical data. But the relationship cannot be established for the future.

**Conclusion:** It is not very easy to estimate demand for a product. Customer's opinions are always volatile or changeable. One should not use a mathematical formula without having knowledge of consumer preference and changing styles, attitudes. It does not present an eternal truth. Though statistical or quantitative techniques are essential in clarifying relationships and provide techniques of analysis, yet they are no substitute for judgemental analysis or qualitative techniques. What is needed is some common sense mean between guessing and too much mathematics.

**MARKET**

Market for a commodity may be local, regional, national or international. In common parlance 'Market' refers to a place or locality where commodities are bought and sold. In an economic sense, a market is a system by which buyers and sellers bargain for the price of a product and transactions will take place in that system. Market does not limited to a particular place and personal contact between buyers and sellers is also not necessary.

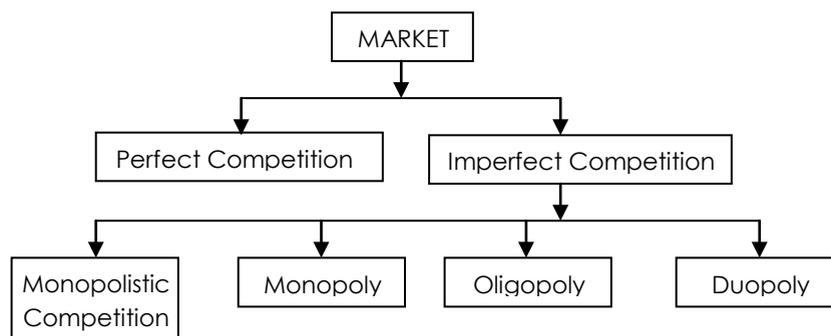
"Market means the whole of any region which buyers and sellers are in such free intercourse with each other, that the price of the same goods tend to equally easily and quickly". – Prof. Cournot

"The word market has been generalized so as to mean any body of persons who are in intimate business relations and carry on extensive transactions in any commodity". – Jevons

**Elements of Markets:**

1. Sellers and buyer agree to transact at a particular price of a product.
2. Nature of the commodity is known to both parties
3. Price of the product is determined under conditions of the market
4. Competition is depend on the increase in the buyers and seller
5. If there is increase in number buyers, price will increase and it is treated as Seller's market
6. If there is increase in number sellers, price will decrease, it is treated as buyer's market
7. Free communication between the buyers and sellers.
8. Size of the market is not restricted; it may certain city, a region a country or even the entire world.
9. Product is homogenous in case of perfect competition, and the product may be differentiated in case of other markets

Markets can be classified into two broad categories:



**PRICE DETERMINATION UNDER PERFECT COMPETITION**

Market is a place where buying and selling transactions are under taken. Here it has no reference to a particular place only. Buying and selling transactions may take place from distinct places. On the basis of competition the markets can be classified into two.

**Definitions:** According to Liff Witch, "Perfect competition is a market in which there are many firms selling identical products with no firm large enough relative to there are many firms selling identical products with no firm large enough relative to the entire market to be able to influence market price".

Mrs. Joan Robinson has defined perfect competition as, "it prevails when the demand for the output of the each product is perfectly elastic".

**Features:**

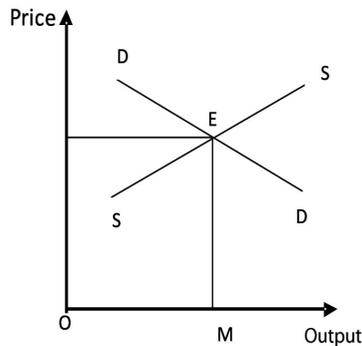
1. There must be Large number of Buyers and sellers.
2. In perfect competition, the goods produced by different firms are homogenous or identical.
3. In perfect competition there is free entry and exit of the firms into the industry.
4. The buyers and the sellers must have the knowledge with regard to the prices of various commodities at different supply and demand forces.
5. The factors must be mobilized from those places where they are getting less remuneration to those places where they will get maximum remuneration.
6. All commodities are identical in perfect competition. So the prices of the commodities are also uniform.
7. In order to maintain the uniform price level in perfect competition we should not include the transport cost in the price level.
8. There is a difference between firm and industry under perfect competition. Firm is a production unit and where as industry is a group of firms.

**Price determination:** Generally price is determined by demand and supply forces. The price is determined at that point where the demand and supply both are equal under perfect competition. The following table explains the price determination under perfect competition.

Price	Demand	Supply
5.00	200	600
4.00	300	500
3.00	400	400
2.00	500	300
1.00	600	200

In the above table if the price of the commodity is ₹ 5/- then there is a demand for 200 commodities and supply is 600 commodities. If the price is 1 rupee then there is a demand for 600 commodities and supply reduced to 200 commodities. In the table at ₹ 3/- price level, there is a demand for 400 commodities and the supply is also 400 commodities. Therefore the price is determined as ₹ 3/-

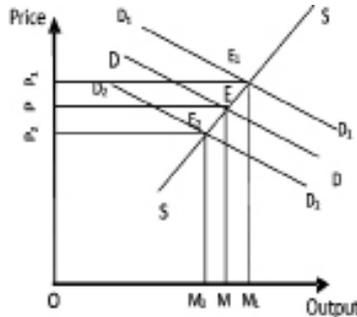
**Diagrammatic Explanation:** The price and output determination under perfect competition can be explained with the help of following diagram.



In the diagram on X-axis output and on Y axis the price are determined. DD is the demand curve as SS is the supply curve. Both demand and supply are equal at point E. So, the price is determined as OP and output as OM.

**Price determination when demand changes and supply remains constant:**

Under perfect competition, if supply being constant the equilibrium price will rise when the demand increases and if the demand decreases then the price will fall down. This can be shown in the diagram.

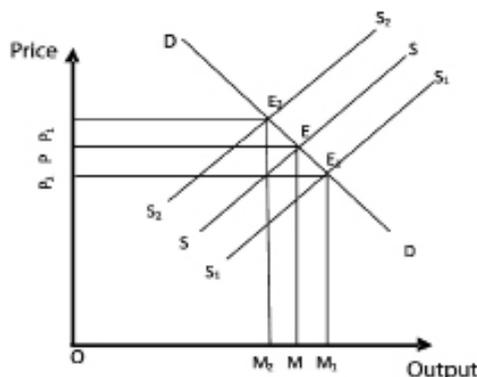


In the diagram DD is the demand curve SS is the supply curve. In the diagram we find supply remains constant. SS is the supply curve. Demand has increased from DD to D<sub>1</sub>D<sub>1</sub>. This increased demand curve and supply curve both are equal at point E<sub>1</sub>. The equilibrium point has changed from E to E<sub>1</sub>. Therefore the price and output have changed OP to OP<sub>1</sub> and from OM to OM<sub>1</sub> respectively. When the demand decreases from DD to D<sub>2</sub>D<sub>2</sub> then supply curve and decreased demand curve both are equal at point E<sub>2</sub>. Therefore the price has decreased from OP to OP<sub>2</sub> and the output also decreased from OM to OM<sub>2</sub>

**Price determination when demand remains constant and supply changes:**

If demand is constant, the equilibrium price rise if supply decreases and if supply increases the equilibrium price will fall. This can be explained with the help of diagram.

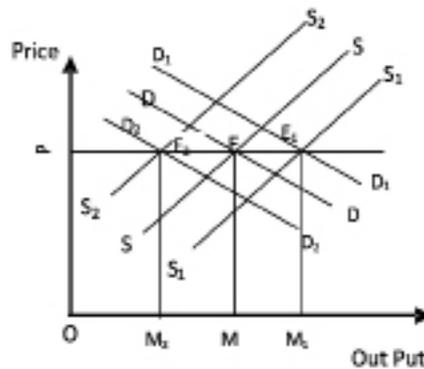
In the diagram DD is the demand curve SS is the supply curve.



In the diagram when the supply increased from  $SS$  to  $S_1S_1$  then the demand curve and increased supply curve both intersect at point  $E_1$ . So the output has increased from  $OP$  to  $OP_1$ . If the supply reduces from  $SS$  to  $S_2S_2$  then the decreased supply curve and the demand curve both are equal point  $E_2$ . So the output is decreased from  $OM$  to  $OM_2$  and the price has increased from  $OP$  to  $OP_2$ .

#### Price determination when both demand and supply are changed:

Under perfect competition if the demand and supply both are changing in the same direction and in the same rate, then the price may not change. This can be shown in the diagram.



In the diagram on X-axis the output and on Y-axis the price are determined.  $DD$  is the demand curve and  $SS$  is the supply curve. The demand and supply are equal at point  $E$  and at the point the price is  $OP$  and output is  $OM$ . Suppose the demand and supply both have increased from  $DD$  to  $D_1D_1$  and  $SS$  to  $S_1S_1$  respectively. Now both are equal at point  $E_1$  and at that point the price remains constant. In the same way if demand and supply both have decreased from  $DD$  to  $D_2D_2$  and from  $SS$  to  $S_2S_2$  respectively.

#### PRICE DETERMINATION UNDER MONOPOLY:

Mono means "single" and poly means "seller". Therefore monopoly means single seller. In economics, monopoly is said to exist when a firm is the single producer or seller of a product where there are no close substitutes for it. According to M.C. Connel, "Pure or absolute Monopoly exists when a single firm is the sole producer of a product for which there are no close substitutes".

##### Features:

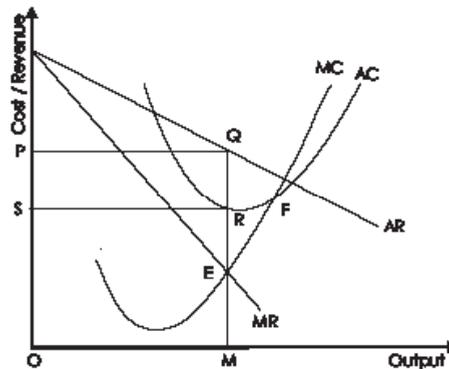
1. **Single producer:** Under monopoly there is only one producer or seller. He controls the entire supply of the commodities. Monopoly may be an individual or a partnership or a joint stock company or a state. There is no competition in monopoly market.
2. **No close substitutes:** there are "no close substitutes" in monopoly market. There are no other firms produce the similar and nearer commodities for the product of monopoly.
3. **No difference between Firm and Industry:** Under Monopoly market there is "no difference between firm and industry". There is only one firm and other firms should not produce the similar products which are produced by the monopoly firm. Therefore the firm and industry both are same under monopoly market.
4. **No free entry:** The monopoly firm can get abnormal profits in the short run as well as in the long run because of strong restrictions on the entry of new firms. If the new firms have freedom to enter the market then the abnormal profits will disappear but in monopoly there is no free entry and therefore the Monopoly firm may get abnormal profits in long run also.
5. **Monopolist controls only price (or) output:** Under monopoly the producer has controlling power on only price or output. He has no controlling power on both price and output simultaneously.
6. **Revenue curve falls down from left to right:** In monopoly market the revenue curves are falling down from left to right. If the monopolist wants to sell more he must reduce the price level and if he wants to fix more price he must reduce the output.

**PRICE AND OUTPUT DETERMINATION:**

The following conditions are essential for the determination of price and output under Monopoly.

1. The main aim of the Monopolist is to get the maximum profits. He must produce the goods to that extent where MC becomes equal to MR. At that level he will get the equilibrium position and maximum profits.
2. If the monopolist increases the supply of commodities then the average revenue and marginal revenue curves fall down from left to right. If he wants to sell more output he must reduce the price level and therefore the revenue curves are falling with the increase of output.
3. Under monopoly the AR is equal to the price, so AR is the demand line.
4. Under monopoly the MR falls more rapidly than the AR
5. The monopoly on AR line which is more than MR and AC. The differences between AC and AR are the amount of abnormal profits.

**Diagrammatic Explanation:** We can explain the price and output determination under monopoly with the help of following diagram.



In the diagram on X-axis the output and on Y-axis the costs, Revenue and price are taken. In this diagram MC is the marginal cost curve and AC is the Average cost curve. AR and MR are Average revenue and marginal revenue curves respectively. Under monopoly the output is determined at that point where MC = MR. In the diagram both MC and MR are equal at point E. So the output is determined on AR line. In this diagram the price is OP or OM. The difference between AR and AC is the amount of abnormal profit for one unit. Therefore OR is the unit profit. If we deduct the total cost from the total revenue, we can get the total profit. So  $OPQM - OSRM = PQRS = \text{Profit}$ .

In the above manner the Monopolist gets maximum profits at OP price level and at OM level of output. Beyond or below OM level of output will reduce the amount of profit.

**PRICE DETERMINATION WHEN COSTS ARE INCREASING, COSNTANT AND DIMINISHING**

There is a difference between perfect competition and Monopoly. In perfect competition at equilibrium point, the cost curves are at increasing stage, but in Monopoly the cost curves may increase or constant or decrease at equilibrium level. These things can be explained with the help of following diagrams.

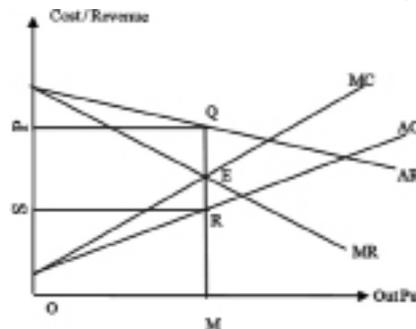
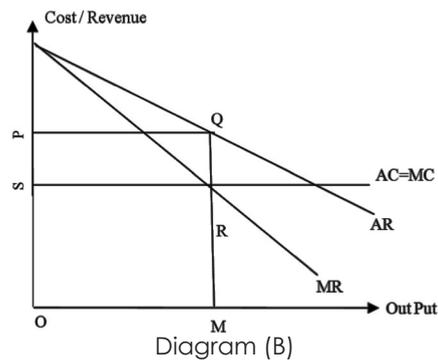
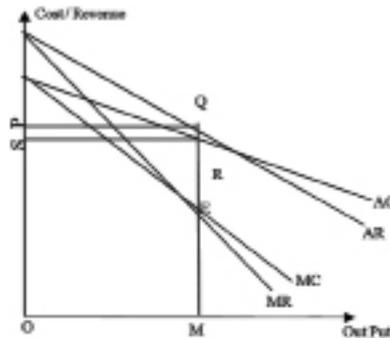


Diagram (A)

In the diagram (A) the cost curves are increasing MC and MR are equal at point E therefore OPQM is the total revenue and OSRM is the total cost. So PQRS is the total amount of profit.



In the diagram (B) the MC and MR equal at point R and the total profit is PQRS. In this diagram MC is constant and therefore it is parallel to X-axis.



In the diagram (C) the cost curves are falling MC curve cuts the MR curve at point E. Therefore the point E is an equilibrium point. OPQM is the total revenue and OSRM is the total cost. Therefore PQRS is the total amount of profit.

**Monopoly price and elasticity of demand:** The concept of elasticity of demand is more useful in price determination under Monopoly. The main motive of the Monopolist is to get maximum profits. In order to get maximum profits the Monopolist fixes more price in the case of those goods in which there is in elastic demand and less price in the case of those goods in which the demand is elastic one. Therefore monopolist generally fixes the price on the basis of elasticity of demand.

**EQUILIBRIUM OF THE FIRM AND INDUSTRY UNDER PERFECT COMPETITION:**

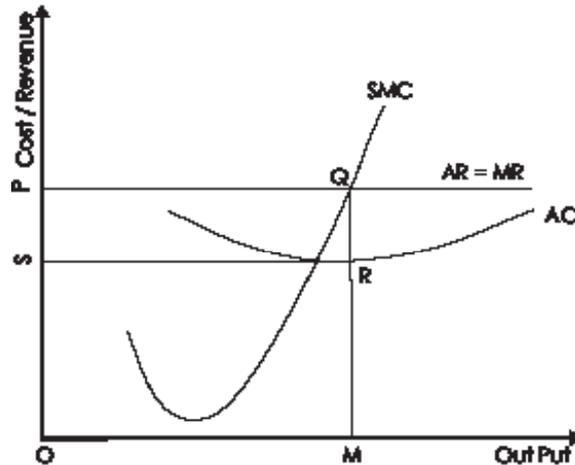
On the basis of competition the markets can be classified into perfect competition and imperfect competition. According to Left Witch, “perfect competition is a market in which there are many firms selling identical products with no firm is large enough relative to the entire market to be able to influence the market price”.

According to Mrs. Joan Robinson, “perfect competition prevails when the demand for the output of the each producer is perfectly elastic”.

In perfect competition there are large number of buyers and sellers and homogeneous products. In this competition there is a free entry and exit and also perfect market information. The inputs can be freely mobilized. There is a uniform price level. In this competition the transport costs should not be included in the price level.

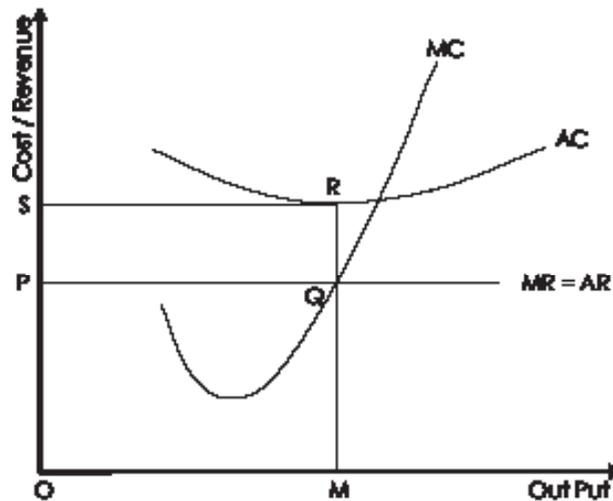
There is difference between firm and industry under perfect competition. Firm is a production unit and where as industry is a group of firms. Equilibrium is a balancing position or resting point.

A firm can get an equilibrium position where it has no desire to increase or decrease its output. At that condition if the firm increase or decrease its output then it will get lesser profits. A consumer is in equilibrium position where he attains maximum satisfaction. The producer gets an equilibrium position if he gets maximum production with the available resources.



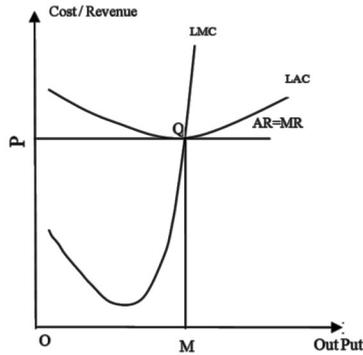
In the above diagram on X-axis the output and on Y-axis Cost, Revenue and price are determined. Under perfect competition the average and marginal revenue curves are equal and parallel to X-axis due to uniform price level. In this diagram SMC curve is equal to MR curve at point Q. So at that point the output is determined as OM and the price as OP. The firm is in equilibrium position at point Q when the SMC curve is at rising stage. In this diagram OPQM is the total revenue and OSRM is the total cost. If we deduct the total cost from the total revenue then we get the total profit. Therefore  $OPQM - OSRM = PQRS$  (profit).

**Equilibrium of the firm under perfect competition:** In the short period the firm can get abnormal profits or losses. The following diagram explains how the firm can get abnormal profits and reaches the equilibrium position.



In the diagram on X-axis output and on Y-axis costs, revenue and price are shown. At point Q. SMC and MR are equal and therefore Q is an equilibrium point. At this equilibrium point SAC is more than AR. In this diagram the output is determined as OM and the price as OP. OPQM is the total revenue and OSRM is the total cost. Here the total cost is more than the total revenue. So the firms incur the losses PQRS are the losses.

**Long Run Equilibrium:** In the long run the firm does not get abnormal profits or losses because of free entry and exit under perfect competition. In the long run both AC and AR become equal and therefore the firm gets only normal profits. This can be explained with the help of following diagram.

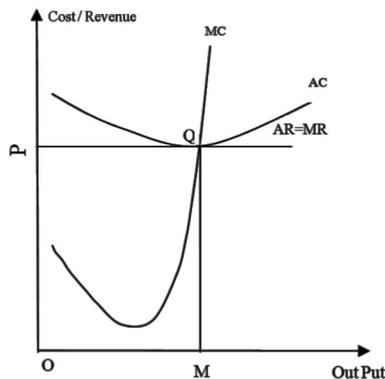


In the diagram on X-axis output and on Y-axis costs, revenue and price are determined. At equilibrium point i.e. at Q, LAC and AR both are equal. OPQM is the total revenue and also total cost. Therefore the firm is getting normal profits in the long run.

**Equilibrium of the industry under perfect competition:** In order to obtain the equilibrium position of the industry under perfect competition the following conditions are essential.

1. The industry gets an equilibrium position where  $MC=MR$ .
2. All firms in the industry get only normal profits.
3. At equilibrium point the MC, AC, MR and AR are equal.
4. Number of the firms is constant.
5. Possible only in long period.

**Diagrammatic Explanation:** In the case of the firm there are some possibilities of getting abnormal profits or losses in the short period. But in the case of industry as a whole there is no possibility of getting abnormal profits. The industry gets only normal profits. This can be explained with the help of following diagram.



In the diagram on X-axis the output and on Y-axis costs, revenues and price are shown. The MC and MR become equal at point Q. At that point the MC, MR, AC and AR are equal. The output is determined as OM and the price as OP. OPQM is the total revenue and also total cost. So there are no abnormal profits. The industry is getting only normal profits.



### PRICE DISCRIMINATION UNDER MONOPOLY:

Price discrimination means the practice of selling the same commodities at different prices to different buyers. Mrs. Joan Robinson has defined the price discrimination as, "The act of selling the same article produced under single control at different prices to different buyers". This price discrimination is possible only under monopoly.

#### Kinds of Price Discrimination:

1. **Personal discrimination:** In this case the Monopolist will charge different prices from different customers on the basis of the ability to pay. For example a doctor may charge more fee from a rich patient and less fee from a poor patient for the same services rendered.
2. **Place (or) Local Discrimination:** In this discrimination different prices are charged from different places. The monopolist charges lower price at one place and higher price at another place. Dumping is the best example for local discrimination. In this case the monopolist sells his output with lower price in the foreign market and with higher price in the domestic market.
3. **Trade (or) Use discrimination:** In this the monopolist will charge different prices for different types of uses of the same commodity. For example electricity will be sold at cheaper rate for agricultural purpose and higher price for industrial purpose.

**Conditions for Price discriminations:** The price discrimination is possible if the following conditions are satisfied:

1. **More than one Market:** There must be two or more than two separate markets otherwise the price discrimination is not possible. Different markets must be essential for charging different prices from different persons.
2. **Different elasticity:** The elasticity of demand in each market must be different. It means that if one market is less elastic than the other it should be elastic. If the elasticity of demand is equal in all markets there will be no scope for price discrimination.

**Price and output determination under discriminating monopoly:** The main aim of the price discrimination under monopoly is to get maximum profits. The following conditions are essential for getting of maximum profits.

1. The monopolist must fix more price in the case of inelastic demand and lower price in the case of elastic demand.
2. All the marginal revenues in different market must be equal to marginal cost.

#### Degrees of Price Discrimination:

Prof. A.C.Pigou has distinguished the degrees of price discrimination into 3 on the basis of the degree or extent of price discrimination.

Under the first type of price discrimination the monopolist will not allow any consumer surplus to the consumers. This type of price discrimination is called perfect price discrimination.

Second degree of price discrimination occurs where the monopolist is able to get a part of consumer surplus but not entire consumer surplus.

In this third degree of price discrimination the monopolist divide the customer into two or more classes or groups or market and are divided on the basis of elasticity of demand. This type of discrimination is the most common one.

#### Importance:

1. There are certain services such as Railways etc., which cannot be provided profitably unless the price discrimination is allowed to take place: uniform price for such services will lead to low incomes or losses to the entrepreneur.
2. If the welfare of the country is required in certain cases the price discrimination is desirable. For example if the doctor charges more fee from rich and less fee from poor, then the public welfare will be increased.



3. With help of price discrimination the government can reduce the inequalities of income and wealth to some extent.
4. If the monopolist fixes higher price in the case of inelastic demand goods and lower price for the elastic demand goods and then the demand and production will not be effected badly.

#### **DIFFERENCE BETWEEN PERFECT COMPETITION AND MONOPOLY:**

Perfect competition and monopoly are the two extreme concepts. There are some difference between perfect competition and monopoly. Perfect competition is that one where there are large number of sellers who are producing similar products and where the activity of single seller or buyer may not influence the entire market price. Monopoly is said to be existed when one firm is the sole producer of the product where there are no close substitutes to it.

In perfect competition there are large number of buyers and sellers and also homogeneous products in this competition. There is free entry and exit and also have perfect market information. These factors of production can be freely mobilized. There is a uniform price level. In this competition the transport cost should be included in the price level. There is difference between firm and industry under perfect competition.

In monopoly market there is only single producer and there are no close substitute products. In monopoly there is no difference between firm and industry. The new firm has no right to enter the market. The monopolist has the controlling power either the price or output. Therefore the revenue curves fall down from left to right, if the production is increased.

#### **Differences:**

The following are some of the differences between perfect competition and monopoly.

1. In perfect competition there is large number of buyers and sellers who are producing homogeneous products therefore the activity of single seller may not influence the market price but in monopoly there is single seller. He controls the entire supply of the commodities. In this there is no competition.
2. In perfect competition the revenue curves are parallel to X-axis and where as in monopoly the revenue curves are falling down from left to right. We can know the nature of revenue curves with the help of following diagrams.
3. In perfect competition because of uniform price level the average revenue and marginal revenue are equal and they are parallel to X-axis but in monopoly the average cost and the marginal revenue curves fall down from left to right. If the monopolist wants to sell more he must reduce the price level and if he wants to fix more price he must reduce the output.
4. Under perfect competition the price is determined at that point where the demand and supply both are equal. In this competition both price and output are determined at equilibrium point. But in monopoly only the output is determined that level where  $MC=MR$ .
5. In perfect competition there is a free entry & exit. The new firms may enter the market when the existing firms are getting abnormal profits and leave the market when they are getting losses. But in monopoly the other firms have no freedom to enter the market.

In perfect competition the firm gets an equilibrium position where the marginal cost is at raising stage, if the marginal cost curve fall down there is no possibility of equilibrium between MC and MR. In monopoly market the firm may get an equilibrium position where the MC curve is at raising stage, constant or at falling stage.

6. In perfect competition there is a difference between firm and Industry. Firm is a production unit and where as industry is a group of firms. But under monopoly market, there is no difference between the firm and Industry and both is same.
7. In the short period under perfect competition the firm may get abnormal profits. But in the long run normal profits because of free entry, exit the firm. But in monopoly the firm may get abnormal profits in short period and in long period the firm may get normal profits, because of no free entry.



8. The average cost becomes minimum at equilibrium point under perfect competition. In the case of monopoly AC curve is falling at equilibrium point i.e., point R.
9. In perfect competition the output is more when the price is less and where as in monopoly the output is less and price is more.
10. In perfect competition there is no price discrimination. Fixing of different prices to different customers for the same article is said to be price discrimination. The price discrimination is not possible under perfect competition. But in monopoly market there is a possible for price discrimination. Monopolist can fix different prices to different customers for the same commodities.

### MONOPOLISTIC COMPETITION (IMPERFECT COMPETITION)

Prof. E.H Chamberline of Harvard University is the founder and the builder of Monopolist competition. It is also sometimes referred as group equilibrium. According to Joe. S.Bain, "Monopolistic competition is found in the industry where there is a large number of small seller selling differentiated but close substitute products".

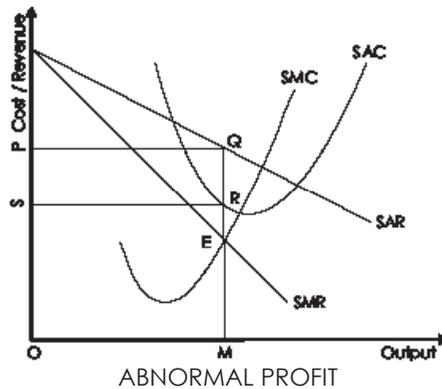
Monopolistic competition is the midway of perfect competition and monopoly. There are some elements of competition and monopoly in this monopolistic competition.

#### Features:

1. **Existence of large number of firms:** In monopolist competition there are large number of firms in the market. The output of each firm is very much less in the total output. Because of large number of firms each firm acts independently without bothering about the reaction of rivals.
2. **Product differentiation:** Product differentiation is another feature of monopolistic competition. Under this monopolist competition products are not homogeneous like in perfect competition and they are not remote substitutes as in monopoly. These products may be close substitutes. For example Colgate tooth paste, close-up etc., product differentiation can be brought about in several ways. The firms may bring about product differentiation by offering supplementary services to the customers or by differentiation the quality of the goods or through advertisements.
3. **Free entry and Exit:** There is a free entry and exit of the firms in monopolistic competition. The new firms may enter the market or the existence firms may leave the market.
4. **Excess capacity:** Under monopolistic competition the firms produce the goods upto that level where the average cost is at falling stage. The firms do not produce the output upto that level where the long run average cost is at minimum level. In monopolist competition the amount of output that is produced by the firm is less than the ideal output. This is called excess capacity.
5. **Selling costs:** The costs on advertisements are commonly called selling costs. According to E.H.Chamberlin selling cost is that cost which shifts the demand curve towards right side. Therefore the selling costs are useful for the increase of demand. The producer spends on selling costs upto that situation where the additional revenue becomes zero. Through publicity and propaganda the firm will popularize the quality of the products. With the help of advertisements the firms may change the tastes of the customers. In a real sense the selling costs will not promote the welfare of the customers.

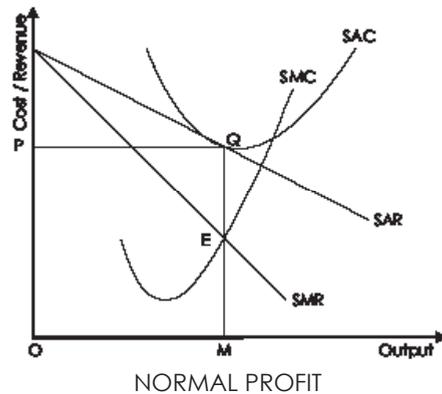
#### Short run equilibrium of the firm under monopolistic competition

With regard to abnormal profits short run equilibrium of the firm under monopolistic competition is similar to that of a monopoly firm. In order to maximize its profits and for attainment of equilibrium position, the firm must produce the goods upto that level where the marginal cost will become equal to marginal revenue. This can be explained with the help of following diagram.

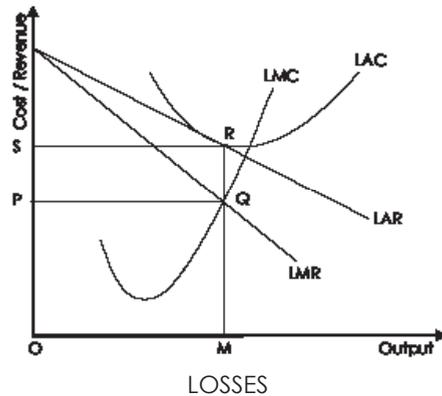


In this diagram SAR is the short run average revenue curve and also demand line. SMR is the short run marginal revenue curve. SAC is the short run average cost curve and SMC is the short run marginal cost curve, SMC & SMR are equal at point E. Therefore the equilibrium level of output is OM and the price is OP. OPQM is the total revenue and OSRM is the total cost. Therefore QR is the amount of abnormal profit per one unit. PQRS is the total amount of profit.

In the short period it is possible that some firms may get abnormal profits like in the above manner and some other firms may get normal profits or losses like in the following manner:



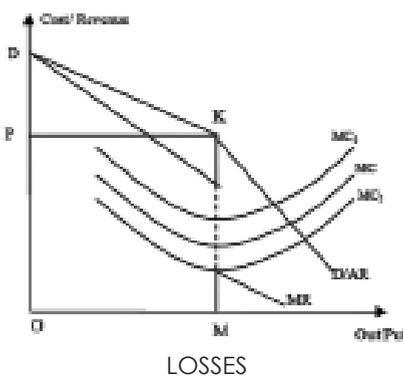
In this diagram, the firm is getting only normal profits which are included in the cost of production. The equilibrium output is OM. At OM output level the price is OP which is also equal to average cost. In the diagram OPQM is the total revenue and total cost. So, the firm is getting only normal profits.



In this diagram, the firm is getting losses. In this diagram at OM output level the price is OP but the unit cost that is average cost is OS. Therefore the firm is getting PS or QR amount of loss. OPQM is the total revenue and OSRM is the total cost. So PQRS is the total amount of loss.

### Long Run Equilibrium:

Under monopolistic competition there is a free entry & exit. If the existing firms are getting profits then the new firms may enter the market and if the firms are getting losses then the firms have freedom to leave the market. Therefore in the long run the firms get only normal profits. We can know these things with the help of following diagram.



In this diagram LAC is the long run average cost curve and LMC is the long run marginal cost curve and LMR is the long run marginal revenue curve. The LMC and LMR are equal at point E. So the output is determined as OM and the price is OP. In the diagram average cost is equal to average revenue. So the firm is getting only normal profits in the long run. These normal profits are included in the cost of production.

### Difference between perfect competition and Monopolistic competition:

Under perfect competition especially in the long period the firm gets an equilibrium position at that level that the AC is minimum and where as in Monopolistic competition the firm gets an equilibrium position at point Q where the LAC curve is at falling stage. Therefore in monopolistic competition there is an excess capacity.

### PRICE DETERMINATION UNDER OLIGOPOLY:

The term oligopoly is derived from two Greek words Oligos means "a few" and pollein which means "to sell". Therefore oligopoly refers to that form of imperfect competition where there will be few sellers are producing either homogeneous products or products which are close substitutes. Oligopoly may also be referred as "Competition among the few".

#### Features:

1. **Interdependence:** In Oligopoly market there is an element of interdependence of the firms. The price and output decisions of one firm will affect the other firms.
2. **Indeterminate demand curve:** No firm in oligopoly can forecast with fair degree of certainty about the nature and position of its demand curve. The firm cannot make an estimation of sales of its products if it reduces its price.
3. **Element of Monopoly:** In oligopoly market where there are only few firms monopoly element may be prevailed in the market. Each firm controls a large share of the market.
4. **Importance of selling costs:** Indeterminate demand leads to making of advertisements to make the average revenue more favourable.
5. **Price rigidity:** The price will be kept unchanged due to fear of realization and the price will tend to inflexible. The reasons for price rigidity are:
  - a) The firms know the ultimate outcome of price change.
  - b) Revised prices further lead to irritation among the consumers.
  - c) To discourage any new firm entering in the field of production.

**PRICE DETERMINATION UNDER OLIGOPOLY:**

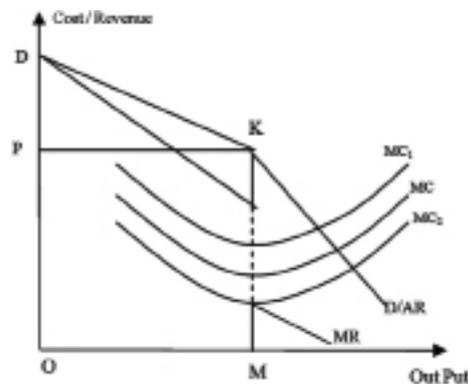
Price can be determined in three ways under oligopoly:

1. Independent pricing; 2. Pricing under collusion; 3. Price Leadership

1. **Independent pricing:** If there is a product differentiation under oligopoly each firm can act as a monopoly and fixes the price independently. Therefore the firm may determine its price in that way where it gets maximum profits. If there is no product differentiation, it is difficult to know the price determination in accurate manner the firm may compete each other and finally they may fix the common reasonable price which cannot be changed. But this policy independent pricing cannot with stand in the market.
2. **Pricing Under collusion:** Most of the firms have the opinion that independent price determination leads to uncertainly. To avoid this defect there is a tendency among the oligopoly firm to act collectively by collusion. In this method these firms may make 'cartle' arrangement. The centralized cartle determines the output produce by different firms and the price is also determined which is the most acceptable by all firms. The firms may agree to share the market even though they are producing homogeneous products.
3. **Price leadership:** If the other firms follow the price which is determined by one firm in oligopoly then we can say that there is a dominant firm or the firm with low costs or well established old firm may take this leadership and fixes the price.

**Diagrammatic Explanation:** The price & output determination under oligopoly can be explained with the help of following diagram:

The popular method with regard to price and output determination is the method of kinked demand curve.



In this diagram on X-axis the output and on Y-axis costs, Revenue and Price are determined. The demand curve  $DD_1$  has a kink at point K. It is the average revenue curve. The point K divides the demand curve into two parts. DK part of demand curve is elastic one and where as  $KD_1$  part of the demand curve is less elastic.

There is price rigidity at point K because of several reasons. If the particular firm rises its prices the other firms do not follow. Therefore the demand for the particular products will be reduced; on the other hand if the particular firm reduces their prices, other firms follow the price. Therefore no firm has to desire to increase or decrease the price level. So there is price rigidity in oligopoly market. The marginal cost becomes equal to marginal revenue at point E. Therefore the output is determined as OM and the price as OP.

**PRICE DETERMINATION UNDER DUOPOLY:**

As early as in 1838, a French economist Cournot analyzed a special case of competitive business behaviour with only two firms in an industry. The assumptions are quite strict but considering the time at which this formulation was developed, they cannot be faulted with too much. It is assumed that each member in this two – firm industry produces a homogeneous product, treats the rivals output as given and maximizes profit. We shall illustrate the equilibrium price-volume combination for each firm by taking simple example. The rival firm's output behaviour with respect to one firm's output is called conjectural variation. Cournot assumed a zero conjectural variation.

**Assumptions:**

1. There are two firms, each owning an artesian mineral water well.
2. Both the firms operate their wells at zero marginal cost
3. Both of them face an demand curve with constant negative slope.
4. Each seller acts on the assumption that his competitor will not reach to his decision to change his output and price.

Suppose, the total industry demand function was:

$$P = 100 - 0.5Q$$

Since the entire output is shared by just two firms, this can well be written as

$$P = 100 - 0.5(Q_1 + Q_2)$$

Firm number 1 for example has a constant cost function represented by

$$C_1 = 5Q_1$$

Firm number II is having an increasing cost function  $C_2 = 0.5 Q_2^2$

Firm I's Profit = Total Revenue – Total costs

$$= PQ_1 - 5Q_1$$

$$= [100 - 0.5(Q_1 + Q_2)] Q_1 - 5Q_1$$

$$= 95 Q_1 - 0.5 Q_1 Q_2 - 0.5 Q_1^2$$

The solution of duopoly equilibrium crucially depends on the nature of the reaction function of each duopolist. The equilibrium is reached when the values of  $Q_1$  and  $Q_2$  are such that each firm maximizes its profit, given the output of the other and neither desire to alter the respective output. However, for a common solution, both the firms must achieve maximum profits and at the same time have no incentive for changing respective output levels. Such a solution is obtained at the intersection point of the two linear reaction functions.

'Duopoly' means two sellers. There are different kinds of 'Duopoly'.

1. Cournot's Solution
2. Edgeworth Model
3. Chamberlin's Model

**1. Cournot's Solution:**

A.A. Cournot, a French economist was found solution to duopoly pricing in 1838. His model is based on the following assumptions:

1. Total output must be sold out.
2. The two sellers produce and sell a homogeneous product.
3. The number of buyers is large.
4. Each seller knows the demand curve for his product
5. The cost of production is assumed to be zero
6. Each rival's plans of output.
7. Each supplier takes the supply of his rival to be constant.
8. Each accepts the market demand for his product.
9. Each seller aims at maximum revenue Cournot assumed that there are two firms each owning a mineral well, and operating with zero costs. They sell output in a market with a straight – line demand curve. Each firm acts on the assumption that its competition will not change its output, and decides its own output so as to maximize profit.

Based on these assumptions, Cournot's model tells us that each will be supplying exactly equal quantities of the product and the price charged will be same.

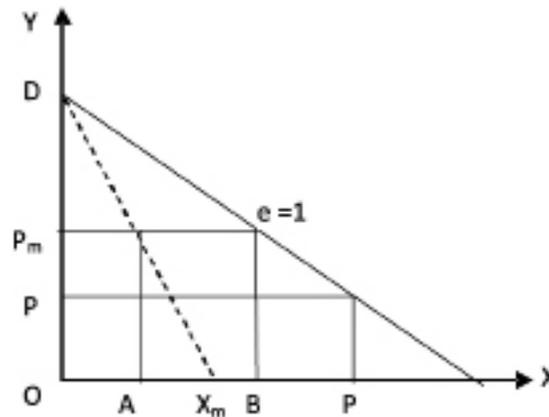
### 1. Edgeworth's model duopoly pricing:

Edgeworth based his model on the same assumptions of Cournot except that each seller takes his rival's supply constant. Instead Edgeworth assumes that each seller takes the price of his rival constant. According to Edgeworth, there will not be any price stability under duopoly. The price continually varies between competitive and monopolistic levels. According to him, duopoly situation is indeterminate and unstable equilibrium.

### 2. Chamberlin's Model:

Chamberlin's contribution to the theory of oligopoly consists in his suggestion that a stable equilibrium can be reached with the monopoly price being changed by all firms, if firms recognize their interdependence and act so as to maximize the industry profit.

Chamberlin rejects the assumption of independent action by competitors. He recognizes the mutual dependence of the two sellers and put forth a stable equilibrium model. His situation is based on the assumption that each seller is intelligent enough to understand the importance of mutual agreement between the two and that sharing monopoly profits is to the best advantage of both.



1. Firm 'A' – Maximizing output 'OX<sub>m</sub>' and sell it at the monopoly price 'P<sub>m</sub>'.
2. Firm 'B' is having 'Quantity' – 'X<sub>m</sub>B' at which B's MR = MC = 0
3. Total industry output is OB.
4. 'DD' is demand curve.
5. 'e' – equilibrium price.

Under Chamberlin model the market demand is a straight line with negative slope, and production is assumed costless for simplicity.



### TECHNIQUES AND APPLICATIONS OF ECONOMICS

In all this, economics for managerial decision making, we have discussed demand, elasticity of demand, price determination under various markets etc. Further we have also discussed total cost, average cost, marginal cost, marginal revenue etc. Profit maximization, revenue maximization and cost minimization can be made using the following economic techniques, which are useful in taking several managerial decisions.

Problems are worked out and given as illustrations in the following pages relating to all the above concepts for better understanding. Before those illustrations are worked out, the following terminology should be understood by anybody to go further.

- 1) Total Cost (TC) = Fixed Cost (FC) + Variable Cost (VC)

Variable Cost is directly proportional to the number of units produced.

$$\therefore \text{Total Cost} = F + kx = C \text{ (Say)}$$

Where F is the fixed cost and k the constant of proportionality

Total Cost (c) is expressed as a function of output (x) produced i.e.  $c = f(x)$  or  $c = f(q)$  or  $f(u)$ .

Total cost (c) =  $f(x) + k$  [k is constant]

- 2) Average Cost (AC) =  $\frac{\text{Total Cost}}{\text{Total number of units produced (Quantity)}} = \frac{c}{x} = \frac{f(x) + k}{x}$

Average Variable Cost (AVC) =  $\frac{f(x)}{x}$  as 'k' is fixed cost.

Average fixed cost (AFC) =  $\frac{k}{x}$

- 3) Marginal Cost (MC) =  $\frac{dc}{dx}$  = Differential Coefficient of total cost w.r.t quantity

Marginal cost =  $\frac{dc}{dx} = f'(x)$  because k's derivative is 0

#### CASE:

- (i) When average cost goes upward,  $\frac{d}{dx}\left(\frac{c}{x}\right) > 0$ , i.e.  $MC > AC$ .

- (ii) When the average cost curve reaches a minimum point i.e. constant  $\frac{d}{dx}\left(\frac{c}{x}\right)$   
i.e.  $MC = AC$ .

- (iii) When AC is falling downwards  $\frac{d}{dx}\left(\frac{c}{x}\right) < 0$ , i.e.  $MC < AC$ .

**Prove that the Slope of Average Cost Curve is  $\frac{1}{x}(MC - AC)$**

#### Proof:

Let cost be 'C' and units be 'x'.

Then Average cost (say, y) =  $\frac{C}{x}$

To find out the slope, the average cost should be differentiated w.r.to. 'x'.

$$\frac{dy}{dx} = \frac{x \times \frac{dc}{dx} - c \times \frac{dx}{dx}}{x^2}$$

$$= \frac{x \times \frac{dc}{dx} - c}{x^2}$$

$$= \frac{1}{x} \times \frac{dc}{dx} - \frac{1}{x} \times \frac{c}{x}$$



$$= \frac{1}{x} \left( \frac{dc}{dx} - \frac{c}{x} \right)$$

$$= \frac{1}{x} (MC - AC)$$

4) Total Revenue (TR) = Quantity sold selling price per unit of the commodity =  $R = px$  where  $p$  is the price per unit and  $x$  the number of units sold.

5) Average Revenue (AR) =  $\frac{\text{Total Revenue}}{\text{Quantity Sold}}$

6) Marginal Revenue (MR) = Differential Coefficient of total Revenue w.r.t quantity =  $\frac{dR}{dx}$

7) Profit (P) = Total Revenue (TR) – Total cost (TC)

8) For maximum Profit: Marginal Revenue (MR) = Marginal Cost (MC)

$$\text{Profit} = R - C$$

Marginal profit is the first derivative of profit function.

i.e. where  $p$  = profit and  $x$  = quantity and marginal profit =  $\frac{dR}{dx}$

9) Price Elasticity of Demand.

Price Elasticity of demand is the degree of responsiveness of the demand for a commodity to a change in its price.

$$\text{Price elasticity of demand} = \frac{\frac{\text{Change in quantity demanded}}{\text{Quantity demanded at original price}}}{\frac{\text{Change in price}}{\text{Original price}}} = \frac{\frac{dx}{x}}{\frac{dp}{p}} = \frac{dx}{x} \div \frac{dp}{p} = 1$$

Where  $x$  is the quantity demanded at original price and  $p$  is the original price per unit.

It may further be noted that if the price increases, quantity demanded will decrease i.e., Corresponding to any change in price, quantity demanded changes in the opposite direction i.e.,  $\frac{dx}{dp}$  is always negative. But we take only numerical value and hence ignore the sign.

Price elasticity of demand is denoted by  $E_p = -\frac{dp}{p} \div \frac{dx}{x} = \frac{dx}{dp} \div \frac{x}{p}$  (numerically)

**Show that elasticity of demand =  $\frac{AR}{AR - MR}$ , where AR and MR are average and marginal revenue respectively at any output.**

**Proof:**

$$\text{Total Revenue, (say } R) = px, AR = \frac{R}{x} = \frac{px}{x} = p$$

$$MR = \frac{d}{dx} (R) = \frac{d}{dx} (px) = p + x \frac{dp}{dx}$$

$$\text{Now, } \frac{AR}{AR - MR} = \frac{p}{p - p - x \frac{dp}{dx}} = \frac{-p}{x \frac{dp}{dx}} = -\frac{p \frac{dx}{dp}}{x} = -\frac{\frac{dx}{dp}}{\frac{x}{p}} = -\frac{dx}{dp} \times \frac{p}{x} = |E_p| \text{ (proved)}$$

10) If marginal revenue function is given, total revenue function can be found out in the following manner. Here Total Revenue =  $R$  & Marginal Revenue =  $MR$

$$\text{We have } MR = \frac{dR}{dx}$$

$$\Rightarrow MR dx = dR$$

$$\Rightarrow dR = MR dx$$

integrating with respect to  $x$

$$\int dR = \int MR dx$$



$$\Rightarrow R = \int MR dx + k,$$

To find out total cost, when marginal cost is given

Here Total Cost = C, Marginal Cost = MC

$$MC = \frac{dc}{dx}$$

$$\Rightarrow dc = MC dx$$

Integrating with respect to x

$$\int dc = \int MC dx$$

$$\Rightarrow c = \int MC dx + k$$

### 11) Consumer's surplus

Let y = price; f(x) = demand

i.e. y = f(x)

where  $x_0$ ,  $p_0$  refers to actuals.

$$\therefore \text{Consumer's surplus} = \int_0^{x_0} f(x) dx - x_0 p_0$$

### 12) Producer's surplus

$$\text{Producer's surplus} = x_0 p_0 - \int_0^{x_0} f(x) dx$$

### 13) Cross demand

If  $x_1 = p_1$ ;  $x_2 = p_2$  be the two demand functions of the commodities A & B, then the following results would emerge.

(i) If  $\frac{\partial x_1}{\partial p_2}$  and  $\frac{\partial x_2}{\partial p_1}$  are  $< 0$ , then the commodities are complementary

(ii) If  $\frac{\partial x_1}{\partial p_2}$  and  $\frac{\partial x_2}{\partial p_1}$  are  $> 0$ , then the commodities are said to be substitutes or competitive.

(iii) If  $\frac{\partial x_1}{\partial p_2} > 0$  (or)  $< 0$   $\frac{\partial x_2}{\partial p_1} < 0$  or  $> 0$ , they are said to be unrelated that means no relationship can be established.

#### Illustration 1:

The cost (c) of a firm is given by the function  $c = 4x^3 + 9x^2 + 11x + 27$ . Find the Average Cost, Marginal Cost, Average Variable Cost, and Average Fixed Cost 'x' being the output.

#### Solution:

$$C = \text{Total Cost} = 4x^3 + 9x^2 + 11x + 27$$

$$\text{Average Cost} = 4x^2 + 9x + 11 + \frac{27}{x}$$

$$\text{Marginal Cost} = \frac{dc}{dx} = 12x^2 + 18x + 11$$

$$\text{Average Variable Cost} = 4x^2 + 9x + 11$$

$$\text{Average fixed Cost} = \frac{27}{x}$$

**Illustration 2:**

The Average Cost of a firm is given by the function Average Cost =  $x^3 + 12x^2 - 11x$ , find the Total Cost, Average Variable Cost & Marginal cost.

**Solution:**

$$\text{Average Cost} = x^3 + 12x^2 - 11x$$

$$\text{Total Cost (C)} = x^4 + 12x^3 - 11x^2$$

$$\text{Marginal Cost} = \frac{dc}{dx} = 4x^3 + 36x^2 - 22x$$

**Illustration 3:**

The cost function of a firm is given by  $c = x^3 - 4x^2 + 7x$ , find at what level of output Average Cost is minimum and what level will it be.

**Solution:**

$$\text{Total Cost} = x^3 - 4x^2 + 7x$$

$$\text{Average Cost} = x^2 - 4x + 7$$

In order that average cost is minimum  $\frac{dy}{dx} = 0$  and the value of  $\frac{d^2y}{dx^2}$

$$\text{i.e. } \frac{dy}{dx} = 2x - 4 = 0$$

$$\text{or, } x - 2 = 0$$

$$\therefore x = 2$$

$$\text{Again, } \frac{d^2y}{dx^2} = \frac{d}{dx} \left( \frac{dy}{dx} \right) = \frac{d}{dx} (2x - 4)$$

$$= \frac{d^2y}{dx^2} = 2 \text{ which is positive so the function will have minimum values.}$$

Minimum:

$$\text{Average Cost} = x^2 - 4x + 7$$

$$= 4 - (4 \times 2) + 7$$

$$= 11 - 8 = 3$$

**Illustration 4:**

The Average Cost function (AC) for a certain commodity is given by  $AC = 2x - 1 + \frac{50}{x}$  in terms of output  $x$ , find the output for which (i) Average cost is increasing (ii) Average cost is decreasing (iii) Find the total cost (iv) Marginal Cost.

**Solution:**

In order to a function is said to be increasing (or) decreasing its derivation must be zero.

$$\frac{dy}{dx} = 2 - 50x^{-2} = 0, \text{ Where } y = AC = 2x - 1 + 50/x.$$

$$\Rightarrow 2 - \frac{50}{x^2} = 0$$

$$\Rightarrow 2x^2 - 50 = 0$$

$$\Rightarrow x^2 - 25 = 0$$

$$\therefore x = \pm 5$$

When  $x > 5$  it is increasing

When  $x < 5$  it is decreasing

$$\text{Total Cost} = \left( 2x - 1 + \frac{50}{x} \right) x = 2x^2 - x + 50$$

$$\text{Marginal Cost} = \frac{dy}{dx} (2x^2 - x + 50) = 4x - 1$$

**Illustration 5:**

The Cost function of a particular firm  $c = \frac{1}{3}x^3 - 5x^2 + 75x + 10$ , find at which level, i) The Marginal Cost attains its minimum ii) What is the marginal cost of this level?

**Solution:**

$$c = \frac{1}{3}x^3 - 5x^2 + 75x + 10$$

$$\text{Marginal Cost} = \frac{dc}{dx}$$

$$= \frac{1}{3}(3x^2) - 5(2x) + 75$$

$$= x^2 - 10x + 75 \text{ (y say)}$$

In order that the MC to be at minimum its 2<sup>nd</sup> derivative value must be positive

$$\frac{dy}{dx} = 2x - 10 = 0$$

$$\text{or } 2x = 10$$

$$x = 5$$

$$\frac{d^2y}{dx^2} = 2, \text{ which is positive when } x = 5 \text{ MC is minimum}$$

$$\begin{aligned} \therefore \text{Minimum Marginal Cost} &= 5^2 - 10 \times 5 + 75 \\ &= 25 - 50 + 75 = 50 \end{aligned}$$

**Illustration 6:**

The cost function 'c' for the commodity 'q' is given by  $C = q^3 - 4q^2 + 6q$  find Average Variable Cost and also find the value of q for which average variable cost is minimum.

**Solution:**

$$C = q^3 - 4q^2 + 6q$$

$$\text{Average Variable Cost} = q^2 - 4q + 6 \text{ ('y' say)}$$

$$\Rightarrow \frac{d}{dq}(q^2 - 4q + 6) = 0$$

$$\Rightarrow 2q - 4 = 0$$

$$\therefore q = \frac{4}{2} = 2$$

$$\frac{d^2C}{dq^2} = 2 > 0, \text{ positive}$$

$\therefore$  Average Cost is minimum at  $q = 2$

**Illustration 7:**

The cost function 'c' of a firm =  $\frac{1}{3}x^3 - x^2 + 5x + 3$ , find the level at which the marginal cost and the average variable cost attain their respective minimum.

**Solution:**

$$C = \frac{1}{3}x^3 - x^2 + 5x + 3$$

$$\text{Marginal Cost} = \frac{dc}{dx} = \frac{1}{3} \cdot 3x^2 - 2x + 5$$

$$= x^2 - 2x + 5 \text{ ('y' say)}$$

$$\frac{dy}{dx} = 2x - 2 = 0$$

$$\therefore x = 1$$

$$\frac{d^2y}{dx^2} = 2, \text{ which is positive}$$

$\therefore$  Marginal cost is minimum value at  $x = 1$

$$\text{Average Variable Cost} = \frac{1}{3}x^2 - x + 5 \text{ (y say)}$$



$$\frac{d}{dx} \{\text{Average Variable Cost}\} = \frac{2}{3}x - 1 = 0$$

$$\Rightarrow \frac{2}{3}x = 1$$

$$\therefore x = \frac{3}{2}$$

$$\frac{d^2y}{dx^2} = \frac{2}{3}, \text{ positive}$$

$\therefore$  Average Variable Cost is minimum at output  $x = \frac{3}{2}$

**Illustration 8:**

Cost =  $300x - 10x^2 + \frac{1}{3}x^3$ , Calculate

- (i) Output at which Marginal Cost is minimum
- (ii) Output at which Average Cost is minimum
- (iii) Output at which Marginal Cost = Average Cost.

**Solution:**

(i) Cost =  $300x - 10x^2 + \frac{1}{3}x^3$   
Marginal Cost =  $\frac{dc}{dx} = 300 - 20x + x^2$  (say,  $y$ )

In order that MC is minimum first derivate must be equal to zero and 2<sup>nd</sup> derivate must be positive.

$$\therefore \frac{dy}{dx} = 2x - 20 \Rightarrow 2x = 20$$

$$x = 10$$

$$\frac{d^2y}{dx^2} = 2, \text{ which is positive. It is minimum at } x = 10.$$

(ii) Average Cost =  $300 - 10x + \frac{1}{3}x^2$  ( $y$  say)  
 $\frac{dy}{dx} = -10 + \frac{2}{3}x = 0$

$$\Rightarrow x = 30/2 = 15$$

$$\frac{d^2y}{dx^2} = \frac{2}{3} > 0,$$

$\therefore$  Average Cost is minimum of output at  $x = 15$

- (iii) Output at which Marginal Cost = Average Cost

$$300 - 20x + x^2 = 300 - 10x + \frac{1}{3}x^2$$

$$-20x + 10x + x^2 - \frac{1}{3}x^2 = 0$$

$$-10x + \frac{2}{3}x^2 = 0$$

$$\frac{-30x + 2x^2}{3} = 0$$

$$2x^2 - 30x = 0$$

$$2x(x - 15) = 0$$

$$x - 15 = 0$$

$$\therefore x = 15$$

**Illustration 9:**

Cost Function  $C = \frac{3}{5}x + \frac{15}{4}$ , find

- (i) Cost when output is 5 units
- (ii) Average Cost of 10 units
- (iii) Marginal cost.

**Solution:**

$$C = \frac{3}{5}x + \frac{15}{4}$$

i) Cost when output is 5 units

$$= \frac{3}{5} \times 5 + \frac{15}{4} = 3 + \frac{15}{4} = 6.75$$

ii) Average Cost of 10 units

$$\begin{aligned} \text{Average Cost} &= \frac{3}{5} + \frac{15}{4x} \\ &= \frac{3}{5} + \frac{15}{10 \times 4} = \frac{3}{5} + \frac{15}{40} \\ &= \frac{3}{5} + \frac{3}{8} = \frac{24+15}{40} = \frac{39}{40} = 0.975 \end{aligned}$$

iii) Marginal Cost

$$\begin{aligned} &= \frac{dc}{dx} \\ &= \frac{3}{5} = 0.6 \end{aligned}$$

**Illustration 10:**

The Revenue function of a firm given by  $R = (2200 - 3x)\frac{x}{2}$ , find the firm's marginal revenue function.

**Solution:**

$$R = (2200 - 3x)\frac{x}{2} = \frac{2200x}{2} - \frac{3}{2}x^2 = 1100x - \frac{3}{2}x^2$$

$$MR = \frac{dR}{dx} = 1100 - 3x$$

**Illustration 11:**

Given  $C = x^3 - 10x^2 + 9x$ ;  $R = 12x^2 + 11x - 4$ . Find the total profit and hence marginal profits.

**Solution:**

$$C = x^3 - 10x^2 + 9x$$

$$R = 12x^2 + 11x - 4$$

$$\text{Total Profit} = R - C = 12x^2 + 11x - 4 - x^3 + 10x^2 - 9x$$

$$= -x^3 + 22x^2 + 2x - 4$$

$$= -(x^3 - 22x^2 - 2x + 4) \text{ (Say P)}$$

$$\text{Marginal Profit } \frac{dp}{dx} = (3x^2 - 44x - 2)$$

**Illustration 12:**

A manufacturer can sell "x" items ( $x \geq 0$ ) at a price of  $(330 - x)$  each; the cost of producing 'x' items is  $\text{₹}x^2 + 10x + 12$ . How many items should he sell to make the maximum profit? Also determine the maximum profit.

**Solution:**

$$\text{Given price (P)} = 330 - x$$

$$\text{Cost (C)} = x^2 + 10x + 12$$

$$\text{Output} = x \geq 0$$

$$\text{Revenue (R)} = P_x = 330x - x^2$$

$$\begin{aligned} \text{Profit} = R - C &= 330x - x^2 - x^2 + 10x - 12 \\ &= 320x - 2x^2 - 12 \text{ (say y)} \end{aligned}$$

In order that maximum profit is attained



$$\frac{dy}{dx} = 0, \text{ and}$$

$$\frac{d^2y}{dx^2} = \text{Positive}$$

$$\frac{dy}{dx} = 320 - 4x = 0$$

$$\Rightarrow -4x = -320$$

$$x = 80$$

$$\frac{d^2y}{dx^2} = -4, \text{ which is negative.}$$

Therefore profit is maximum at  $x = 80$  units

$$\begin{aligned} \text{Maximum profit} &= 320(80) - 2(80)^2 - 12 \\ &= 12,788 \end{aligned}$$

**Illustration 13:**

The efficiency (E) of a small manufacturing concern depends on the number of workers (W) and is given by  $10E = \frac{-W^3}{40} + 30W - 392$ , find the strength of the worker, which give maximum efficiency.

**Solution:**

$$\text{Given } 10E = \frac{-W^3}{40} + 30W - 392$$

$$\text{Efficiency (E)} = \frac{-W^3}{400} + 3W - \frac{392}{10}$$

$$\frac{dE}{dW} = -\frac{1}{400} \times 3W^2 + 3 = 0$$

$$\Rightarrow 3W^2 = 1200$$

$$\Rightarrow W^2 = 400$$

$$\Rightarrow W = 20$$

$$\frac{d^2E}{dW^2} = -\frac{6W}{400}$$

$$\therefore \frac{d^2E}{dW^2} \text{ at } w = 20 = \frac{-6(20)}{400} = \frac{-6}{20} < 0$$

$\therefore$  Maximum efficiency at  $w = 20$ .

**Illustration 14:**

A firm assumes a cost function  $c(x) = x \left( \frac{x^2}{10} + 200 \right)$ ,  $x$  is a monthly output in thousands of units. Its revenue function is given by  $R(x) = \left( \frac{2200 - 3x}{2} \right)x$ . Find i) If the firm decides to produce 10,000 units per month, the firm's cost and Marginal cost. ii) If the firm decides to produce Marginal cost of 320, the level of output per month, and cost of the firm. iii) The marginal revenue function. iv) If a decision is taken to produce 10,000 units each month, the total revenue and marginal revenue of the firm. v) If the firm produces with a marginal revenue of 1040, the firm's monthly output and monthly revenue. vi) The firm's profit function and marginal profit function. vii) The output required per month to make the marginal profit = 0, and find the profit at this level of output. viii) Find the marginal revenue and the marginal cost at the output obtained in (vii) and comment upon the result.

**Solution:**

$$C = x \left( \frac{x^2}{10} + 200 \right) = \frac{x^3}{10} + 200x$$

$X = 1000$  units p.m.

$$R = \left( \frac{2200 - 3x}{2} \right)x = \frac{2200x - 3x^2}{2}$$

i) if firm's output = 10,000 units per month.

$$\text{Cost} = 10 \left( \frac{1000}{10} + 200 \right) = 2100$$



$$MC = \frac{dc}{dx} = \frac{3x^2}{10} + 200$$

$$\text{Marginal Cost (at } x = 10) = \frac{3(100)}{10} + 200 = 230$$

ii) i.e.,  $MC = 320$

$$\frac{3x^2}{10} + 200 = 320$$

$$3x^2 + 2000 = 3,200$$

$$3x^2 = 1200$$

$$x^2 = 400$$

$$\therefore \sqrt{400} = 20$$

$$\therefore \text{Total cost} = \frac{(20)^3}{10} + 200 \times 20 = 4,800$$

iii) Marginal Revenue

$$= MR = \frac{dR}{dx} = \frac{2200}{2} - \frac{6x}{2}$$

$$= 1100 - 3x$$

iv) Total revenue at  $x = 10$

$$\text{is } \frac{2200 \times 10 - 3(100)}{2} = \frac{22000 - 300}{2} = \frac{21700}{2}$$

$$= 10,850$$

$$\text{Marginal Revenue} = 1100 - 3 \times 10 = 1070$$

v) Given,  $MR = 1040$

$$\text{i.e. } 1100 - 3x = 1040$$

$$-3x = -60$$

$$x = 20$$

$$\text{Monthly Revenue} = \frac{2200 \times 20}{2} - \frac{3 \times 400}{2}$$

$$= 22000 - 600 = 21400$$

vi) Profit =  $R - C = \frac{2200x}{2} - \frac{3x^2}{2} - \frac{x^3}{10} - 200x$

$$\text{Profit } \frac{-x^3}{10} - \frac{3x^2}{2} + 900x \text{ (say } p)$$

$$\text{Marginal Profit} = \frac{dp}{dx} = \frac{-3x^2}{10} - \frac{6x}{2} + 900$$

vii)  $MP = 0$  (given)

$$\frac{-3x^2}{10} - 3x + 900 = 0$$

$$\Rightarrow -3x^2 - 30x + 9000 = 0$$

$$x^2 + 10x - 3000 = 0$$

$$x^2 + 60x - 50x - 3000 = 0$$

$$x(x + 60) - 50(x + 60) = 0$$

$$x(x - 50)(x + 60) = 0$$

$$\therefore x = 50 \text{ or } x = -60$$

$$\text{Profit} = R - C = \frac{2200x}{2} - \frac{3x^2}{2} - \frac{x^3}{10} - 200x$$

$$\text{Profit, at output } x = 50$$

$$= 28750$$



- viii) Marginal cost at  $x = 50$   
 $= \frac{3x^2}{2} + 200 = \frac{3(2500)}{10} + 200 = 950$   
Marginal Revenue = at  $x = 50$   
 $1100 - 3x = 1100 - 3 \times 50 = 950$   
Profit will be maximum at  $MC = MR$

**Illustration 15:**

A radio manufacturer produces 'x' sets per week at total cost of ₹  $x^2 + 78x + 2500$ . He is a monopolist and the demand function for his product is  $x = \frac{(600-P)}{8}$ , when the price is 'p' per set show that maximum net revenue is obtained when 29 sets are produced per week what is the monopoly price.

**Solution:**

$$\text{Cost (C)} = x^2 + 78x + 2500$$

$$\text{Demand (D)} X = (600 - P) / 8$$

$$8x = 600 - P$$

$$\therefore P = 600 - 8x$$

Total Revenue per 'x' sets

$$\text{Price } x \text{ i.e., } 600x - 8x^2$$

Maximum revenue is obtains at  $MC = MR$

$$\text{Marginal Cost} = \frac{dc}{dx} = 2x + 78 - \text{(i)}$$

$$\text{Marginal Revenue} = \frac{dr}{dx} = 600 - 16x - \text{(ii)}$$

Equation (i) & (ii)

$$2x + 78 = 600 - 16x$$

$$\text{or, } 18x = 522$$

$$\therefore x = \frac{522}{18} = 29$$

Monopoly price  $600 - 8x$

$$600 - 8 \times 29$$

$$= 600 - 232 = 368$$

**Illustration 16:**

The demand function for a particular commodity is  $y = 15 e^{-\frac{x}{5}}$ , where 'y' is the price per unit and 'x' is the no. of units demanded, determine the price and quantity for which revenue is maximum.

**Solution:**

$$\text{Demand function } y = 15 e^{-\frac{x}{5}}$$

$$\text{Total Revenue (TR)} = yx = 15e^{-\frac{x}{5}} \cdot x$$

$$= 15xe^{-\frac{x}{5}}$$

In order that Revenue is maximum  $\frac{dR}{dx} = 0$

$$\text{And } \frac{d^2R}{dx^2} = \text{negative}$$

$$R = 15xe^{-\frac{x}{5}}$$

$$\frac{dR}{dx} = 15 \left[ e^{-\frac{x}{5}} + xe^{-\frac{x}{5}} \left(-\frac{1}{5}\right) \right]$$



$$= 15 \left[ e^{-\frac{x}{5}} - \frac{x e^{-\frac{x}{5}}}{5} \right]$$

$$\text{Now } 15e^{-\frac{x}{5}} \left[ 1 - \frac{x}{5} \right] = 0$$

$$\text{or, } 1 - \frac{x}{5} = 0$$

$$\text{or, } 1 = \frac{x}{5}$$

$$\therefore x = 5$$

$$\frac{d^2R}{dx^2} = 15 \left[ \frac{x}{25} e^{-x/25} - \frac{e^{-x/5}}{5} - \frac{e^{-x/5}}{5} \right]$$

$$= 15 \left[ \frac{x}{25} e^{-x/25} - \frac{2e^{-x/5}}{5} \right]$$

$$\therefore \frac{d^2R}{dx^2} \text{ at } x = 5 = 15 \left[ \frac{1}{5e} - \frac{2}{5e} \right] = -ve = \frac{-1}{5e} < 0$$

**Illustration 17:**

$P = \frac{150}{q^2 + 2} - 4$  represents the demand function for a product where 'p' is the price per unit per 'q' units; determine the marginal revenue function.

**Solution:**

$$P = \frac{150}{q^2 + 2} - 4$$

$$\text{Revenue (R)} = \frac{150q}{q^2 + 2} - 4q$$

$$\text{MR} = \frac{dR}{dq} = \frac{q^2 + 2(150) - 150q \times 2q}{(q^2 + 2)^2} - 4$$

$$= \frac{150q^2 - 300 \times 300q^2}{(q^2 + 2)^2} - 4 = \frac{300 - 150q^2}{(q^2 + 2)^2} - 4$$

**Illustration 18:**

A manufacturer can sell 'x' items per month, at price  $P = 300 - 2x$ . Manufacturer's cost of production ₹ Y of 'x' items is given by  $Y = 2x + 1000$ . Find no. of items to be produced to yield maximum profit per month

**Solution:**

$$\text{Units} = x$$

$$\text{Price} = 300 - 2x$$

$$\text{Revenue (R)} = Px = 300x - 2x^2$$

$$\text{Cost (C)} = 2x + 1000$$

$$\text{Profit (z)} = 300x - 2x^2 - 2x - 1000$$

$$-2x^2 + 298x - 1000$$

$$\frac{dz}{dx} = -4x + 298 = 0$$

$$-4x = -298$$

$$x = \frac{298}{4} = 74.5$$

$$\frac{d^2z}{dx^2} = -4 \text{ which is Negative}$$

$$\frac{d^2z}{dx^2} = < 0$$

Profit is maximum at  $x = 74.5$  units

**Illustration 19:**

The price (P) per unit at which company can sell all that it produces is given by the function  $P(x) = 300 - 4x$ . The cost function is  $500 + 28x$ , where 'x' is the number of units, find x, so that profit is maximum.

**Solution:**

$$P = 300 - 4x$$

$$R = P(x) = 300x - 4x^2$$

$$C = 500 + 28x$$

$$\text{Profit (₹)} = R - C$$

$$\text{Profit} = 300x - 4x^2 - 500 - 28x$$

$$= -4x^2 + 272x - 500$$

$$\frac{dz}{dx} = -8x + 272 = 0$$

$$-8x = -272$$

$$X = \frac{272}{8} = 34$$

$$\frac{d^2z}{dx^2} = -8, \text{ which is Negative}$$

Profit is maximum at  $x = 34$  units.

**Illustration 20:**

If 'n' be the no. of workers employed the average cost of production is given by

$$C = 24n + \left[ \frac{3}{2(n-4)} \right] \text{ Show that } n = 4\frac{1}{4} \text{ will make } C \text{ minimum.}$$

**Solution:**

$$C = 24n + \left[ \frac{3}{2(n-4)} \right] = 24n + \frac{3}{2}(n-4)^{-1}$$

if,  $\frac{dc}{dn} = 0$ , then Cost is minimum,  $\frac{d^2c}{dn^2} = \text{Positive}$

$$\frac{dc}{dn} = 24 + \frac{3}{2} \times -1 \times (n-4)^{-2} = 0$$

$$24 - \frac{3}{2}(n-4)^{-2} = 0$$

$$(n-4)^{-2} = 16$$

$$\frac{1}{(n-4)^2} = 16$$

$$(n-4)^2 \cdot 16 = 1$$

$$(n-4)^2 = \frac{1}{16}$$

$$n-4 = \frac{1}{4}$$

$$n = \frac{1}{4} + 4 = 4\frac{1}{4}$$

$$\frac{d^2c}{dn^2} = 0 + \frac{-3}{2} \times -2(n-4)^{-3}$$

$$= 3(n-4)^{-3}$$

$$= 3\left(\frac{1}{4}\right)^{-3}$$

$$= \frac{3}{\left(\frac{1}{4}\right)^3} \text{ which is Positive}$$

Hence condition is satisfied and cost will be minimum at  $n = 4\frac{1}{4}$ .

**Illustration 21:**

A firm has revenue function given by  $R = 8D$ , where  $R$  = Gross Revenue and  $D$  = Quantity sold, production cost function is given by  $C = 15000 + 60\left(\frac{D}{900}\right)^2$ . Find the total profit function and the number of units to be sold to get the maximum profit.

**Solution:**

$$R = 8D$$

$$C = 15000 + 60\left(\frac{D}{900}\right)^2$$

$$\text{Profit (P)} = 8D - 15000 - 60\left(\frac{D}{900}\right)^2$$

To find number of units to get the maximum profit

$$\frac{dp}{dD} = 0 \text{ and } \frac{d^2p}{dD^2} \text{ should be -ve}$$

$$\Rightarrow \frac{dp}{dD} = 8 - \frac{60 \cdot 2D}{810000} = 0$$

$$\Rightarrow 8 - \frac{120D}{810000} = 0$$

$$\Rightarrow 8 - \frac{120D}{810000} = 0$$

$$\therefore D = \frac{27000 \times 8}{4} = 54000$$

$$\frac{d^2p}{dD^2} = \frac{-4}{27000} \text{ which is -ve}$$

P is maximum at  $D = 54000$ .

**Illustration 22:**

The total cost function of a firm  $C = \frac{x^3}{3} - 5x^2 + 28x + 10$ , where  $C$  is total cost and ' $x$ ' is the output. A tax @ ₹2 per unit of output is imposed and the producer adds it to his cost. If the demand function is given by  $P = 2530 - 5x$ , where ₹'P' is the price per unit of output, find the profit maximising output and the price at the level.

**Solution:**

$$\text{Given (C)} = \frac{x^3}{3} - 5x^2 + 28x + 10 + 2x$$

$$P = 2530 - 5x$$

$$\text{Revenue} = xp = 2530x - 5x^2$$

$$\text{Profit} = 2530x - 5x^2 + 5x^2 - 28x - 10 - \frac{x^3}{3} - 2x$$

$$= -\frac{x^3}{3} + 2502x - 10 - 2x$$

$$= -\frac{x^3}{3} - 10 + 2500x$$

$$\frac{dp}{dx} = \frac{-3x^2}{3} + 2500 = 0$$

$$x^2 = 2500$$

$$\therefore x = \sqrt{2500} = 50$$

$$\frac{d^2p}{dx^2} = -2, \text{ which is Negative}$$

$\therefore$  Maximum profit is at  $x = 50$  units

$$\text{Price } 2530 - 5 \times 50 = 2280$$

**Illustration 23:**

Find the Elasticity of Demand for the following:

(i)  $P = \frac{10}{(x+2)^2}$

(ii)  $P = \frac{4}{(2x+1)^2}$

(iii)  $x \cdot p^n = K$ , where  $n, k$  are constant.

**Solution:**

(i)  $P = \frac{10}{(x+2)^2} = 10(x+2)^{-2}$

Differentiating w.r.to  $x$ 

$$\frac{dp}{dx} = 10(-2)(x+2)^{-3} = -20(x+2)^{-3}$$

$$\frac{p}{x} = \frac{10}{x(x+2)^2}$$

Elasticity of demand  $|E_p| = \left| \frac{dx}{dp} \times \frac{p}{x} \right|$

$$\frac{dx}{dp} = \frac{1}{20(x+2)^{-3}} = \frac{(x+2)^3}{20}$$

$$\left| \frac{dx}{dp} \times \frac{p}{x} \right| = \frac{(x+2)^3}{20} \times \frac{10}{x(x+2)^2}$$
$$= \frac{(x+2)}{2x}$$

(ii)  $P = \frac{4}{(2x+1)^2} = 4(2x+1)^{-2}$

$$\frac{dp}{dx} = 4 \times -2 \times (2x+1)^{-3} = -\frac{8}{(2x+1)^3}$$

$$\frac{dp}{dx} = -\frac{8}{(2x+1)^3}$$

$$\frac{dx}{dp} = -\frac{(2x+1)^3}{8}$$

$$\frac{p}{x} = \frac{4}{x(2x+1)^2}$$

Elasticity of demand  $= |E_p| = \frac{(2x+1)^3}{8} \times \frac{4}{x(2x+1)^2} = \frac{(2x+1)}{2x}$

(iii)  $xp^n = k$

or,  $x = \frac{k}{p^n}$

or,  $\frac{x}{p} = \frac{k}{p^n \times p}$

or,  $\frac{x}{p} = \frac{k}{p^{n+1}}$

or,  $\frac{p}{x} = \frac{p^{n+1}}{k} \quad \dots (1)$

Again,  $x.p^n = k$

Differentiate both sides w.r.to  $x$ .

$$x.np^{n-1} \frac{dp}{dx} + p^n = 0$$

or,  $\frac{dp}{dx} \cdot xnp^{n-1} = -p^n$

or,  $\frac{dp}{dx} = \frac{-p^n}{x.n.p^{n-1}}$



$$\text{or, } \frac{dx}{dp} = \frac{-x.n.p^{n-1}}{p^n} = \frac{-xn}{p} \quad \dots (2)$$

$$\begin{aligned} \text{Now, } |E_p| &= \frac{xn}{p} \times \frac{p^{n+1}}{k} \\ &= \frac{xn p^n}{k} \end{aligned}$$

**Illustration 24:**

The Demand curve for x is given by the equation  $P = 24 - \frac{1}{2} \sqrt{q}$ , where P and q denote price and quantity respectively. Find the point price elasticity for  $P = ₹20$ .

**Solution:**

$$\text{Demand } P = 24 - \frac{1}{2} \sqrt{q}$$

$$\frac{dp}{dq} = \frac{1}{2} \times \frac{1}{2\sqrt{q}} = \frac{1}{4\sqrt{q}}$$

$$\frac{dq}{dp} = -4\sqrt{q}$$

$$\frac{p}{q} = \frac{24 - 2\frac{1}{2}\sqrt{q}}{q} = \frac{24 - \frac{1}{2} \times 8}{64} = \frac{24 - 4}{64} = \frac{20}{64}$$

$$|E_p| = \frac{dp}{dq} \times \frac{p}{q} = \frac{-4\sqrt{q} \times (24 - \frac{1}{2}\sqrt{q})}{q}$$

When  $p = 20$ , then  $q$ ,

$$P - 24 = \frac{-1}{2} \sqrt{q}$$

$$-2(p - 24) = \sqrt{q}$$

$$-2(20 - 24) = \sqrt{q}$$

$$-40 + 48 = \sqrt{q}$$

$$\sqrt{q} = 8$$

$$\therefore q = 64$$

**Illustration 25:**

The Demand function is  $x = 100 + 4p + 10p^2$ , where x is demand for the commodity at price 'p' compute marginal quantity demand, average quantity demand and hence elasticity of demand, at  $p = 4$ .

**Solution:**

$$X = 100 + 4p + 10p^2$$

$$\text{Marginal quantity demand} = \frac{dx}{dq}$$

$$\frac{dx}{dq} = 4 + 20p \rightarrow (1)$$

$$\text{Average Quantity demand} = \frac{x}{p} = \frac{100}{p} + 4 + 10p \rightarrow (2)$$

$$E_p = \frac{dx}{dq} \times \frac{x}{p} = \frac{4 + 20p}{\frac{100}{p} + 10p + 4} = \frac{(4 + 20p)p}{100 + 10p^2 + 4p}$$

at  $P = 4$

$$= \frac{(4 + 80)4}{100 + 160 + 16} = \frac{28}{23}$$

**Illustration 26:**

Find an expression for price elasticity in the case of following demand functions and evaluate it at the price  $P = 20$

$$(i) \quad 12Q + 7P = 216$$

$$(ii) \quad Q = 2500 - 8P - 2P^2$$

$$(iii) \quad Q = \frac{64}{p^6}$$

$$(iv) \quad Q = \frac{5p}{(1-3p)^2}$$

**Solution:**

$$(i) \quad 7P = 216 - 12Q$$

$$P = \frac{216-12Q}{7} = \frac{1}{7} (216 - 12Q)$$

$$\frac{dp}{dQ} = \frac{1}{7} \times -12 = \frac{-12}{7} = \frac{dQ}{dp} = \frac{-7}{12}$$

$$\frac{P}{Q} = \frac{1}{7} \left( \frac{216}{Q} - 12 \right)$$

$$E_p = \left[ \frac{-7}{12} \times \left( \frac{216}{Q} - 12 \right) \right]$$

$$E_p = \left[ \frac{-1}{12} \times \left( \frac{216 - 12Q}{Q} \right) \right]$$

At  $p = 20$ ,  $Q$  is

$$12Q = 216 - (7 \times 20) = 216 - 140 = 76$$

$$Q = \frac{76}{12} = 6 \frac{1}{3}$$

$E_p$  at  $P = 20$

$$E_p = \frac{1}{12} \left[ \frac{216 - 12 \times \frac{76}{12}}{\frac{76}{12}} \right]$$

$$= \frac{1}{12} \left( \frac{140 \times 12}{76} \right) = \frac{140}{76} = \frac{35}{19}$$

$$(ii) \quad Q = 2,500 - 8p - 2p^2$$

At  $p = 20$ ,

$$\frac{dQ}{dp} = -8 - 4p = -8 - 80 = -88$$

$$\frac{Q}{p} = \frac{2500}{p} - 8 - 2P$$

$$= 125 - 8 - 40 = 77$$

$$\frac{Q}{p} = \frac{1}{77}$$

$$E_p = 88 \times \frac{1}{77} = \frac{8}{7}$$

$$(iii) \quad Q = \frac{64}{p^6}, \quad \frac{dQ}{dp} = \frac{64 \times -6}{p^7}$$

$$\frac{Q}{p} = \frac{64}{p^7} \Rightarrow \frac{p}{Q} = \frac{p^7}{64}$$



$$E_p = \frac{64 \times 6}{p^7} \times \frac{p^7}{64} = 6$$

$$(iv) \quad Q = \frac{5p}{(1-3p)^2} = 5p(1-3p)^{-2}$$

$$\begin{aligned} \frac{dQ}{dp} &= \frac{(1-3p)^2 \cdot 5 - 5p \times (-2)(1-3p)^{-3}}{(1-3p)^4} \\ &= \frac{5(1-3p)^2 + 30p(1-3p)}{(1-3p)^4} = \frac{5(1-3p) + 30p}{(1-3p)^3} \end{aligned}$$

$$\frac{Q}{p} = \frac{5}{(1-3p)^2} = \frac{p}{Q} = \frac{(1-3p)^2}{5}$$

$$\begin{aligned} E_p &= \frac{5(1-3p) + 30p}{(1-3p)^3} \times \frac{(1-3p)^2}{5} \\ &= \frac{5 - 15p + 30p}{5(1-3p)} = \frac{1 - 3p + 6p}{1 - 3p} = \frac{1 + 3p}{1 - 3p} \\ &= \frac{1 + 60}{1 - 60} = \frac{61}{-59} \end{aligned}$$

**Illustration 27:**

The total revenue from sale of 'x' units is given by the equation  $R = 100x - 2x^2$ , calculate the point price elasticity of demand, when marginal revenue is 20.

**Solution:**

$$R = 100x - 2x^2$$

$$\text{Price (P)} = 100 - 2x$$

$$MR = \frac{dR}{dx} = 100 - 4x$$

$$\frac{p}{x} = \frac{100}{x} - 2$$

$$\frac{dp}{dx} = -2 = \frac{dx}{dp} = \frac{1}{2}$$

$$E_p = \frac{1}{2} \times \left( \frac{100}{x} - 2 \right)$$

$$= \frac{50}{x} - 1$$

$$= \frac{50}{20} - 1$$

$$= \frac{5}{2} - 1$$

$$\frac{5-2}{2} = \frac{3}{2}$$

$$MR = 20, \quad x \text{ is } \dots$$

$$100 - 4x = 20$$

$$4x = 80$$

$$x = 20$$

**Illustration 28:**

Prove that the elasticity of demand for the following is constant  $x = 3(p^{-2})$ , Where P and X are the price & quantity demanded respectively.

**Solution:**

$$E_p = - \left| \frac{dx}{dp} \times \frac{p}{x} \right|$$

Differentiate w.r.to 'x'



$$\Rightarrow 1 = 3 (-2 \cdot p^{-3}) \frac{dp}{dx}$$

$$\Rightarrow 1 = -6p^{-3} \cdot \frac{dp}{dx}$$

$$\Rightarrow \frac{dp}{dx} = \frac{p^3}{6}$$

$$\therefore \frac{dx}{dp} = \frac{6}{p^3} \text{ - Equation (1)}$$

$$\text{Now } \frac{x}{p} = \frac{3}{p^3}$$

$$\Rightarrow \frac{p}{x} = \frac{p^3}{3} \text{ - Equation (2)}$$

From equations (1) & (2)

$$\therefore E_p = \frac{dx}{dp} \times \frac{p}{x}$$

$$= \frac{6}{p^3} \times \frac{p^3}{3}$$

$$= 2 \text{ (proved)}$$

#### Illustration 29:

The total cost (C) and the total revenue (R) of a firm are given  $C(x) = x^3 + 60x^2 + 8x$ ;  $R(x) = 3x^3 - 3x^2 + 656x$ ,  $x$  being output determine, the output for which the firm gets maximum profit. Also obtain the maximum profit.

#### Solution:

$$C = x^3 + 60x^2 + 8x$$

$$R = 3x^3 - 3x^2 + 656x$$

$$\text{Profit} = 3x^3 - 3x^2 + 656x - x^3 - 60x^2 - 8x$$

$$= 2x^3 - 63x^2 + 648x = (p)$$

Derivative w.r.to  $x$

$$\frac{dp}{dx} = 6x^2 - 126x + 648 = 0$$

$$x^2 - 21x + 108 = 0$$

$$x^2 - 9x - 12x + 108 = 0$$

$$x(x - 9) - 12(x - 9) = 0$$

$$(x - 12)(x - 9) = 0$$

$$x = 12 \text{ or } 9$$

$$\frac{d^2p}{dx^2} = 2x - 21$$

$$\text{at } x = 9$$

$$\frac{d^2p}{dx^2} = 18 - 21 = -3 < 0$$

$$\therefore P \text{ is maximum at } x = 9$$

$$\text{at } x = 12$$

$$\frac{d^2p}{dx^2} = 24 - 21 = 3 > 0$$

$$\therefore P \text{ is minimum at } x = 12$$

$$P = 2x^3 - 63x^2 + 648x$$

$$\text{at } x = 9$$

$$\text{Profit } P = 2(9)^3 - 63(9)^2 + 648(9)$$

$$7292 - 63 \times 81 - 648 \times 9 = 2187$$

**Illustration 30 :**

A monopolist has demand curve  $x = 106 - 2p$  and average cost curve  $(AC) = 5 + x/50$ . The total revenue is  $(R) = xp$ , determine the most profitable output and maximum profit.

**Solution:**

$$x = 106 - 2p \Rightarrow x - 106 = -2p$$

$$p = \frac{x - 106}{-2} = \frac{106 - x}{2}$$

$$R = \frac{106x - x^2}{2}$$

$$\text{Total Cost} = 5x + \frac{x^2}{50}$$

$$\text{Profit} = \frac{106x - x^2}{2} - 5x - \frac{x^2}{50}$$

$$\frac{dp}{dx} = \frac{(106 - 2x)}{2} - 5 - \frac{2x}{50} = 0$$

$$\frac{dp}{dx} = 53 - x - 5 - \frac{2x}{50} = 0$$

$$48 = x \left(1 + \frac{1}{25}\right)$$

$$x = \frac{1200}{26}$$

$$\frac{d^2p}{dx^2} = \frac{-26}{25} < 0$$

$$\therefore P \text{ is maximum at } x = \frac{1200}{26}$$

**Illustration 31:**

The total cost function of a manufacturing firm is given by  $C = 2x^3 - x^2 + 3x + 5$  and the Marginal Revenue =  $8 - 3x$ ,  $X$  = output, determine the most profitable output of the firm.

**Solution:**

$$C = 2x^3 - x^2 + 3x + 5$$

$$MR = 8 - 3x$$

$$MC = \frac{dc}{dx} = 6x^2 - 2x + 3$$

Profit maximum at  $MC = MR$

$$6x^2 - 2x + 3 = 8 - 3x$$

$$6x^2 + x - 5 = 0$$

$$6x^2 + 6x - 5x - 5 = 0$$

$$6x(x + 1) - 5(x + 1) = 0$$

$$(x + 1)(6x - 5) = 0$$

$$x = -1$$

$$\text{or } 6x - 5 = 0 = \frac{5}{6}$$

$$x = \frac{5}{6}$$

$\therefore$  Most Profitable output of the firm is  $\frac{5}{6}$ .

**Illustration 32:**

A company is planning to market a new model of a doll. Rather than setting the selling price of the doll based only on production cost estimation management polls the retailers of the doll to see how many dolls they will buy for various prices. From this survey, it is determined at the unit demand function (the relationship between the amount 'x' each retailer would buy and the price he would pay) is  $x = 30000 - 1500P$ . The fixed cost of the production of the dolls are found to be ₹28,000 and cost of Material & labour to produce each doll is estimated to be ₹ 8 per unit. What price should the company charge retailer in order to obtain a maximum profit? Also find the maximum profit.

**Solution:**

$$x = 30000 - 1500P$$

$$x - 30000 = -1500P$$

$$\therefore P = \frac{30000 - x}{1500}$$

$$\text{Revenue} = \frac{30000x - x^2}{1500}$$

$$C = 8x + 28000$$

$$\text{Profit (y)} = \frac{30000x - x^2}{1500} - 8x - 28000$$

$$\frac{dy}{dx} = \frac{1}{1500} (30000 - 2x) - 8 = 0$$

$$= 30000 - 2x - 12000 = 0$$

$$-2x = -18000$$

$$x = \frac{18000}{2} = 9000$$

$$\frac{d^2y}{dx^2} = -2, \text{ which is Negative}$$

$$\text{Profit} = \frac{30000 \times 9000 - 9000^2}{1500} - 72000 - 28000$$

$$180000 - \frac{810000}{15} - 72000 - 28000$$

$$= 180000 - 54000 - 72000 - 28000 = 26000$$

**Illustration 33:**

Assume that for a closed economy  $E = C + I + G$ ; Where E= total expenditure on consumption goods, I = Exp. on Investment goods and G = Govt. Spending. For equilibrium, we must have  $E = Y$ , Y being total income received.

For a certain Economy, it is given that  $C = 15 + 0.9Y$ , where  $I = 20 + 0.05Y$  and  $G = 25$ . Find the equilibrium values of Y, C and I. How will these change, if there is no Government spending.

**Solution:**

$$E = 15 + 0.9Y + 20 + 0.05Y + 25$$

$$E = 60 + 0.95Y = (1)$$

$$\text{As given } E = Y = 60 + 0.95Y$$

$$0.05Y = 60$$

$$\therefore Y = \frac{60}{0.05} = 1200$$

$$C = 15 + 0.9 \times 1200 = 1095$$

$$I = 20 + 0.05 \times 1200 = 80$$

When there is no government spending.



$$Y = 35 + 0.95Y$$

$$\text{or, } 0.05Y = 35$$

$$\therefore Y = \frac{35}{0.05} = 700$$

$$C = 15 + 630 = 645$$

$$I = 20 + 35 = 55$$

**Illustration 34:**

A demand function of an item is  $P = 8/(x+1) - 2$  and supply function is  $P = (x+3)/2$ , determine the equilibrium price and consumer's surplus.

**Solution:**

Equilibrium price = Demand = Supply

$$= \frac{8}{x+1} - 2 = \frac{x+3}{2}$$

$$= \frac{8 - 2(x+1)}{x+1} = \frac{x+3}{2}$$

$$= [8 - 2x - 2]2 = (x+3)(x+1)$$

$$16 - 4x - 4 = x^2 + 4x + 3$$

$$-x^2 - 8x + 9 = 0$$

$$x^2 + 8x - 9 = 0$$

$$x^2 - x + 9x - 9 = 0$$

$$x(x-1) + 9(x-1) = 0$$

$$(x-1)(x+9) = 0$$

$$x = 1, x = -9$$

$$\text{Price} = \frac{1+3}{2} = \frac{4}{2} = 2$$

Consumer's surplus = Consumer willing to pay - Consumer actually paid

$$= \int_0^1 \left( \frac{8}{(x+1)} - 2 \right) dx - [2 \times 1]$$

$$= \int_0^1 [8 \log(x+1) - 2x] - 2$$

$$= [8 \cdot \log 2 - 2] - 2$$

$$= 8 \log 2 - 4$$

**Illustration 35:**

The demand function for a particular brand of pocket calculator is stated below,  $P = 75 - 0.3Q - 0.05Q^2$ , Find the consumer's surplus at a quantity of 15 calculators.

**Solution:**

$$\text{Price} = 75 - 0.30(15) - 0.05(15^2)$$

$$= 75 - 4.5 - 0.05(225)$$

$$= 75 - 15.75 = 59.25$$

Consumer's surplus

$$= \int_0^{15} (75 - 0.3Q - 0.05Q^2) dQ - (59.25 \times 15)$$

$$= \int_0^{15} \left( 75Q - \frac{0.3Q^2}{2} - \frac{0.05Q^3}{3} \right) - (59.25 \times 15)$$



$$\begin{aligned} &= [(1125 - 33.75 - 56.25) - 0] - 888.75 \\ &= 1035 - 888.75 \\ &= 146.25 \end{aligned}$$

**Illustration 36:**

The demand and supply function under perfect competition are  $Y = 16 - x^2$  and  $Y = 2(x^2 + 2)$  respectively. Find the market price, consumer's surplus and producer's surplus.

**Solution:**

Under perfect competition market price is: demand = supply i.e.

$$16 - x^2 - 2x^2 - 4 = 0$$

$$-3x^2 + 12 = 0$$

$$-3x^2 = -12$$

$$\therefore x^2 = 12/3$$

$$x = \sqrt{\frac{12}{3}} = 2 \text{ units}$$

$$\begin{aligned} \text{Consumer's surplus} &= \int_0^2 (16 - x^2) dx - (12 \times 2) \\ &= \int_0^2 \left(16x - \frac{x^3}{3}\right) \\ &= 32 - \frac{8}{3} - 24 \\ &= 5 \frac{1}{3} \end{aligned}$$

$$\begin{aligned} \text{Producer's surplus} &= \text{Producer actually received} - \text{Producers willing to receive} \\ &= (2 \times 12) - \int_0^2 2(x^2 + 2)dx \\ &= 24 - \int_0^2 \left(\frac{2x^3}{3} + 4x\right) \\ &= 32 - \frac{16}{3} - 8 - 0 \\ &= 32 - \frac{16}{3} \\ &= 26 \frac{2}{3} \end{aligned}$$

**Illustration 37:**

The demand function is  $Y = 85 - 4x - x^2$ , 'y' is the price and 'x' is the quantity demand. Find the consumer's surplus for  $Y = 64$ .

**Solution:**

$$\text{Quantity is } 85 - 4x - x^2 = 64$$

$$\Rightarrow -x^2 - 4x + 21 = 0$$

$$\Rightarrow x^2 + 4x - 21 = 0$$

$$\Rightarrow x^2 + 7x - 3x - 21 = 0$$

$$\Rightarrow x(x + 7) - 3(x + 7) = 0$$

$$\Rightarrow (x - 3)(x + 7) = 0$$

$$\therefore x = 3 \text{ or } x = -7, \text{ not acceptable}$$



$$\begin{aligned}
 \text{Consumer's surplus} &= \int_0^3 (85 - 4x - x^2) dx - (3 \times 64) \\
 &= \left[ 85x - \frac{4x^2}{2} - \frac{x^3}{3} \right]_0^3 - 192 \\
 &= 255 - 18 - 9 - 192 \\
 &= 36
 \end{aligned}$$

**Illustration 38:**

Find whether the following commodities are complementary or competitive (or) substitutes, where  $P_1$ ,  $P_2$  and  $X_1$ ,  $X_2$  are prices and quantities respectively of the two commodities.

- (i)  $x_1 = P_1^{-1.7} \cdot P_2^{0.8}$ ;  $x_2 = P_1^{0.5} \cdot P_2^{-2}$
- (ii)  $x_1 = \frac{4x^3}{P_1^2 P_2}$ ;  $x_2 = \frac{16}{P_1 P_2^2}$
- (iii)  $x_1 = P_1^{-8} \cdot P_2^{1.2}$ ;  $x_2 = P_1^{0.2} \cdot P_2^{0.6}$
- (iv)  $x_1 = P_1^{-1.1} \cdot P_2^{0.3}$ ;  $x_2 = P_1^{0.2} \cdot P_2^{0.6}$
- (v)  $x_1 = 1 - 2P_1 + P_2$ ;  $x_2 = 5 - 2P_1 - 3P_2$
- (vi)  $x_1 = \frac{P_2^{0.6}}{P_1^{1.5}}$ ;  $x_2 = \frac{P_1^{0.1}}{P_2^{0.1}}$

**Solution:**

(i)  $x_1 = P_1^{-1.7} \cdot P_2^{0.8}$ ;  $x_2 = P_1^{0.5} \cdot P_2^{-2}$

Differentiate partially  $x_1$  w.r.to  $p_2$

$$\begin{aligned}
 \frac{\partial x_1}{\partial p_2} &= P_1^{-1.7} (0.8) P_2^{-0.2} \\
 &= \frac{0.8}{P_1^{1.7} \times P_2^{0.2}} \quad \text{which is greater than zero}
 \end{aligned}$$

Again differentiating partially  $x_2$  w.r.to  $p_1$

$$\begin{aligned}
 \frac{\partial x_2}{\partial p_1} &= \frac{1}{P_2^{0.2}} (0.5) P_1^{-0.5} \\
 &= \frac{0.5}{P_2^{0.2} \cdot P_1^{0.5}} \quad \text{which is greater than zero}
 \end{aligned}$$

Hence the commodities are substitutes.

(ii)  $x_1 = \frac{4x^3}{P_1^2 P_2}$ ;  $x_2 = \frac{16}{P_1 P_2^2}$

Partially differentiating  $x_1$  w.r.to  $p_2$

$$\frac{\partial x_1}{\partial p_2} = \frac{-4}{P_1^2 \cdot P_2^2} \quad \text{which is less than zero}$$

Again partially differentiating  $x_2$  w.r.to  $p_1$

$$\frac{\partial x_2}{\partial p_1} = \frac{-16}{P_1^2 \cdot P_2^2} \quad \text{which is also less than zero}$$

Therefore, commodities are complementary.



$$(iii) \quad x_1 = P_1^{-0.8} \cdot P_2^{1.2}; \quad x_2 = P_1^{0.2} \cdot P_2^{0.6}$$

Differentiating partially  $x_1$  w.r.to  $p_2$

$$\frac{\partial x_1}{\partial p_2} = P_1^{-0.8} (1.2) P_2^{0.2} \text{ which is greater than zero}$$

Similarly differentiating partially  $x_2$  w.r.to  $p_1$

$$\begin{aligned} \frac{\partial x_2}{\partial p_1} &= P_2^{0.6} (0.2) P_1^{-0.8} \\ &= \frac{(0.2) P_2^{0.6}}{P_1^{0.8}} \text{ which is greater than zero} \end{aligned}$$

Therefore the commodities are substitutes.

$$(iv) \quad x_1 = P_1^{-1.1} \cdot P_2^{0.3}; \quad x_2 = P_1^{0.2} \cdot P_2^{0.6}$$

Differentiate partially  $x_1$  w.r.to  $p_2$

$$\frac{\partial x_1}{\partial p_2} = \frac{P_1^{-1.1} (0.3)}{P_2^{0.7}} = \frac{(0.3)}{P_1^{1.1} \cdot P_2^{0.7}} \text{ which is greater than zero.}$$

Similarly differentiate partially  $x_2$  w.r.to  $p_1$

$$\frac{\partial x_2}{\partial p_1} = P_2^{0.6} (0.2) P_1^{-0.8} = \frac{(0.2) P_2^{0.6}}{P_1^{0.8}} \text{ which is also greater than zero.}$$

Therefore, the commodities are substitutes.

$$(v) \quad x_1 = 1 - 2P_1 + P_2; \quad x_2 = 5 - 2P_1 - 3P_2$$

Differentiating partially  $x_1$  w.r.to  $p_2$

$$\frac{\partial x_1}{\partial p_2} = 1, \text{ which is greater than zero.}$$

Similarly, differentiating partially  $x_2$  w.r.to  $p_1$

$$\frac{\partial x_2}{\partial p_1} = -2, \text{ which is less than zero.}$$

Therefore, the relationship between the commodities cannot be established.

$$(vi) \quad x_1 = \frac{P_2^{0.6}}{P_1^{1.5}}; \quad x_2 = \frac{P_1^{0.1}}{P_2^{0.1}}$$

Differentiating partially  $x_1$  w.r.to  $p_2$

$$\begin{aligned} \frac{\partial x_1}{\partial p_2} &= \frac{1}{P_1^{1.5}} (0.6) P_2^{-0.4} \\ &= \frac{(0.6)}{P_1^{1.5} \cdot P_2^{0.4}} \text{ which is greater than zero.} \end{aligned}$$

Similarly, differentiating partially  $x_2$  w.r.to  $p_1$

$$\frac{\partial x_2}{\partial p_1} = \frac{1}{P_1^{0.1}} \cdot \frac{1}{P_1^{0.9}}$$



$$= \frac{0.1}{P_2^{0.1} \cdot P_1^{0.9}} \text{ which is greater than zero.}$$

Therefore, the commodities are substitutes.

### Illustration 39:

1. K Ltd. sells output in a perfectly competitive market. The average variable cost function K Ltd is

$$AVC = 300 - 40Q + 2Q^2$$

K Ltd has an obligation to pay ₹ 500 irrespective of the output produced.

What is the price below which K Ltd has to shut down its operation in the short run?

### Solution:

A firm has to shut down its operation, if the price is less than average variable cost.

Under perfect competition

$$P = MR$$

i.e. Price is equal to marginal revenue. The firm will continue its operation under the short run so long as price is atleast equal to average variable cost.

Thus the equilibrium price which the firm will shut down is the minimum AVC i.e. the average variable cost .

$$AVC = 300 - 40Q + 2Q^2$$

$$AVC \text{ is minimum where } \frac{d(AVC)}{dQ} = 0$$

$$\text{i.e. } \frac{d(AVC)}{dQ} = -40 + 4Q = 0$$

$$\text{i.e. } Q = 10 \text{ units.}$$

when the firm is producing 10 units,

$$AVC = 300 - 40Q + 2Q^2$$

$$= 300 - 40(10) + 2(10)^2$$

$$= 300 - 400 + 200 = 100$$

If the price falls before ₹ 100 the firm has to shut down its operation in short run.

### Illustration 40:

J Ltd is operating in a perfectly competitive market. The price elasticity of demand and supply of the product estimated to be 3 and 2 respectively. The equilibrium price of the product is ₹100. If the government imposes a specific tax of ₹10 per unit, what will be the new equilibrium price?

### Solution:

Distribution of tax burden between buyers and sellers is in ratio of elasticity of supply to elasticity of demand .

$$\text{Thus tax burden borne by the buyer} = ₹ 10 \times \frac{2}{5} = ₹ 4.$$

If the tax burden borne by buyer is ₹ 4, new equilibrium price will be  $100 + 4 = ₹ 104$

### Illustration 41:



The total cost function for a monopolist is given by  $TC = 900 + 40 Q^2$ . The demand function for the good produced by the monopolist is given by  $2Q = 48 - 0.08 P$ . What will be the profit maximising price?

**Solution:**

Demand function is given by

$$2Q = 48 - 0.08 P$$

$$\text{or, } 2Q - 48 = -0.08 P$$

$$\text{or, } 48 - 2Q = 0.08 P$$

$$\text{or, } P = 600 - 25Q$$

$$TR = PQ$$

$$= 600Q - 25Q^2$$

TC is given by,

$$TC = 900 + 40 Q^2$$

The first order condition for profit maximisation is  $MR = MC$

$$TR = 600Q - 25Q^2$$

$$MR = \frac{dTR}{dQ} = 600 - 50Q$$

$$MC = \frac{d(TC)}{dQ} = 80Q$$

For maximising profit

$$MR = MC$$

$$\text{i.e. } 600 - 50Q = 80Q$$

$$Q = \frac{600}{130} = 4.6 \text{ units}$$

Equilibrium Price =

$$P = 600 - 25 Q = 600 - 25(4.6)$$

$$= 600 - 115$$

$$= ₹ 485$$

i.e. profit maximising price is ₹ 485

**Illustration 42:**

S Ltd. a monopolist aims at profit maximisation. The fixed cost of the firm is ₹ 200 and the average variable cost of the firm is constant at ₹ 30 per unit. S Ltd. sells goods in West Bengal and Kerala. The estimated demand function for the goods in west bengal and Kerala are:

$$P_w = 40 - 2.5 Q_w$$

$$P_k = 120 - 10 Q_k$$

If price discrimination is practiced by S Ltd., what will be the profit maximising output?

**Solution:**

When price discrimination is practiced profit maximising condition is



$$MR_w = MC \dots (1)$$

$$MR_k = MC \dots (2)$$

Now,  $P_w = 40 - 2.5 Q_w$

$$TR_w = 40 Q_w - 2.5 Q_w^2$$

$$MR_w = 40 - 5Q_w$$

and  $P_k = 120 - 10 Q_k$

$$TR_k = 120Q_k - 10Q_k^2$$

$$MR_k = 120 - 20 Q_k$$

Since average variable cost is constant at ₹ 30 per unit ,then

$$MC = 30$$

$$40 - 5Q_w = 30$$

$$Q_w = 2 \text{ units}$$

$$\& 120 - 20 Q_k = 30$$

i.e.  $Q_k = \frac{90}{20} = 4.5 \text{ units}$

Thus profit maximising output in west bengal will be 2 units and in kerala will be 4.5 units.

Thus profit maximising output for the monopolist = 2 + 4.5 = 6.5 units.

**Illustration 43:**

The total cost function of a monopolist is given by

$$C = 50 + 40x = 50 + 40 (x_1 + x_2)$$

The total demand is given by

$$P = 100 - 2x$$

The demand function of the segmented market are

$$P_1 = 80 - 2.5x_1$$

$$P_2 = 180 - 10 x_2$$

If the price discrimination is practised by the monopolist, what will be the equilibrium output in each segment and what will be the price?

Prove that the market with the higher elasticity will have the lower price.

**Solution:**

The firm aims at the maximisation of profit .

$$\pi = R_1 + R_2 - C$$

$$R_1 = P_1 x_1 = (80 - 2.5x_1) x_1$$

$$= 80 x_1 - 2.5x_1^2$$

$$MR_1 = 80 - 5x_1 \dots\dots\dots(1)$$

$$R_2 = P_2 x_2 = (180 - 10x_2) x_2$$

$$= 180x_2 - 10x_2^2$$



$$MR_2 = 180 - 20x_2 \dots\dots\dots(2)$$

$$C = 50 + 40x$$

$$= 50 + 40(x_1+x_2)$$

$$MC = \frac{dc}{dx_1} = \frac{dc}{dx_2} = \frac{dc}{dx} = 40 \dots\dots\dots(3)$$

Equating (1) & (3)

$$80 - 5x_1 = 40$$

$$x = 8$$

and, equating (2) & (3)

$$180 - 20x_2 = 40$$

$$x_2 = 7$$

Total output = 8 + 7 = 15 units

$$P_1 = 80 - 2.5x_1 = ₹ 60$$

$$P_2 = 180 - x_2 = ₹ 110$$

The elasticities are

$$|e_1| = \frac{dx_1}{dp_1} \cdot \frac{p_1}{x_1}$$

$$\text{Now } P_1 = 80 - 2.5x_1$$

$$x_1 = 32 - 0.4 P_1$$

$$\frac{dx_1}{dp_1} = 0.4$$

$$\text{then } e_1 = 0.4 \times \frac{60}{8} = 3$$

$$\text{Similarly } e_2 = \frac{dx_2}{dp_2} \cdot \frac{p_2}{x_2} = 1.57$$

Thus  $e_1 > e_2$  and accordingly  $p_1 < p_2$

i.e. market with the higher elasticity will have the lower price.

**Illustration 44:**

6,000 pen drives of 2 GB to be sold in a perfectly competitive market to earn ₹1,06,000 profit, whereas in a monopoly market only 1,200 units are required to be sold to earn the same profit. The fixed costs for the period are ₹74,000. The contribution per unit in the monopoly market is as high as three-fourths its variable cost.

Determine the target selling price per unit under each market condition.

**Solution:**

Calculation of selling price

(₹)

Units	Perfect competition 6,000	Monopoly 1,200
Contribution (1,06,000 + 74,000)	1,80,000	1,80,000
Contribution p. u.	30	150
Variable cost p. u. (150 ÷ ¾)	-	200
Variable Cost p. u.	200	-
Selling price p. u.	230	350

**Illustration 45:**

C Ltd. is about to introduce a new product with the following estimates:

Price per unit (in rupees)	30.00	31.50	33.00	34.50	36.00	37.50	39.00
Demand (in thousand units)	400	380	360	340	315	280	240

**Costs:**

Direct materials	₹12 p. u.	Selling expenses	10% on sale
Direct labour	₹3 p. u.	Fixed production overheads	₹14,40,000
Variable overhead	₹3 p. u.	Administration expenses	₹10,80,000

Judging from the estimates, determine the tentative price of the new product to earn maximum profit.

**Solution:**

Statement for Determining Tentative Price of the New Product, from estimates, to earn maximum profit

Price p. u. (₹) (₹18 p. u. + 10% of selling price)	Demand (in lakhs of unit)	Sales revenue (in ₹ Lakhs)	Variable costs (in ₹ Lakhs)	Contribution (in ₹ Lakhs)
(a)	(b)	(c)	(d)	(c) - (d)
30.00	4.00	120.00	84.00	36.00
31.50	3.80	119.70	80.37	39.33
33.00	3.60	118.80	76.68	42.12
34.50	3.40	117.30	72.93	44.37
36.00	3.15	113.40	68.04	45.36
37.50	2.80	105.00	60.90	44.10
39.00	2.40	93.60	52.56	41.04

The tentative price of the new product should be ₹36 per unit. At this price the profit of C Ltd. is maximum, the maximum profit of the concern comes to ₹20,16,000.

Working Notes:

$$\begin{aligned} \text{Maximum Profit} &= \text{Maximum contribution} - (\text{Fixed production overhead} + \text{Administration expenses}) \\ &= ₹45,36,000 - (₹14,40,000 + ₹10,80,000) = ₹45,36,000 - ₹25,20,000 \\ &= ₹20,16,000 \end{aligned}$$

**Illustration 46:**

H M Ltd. Manufactures an alloy product 'Incop' by using iron and Copper. The metals pass through two plants, X



and Y. The company gives you the following details for the manufacture of one unit of Incop:

Materials	Iron : 10 kgs. @ ₹5 per kg.	Copper : 5 kg. @ ₹8 per kg.
Wages	3 hours @ ₹15 per hour in Plant X	5 hours @ ₹12 per hour in Plant Y
Overhead recovery	On the basis of direct labour hours	
Fixed overhead	₹8 per hour in Plant X	₹5 per hour in Plant Y
Variable overhead	₹8 per hour in Plant X	₹5 per hour in Plant Y
Selling overhead	(fully variable) ₹20 per unit	

- (i) Find out the minimum price to be fixed for the alloy, when the alloy is new to the market. Briefly explain this pricing strategy.
- (ii) After the alloy is well established in the market. What should be the minimum selling price? Why?

**Solution:**

Calculation of Total cost for manufacture of one unit of 'Incop' alloy product

(₹)

Materials			
Iron	(10 kg. × ₹5)	50	
Copper	(5 Kg. × ₹8)	40	90
Wages			
X	(3 hours × ₹15)	45	
Y	(5 hours × ₹12)	60	105
Variable overhead – production			
X	(3 hours × ₹8)	24	
Y	(5 hours × ₹5)	25	49
Variable overhead – Selling			20
Total variable cost			264
Add: Fixed overhead			
X	(₹8 × 3 hours)	24	
Y	(₹5 × 5 hours)	25	49
Total Cost			313

- (i) If pricing strategy is to penetrate the market, the minimum price for a new product should be the variable cost i.e. ₹264. In some circumstances, it can also be sold below the variable cost, if it is expected to quickly penetrate the market and later absorb a price increase. Total variable cost is the penetration price.
- (ii) When the alloy is well established, the minimum selling price will be the total cost - including the fixed cost i.e. ₹ 313 per unit. Long-run costs should cover at least the total cost.

**Illustration 47:**

C. Ltd., an Indian company, has entered into an agreement of strategic alliance with Z Inc. of United States of America for the manufacture of personal computers in India. Broadly, the terms of agreement are:

- (i) Z will provide C with kits in a dismantled condition. These will be used in the manufacture of the personal computer in India. On values basis, the supply, in terms of the FOB price will be 50% thereof.
- (ii) C will procure the balance of materials in India.



- (iii) Z will provide to C with designs and drawings in regard to the materials and supplies to be procedure in India. For this, C will pay Z a technology fee of ₹3 crores.
- (iv) Z will also be entitled to a royalty at 10% of the selling price of the computer fixed for sales in India as reduced by the cost of standard items procured in India and also the cost of imported kits from Z.
- (v) C will furnish to Z detailed quarterly returns.

Other information available:

- (i) FOB price agreed \$510. Exchange rate to be adopted \$1 = ₹47.059  
[Note - In making calculations, the final sum may be rounded to the next rupee].
- (ii) Insurance and freight – ₹500 per imported kit;
- (iii) Customs duty leviable is 150% of the CIF prices; but as a concession, the actual rate leviable has been fixed at 30% of CIF;
- (iv) The technology agreement expires with the production of 2,00,000 computers;
- (v) The quoted price on kits includes a 20% margin of profits on cost to Z;
- (vi) The estimated cost of materials and supplies to be obtained in India will be 140% of the cost of supplies made by Z.
- (vii) 48% of the value in rupees of the locally procured goods represent cost of the standard items.
- (viii) Cost of assembly and other overheads in India will be ₹2,000 per personal computer.

**Required** - Calculate the selling price of a personal computer in India bearing in mind that C has targeted a profit of 20% to itself on the selling price.

**Solution:**

**Working Notes:**

- (1) FOB price of dismantled kit

$$\begin{aligned} \text{FOB price of dismantled kit (in \$)} &= 510 \\ \text{FOB price of dismantled kit (in ₹) } (\$510 \times ₹47.059) &= 24,000 \end{aligned}$$

- (2) Cost of a dismantled kit to Z Inc.

If ₹120 is the S.P. of kit to Z Inc. then its C.P. is ₹100

$$\text{If ₹24,000 is the S.P. then C.P. is} = 24,000 \times 100/120 = ₹20,000$$

- (3) Cost of local procurements

$$140\% \text{ of the cost of supplies made by Zinc.} = 140\% \times ₹10,000^* = ₹14,000$$

\*Being 50% of cost of a dismantled kit to Z Inc.

- (4) Landed cost of dismantled kit (₹)

FOB price (50% × ₹24,000)	12,000
Add: Insurance and freight	500
CIF price	12,500
Add: Customs duty (30% × ₹12,500)	3,750
Landed cost of a dismantled kit	16,250

- (5) Cost of the standard items procured locally

$$48\% \text{ of the cost of locally procured goods} = ₹14,000 \times 48/100 = ₹6,720$$

- (6) Royalty payment per computer:

Let  $x$  = Selling price per unit of personal computer

$y$  = Royalty paid per computer

Since 20% is the margin of profit on S.P. it means a margin of 25% on C.P.,

Therefore we have:

$$x = 1.25 (\text{₹}32,250 + \text{₹}150 + y) \text{ and}$$

$$y = 10\% [x - (\text{₹}6,720 + \text{₹}16,250)]$$

On solving the above equations we get

$$x = \text{₹}43,000$$

$$y = \text{₹}2003.43 \text{ or } \text{₹}2,000 \text{ (approx.)}$$

Statement Showing the Selling Price of a Personal Computer in India	(₹)
Landed cost of a dismantled kit	16,250
Cost of local procurement	14,000
Cost of assembly and other overheads per computer	2,000
Total cost of manufacture	32,250
Technology fee per computer (₹3,00,00,000/2,00,000 computer)	150
Royalty payment per unit	2,000
Total cost	34,400
Profit (20% on selling price or 25% on total cost)	8,600
Selling price per computer	43,000

### 3.2 MARKET FACTORS AFFECTING PRICING DECISIONS

The traditional economic theories of pricing, based on demand and supply are of little use to businessmen in setting prices for their goods. The traditional economists rarely considered the influence exercised by middlemen, rival producers change in Government economic policies, taxation, etc., all of which are really important in price determination.

Under marginal principle of  $MC = MR$ , price and output are determined on the basic assumption of profit maximization. Some economists – Hall and Hitch of the Oxford University - rejected the assumption of profit maximization as unrealistic and inapplicable to actual business conditions. In their empirical study of actual business behaviour, Hall and Hitch found that business firms are either ignorant of the concepts of MR and MC or they do not actually calculate MR and MC. Naturally, they do not determine price and output at the point of equality of MR and MC. Besides, business firms are afraid of charging high prices in the short period much above their average costs of production, lest their price policy, resulting in supernormal profits, attract potential competitors to enter the industry and compete away the profits in the long run. High prices and high profit margins may attract public and Government reaction and possible intervention. In other words, in real life, firms would like to avoid entry of rivals and sharing of the market and for this, they would be prepared to forgo supernormal profits in the short period. Often, firms will be interested in getting a large share of the market rather than maximum profit. Sometimes, business firms are influenced by consideration of charging the “right price” with a “just profit margin”.

#### Factors influencing Price of a Product:

Generally, marketers consider the following factors in setting price:

1. Target customers: Price of product depends on the capacity of buyers to buy at various prices, in other words, influence of price elasticity of demand will be examined.
2. Cost of the product: Pricing is primarily based on, how much it costs to produce and market the product, i.e., both the production and distribution cost.
3. Competition: Severe competition may indicate a lower price than when there is monopoly or little competition.



4. The law: Government authorities place numerous restrictions on pricing activities.
5. Social responsibility: Pricing affects many parties, including employees, shareholders and the public at large. These should be considered in pricing.
6. Market position of the firm: The position of the market may also influence the pricing decision of the firm. It is only why the different producers of identical products sell their products at different prices.
7. Distribution channel policy: The prices of products will also depend upon the policy regarding distribution channel. The longer the channel, the higher would be the distribution costs and consequently higher the prices.
8. Price elasticity of Demand: Price elasticity refers to consequential change in demand due to change in price of the commodity. It is the relative responsiveness to the changes in price. As there an inverse relationship between price and demand for product, the demand will increase with fall in price.
9. Economic environment: In recession, prices are reduced to a sizeable extent to maintain the level of turnover. On the other hand, prices are charged higher in boom period to cover the increasing cost of production and distribution.

There are different types of methods of pricing. The main pricing practices can be classified into following broad categories:

### **(1) Competition Oriented Pricing:**

#### **(a) Going Rate Pricing:**

Another method of pricing adopted by small firms – which are price followers – is known as going rate pricing. Under this system, a firm sets its price according to the general pricing structure in the industry or according to the price set by the price leader. In a sense, each firm has “monopoly” power over its produce and it can, if it chooses, fix a monopoly price and face all the consequences of monopoly. In practice, however, it prefers the easier and more practical method of choosing price going in the market. It will change its price only when other firms do the same. Such a price policy is useful and safe to a firm under certain circumstances. For instance, the firm may not have an accurate idea of its costs or it may like to play safe and not provoke the larger firm to go for cut- throat competition. Besides, it is difficult for each firm to calculate the full implication of change in costs and prices and it is much better to follow the same pattern of pricing adopted by others. Even a large firm may be satisfied with going rate pricing lest a change in price by it unnecessarily disturbs the whole market. No firm would like to “spoil” the common market by reducing the price.

#### **(b) Trade Association Pricing:**

To avoid uncertainties of pricing decision and the downward pressure on prices which competition exerts, firms frequently come to the express or implied agreements to maintain prices at a similar level. Though express (or, overt) agreements are generally declared as illegal, the firms can easily and safely enter into an implied (or, tacit) collusion. Individual firms, however, may frequently find it worthwhile to break out of any such agreements, but this leads to the following possible alternatives:

- (i) The price-cut may spark off a price war between the firms which will go on until one or all firms give up the struggle; or
- (ii) If the firm breaking out of the collusion is able to keep its rivals in the dark about the price- cut, it can gain out of the price-cut only when either the original customers of this firm are unaware or are in some way loyal to this firm. But such situations are generally rare.

#### **(c) Customary Pricing:**

There are certain goods whose prices tend to be fixed more or less in the minds of consumers-these are known as the “Charm” prices. Change in costs of production – if the change is moderate – will not affect the price, as the firms will not and cannot change the price. Accordingly, a rise in cost of production may probably lead to reduction in quality of the product but not to a rise in price. Likewise, a fall in cost of production may not be accompanied by a decline in price. Pricing in this case may be known as customary pricing.



**(d) Price Leadership:**

If often happens that in an industry there is one or many big firms whose cost of production is low and they dominate the industry. In such a situation, the small firms will not like to enter into price war with these big firms. The former may, therefore, follow the price fixed by the leader. For example, Cadbury may be accepted as a leader in the chocolate industry, Hindustan Lever in the soap industry, and so on. Small firms may change the price only when there is a general change in the cost of production and the price leader has recognized and adjusted his price on that basis. In fact, the price leadership pattern is adopted as a strategy of co-existence – each firm catering to its market.

It is not necessary that the price charged by small firms must equal that charged by the price-leader. There might be some difference in their prices (though it cannot be significant) but any change in the price is always in the same direction for both the price-leader and the followers, and is generally in the same proportion too. As a result, both will have their own markets to cater, thus avoiding diversion of customers.

**(e) Sealed – bid Pricing:**

This method is more popular in tenders and contracts. Each contracting firm quotes its price in a sealed cover called 'tender'. All the tenders are opened on a scheduled date and the person, who quotes the lowest price, other things remaining the same, is awarded the contract.

**(2) Demand Oriented Pricing:**

**(a) Differential Pricing or Price Discrimination**

There are many bases on which the open price discrimination is practiced. These are discussed below:

- Time Price Differentials: It is a general practice to use the expression "the demand for a product or service", but it is important to note that demand also has a time dimension. The demand may shift in fairly short-time intervals. For example, demand for telephone facilities is more in the day time rather than at night.
- Use Price differentials: Different buyers have different uses of a product or a service. For example railways can be used for long-haul or short-haul freight traffic. Railways can also be used for transporting different types of commodities. Electricity can similarly, be used for industrial or residential purposes.
- Quality price Differentials: If the product caters to that group of consumers who are concerned about its quality, then the quality becomes a significant determinant of demand elasticity. The seller has, therefore, to create differences in quality to sell his product. It must be emphasized here that the differences in quality basically depend upon the buyers' understanding of the quality. Sellers use many devices to create quality differences.
- Quantity Differentials: When the seller discriminates on the basis of the quantity of purchase, it is known as quantity differentials. Quantity discounts are price concessions based on the size of the lot purchased at one time and delivered at one location. These discounts are thus related to size of a single purchase. The size of the lot purchased is measured in terms of either physical units or monetary units. Sometimes, discounts are according to the trade status, i.e., wholesaler, retailer, jobber, etc.

**(b) Perceived Value Pricing:**

Perceived value pricing refers to fixing the price on the basis of a buyer's perception of the value of the product.

**(3) Pricing based on other Economic Considerations:**

**(a) Administered Pricing:**

Administered prices are the prices which are fixed and enforced by the Government. The term administered prices was introduced by Keynes.

Characteristics of administered prices:



1. They are fixed by Government
2. They are statutory i.e., legally enforced by the Government
3. They are regulatory in nature
4. They are meant as corrective measure
5. They are the outcome of the price policy of the Government.

**(b) Dual Pricing:**

Dual pricing is a system in which there are two prices for the same commodity at the same time – one is a controlled price fixed by the Government and the other is a free market price based on conditions of demand and supply. The controlled price is fixed price while the free market price is a fluctuating price. Generally, the Government fixed the prices of a commodity – say, sugar – at a level which will cover the cost of production and permit a reasonable margin of profit. But this controlled price is obviously lower than the free market price because of the existence of excess of demand over supply. The controlled price is mainly for the benefit of lower income groups and it may often be fixed so low that the producers may incur a small margin of loss. The producers are compelled to sell part of their output at the controlled rate to the weaker sections of the community but are permitted to sell the surplus stocks in the market at the free market price which is much higher. This enables the producers to make up their loss in the controlled market or increase their volume of profit. Besides, the general consumers are given a chance to satisfy their demand fully from the market.

**(c) Shadow Pricing:**

The producer has to decide two questions – 1) how much of each product should be produced to maximize profits? 2) What price is worth paying for additional quantities of a scarce resource? To decide the second question "What price is worth paying for additional quantity of a scarce resource", very often "shadow prices" are used. Shadow prices are not prices obtained by observing the real world. Shadow prices are "imputed values". The shadow price shows the marginal contribution of the factors of production employed. It is calculated by using the "simplex method". These imputed values show the increase in profit which would result if an additional unit of that scarce factor is used. The imputed value is the reduction in contribution if that scarce factor is removed.

**(d) Multiple Product Pricing:**

Now-a-days, multiple production is a common phenomenon. Almost all firms have more than one product in their line of production. Pricing of products under those conditions is known as multi-product pricing. The major problem in pricing of multiple products is that each product has a separate demand curve. But all of them are produced under one organisation by interchangeable production facilities, they have only one inseparable marginal cost curve. Hence marginal rule of pricing cannot be applied. E.W. Clemens suggests a solution to this problem as – third degree price discrimination under monopoly. As a discriminating monopoly tries to maximize its revenue in all its markets so does a multi-product firm in respect of each of its products.

Even the most specialized firms produce a commodity in multiple models, styles and sizes, each so much differentiated from the other that each model or size, may be considered a different product.

For example:

Refrigerators – 165 liters, 200 liters, 250 liters, single door model, two door model, bottom racks, top racks models etc.

Television sets – 14 inches, 20 inches, 21 inches, 25 inches, 27 inches, color - black & white, remote model, without – remote model, flat screen model, digital sound two speakers, four speakers, home theater systems etc.

**(4) Pricing Policies Based on Market Conditions:**

**(a) Perfect Competition:**



A firm can only sell its product at the market price and nothing above it. In the long run, for an efficient firm, the sales price is just equal to the average cost. Normal profit is made. There is no excess profit.

**(b) Monopoly:**

Monopolies are almost always nationalized enterprises for which the criterion of maximization of profit is not justifiable. In reality, a firm enjoys monopoly position only because it has succeeded in eliminating or absorbing its competitors. It is therefore probable that, initially, it was better organized and more efficient.

The technical advantages which benefit large firms in certain branches of industry can also neutralize, at least partly, the harmful effects of a monopoly. Finally, "any defacto monopoly must be prepared to defend itself, on the one hand, against the emergence of substitute competitors and, on the other, against the competition of substitute products, which imposes a limitation on its profit realization".

In general, to prevent the entry of new firms, a monopolist must set entry-preventing prices, i.e., it should hold prices at a level which will tend to discourage new firms from entering that particular branch of industry. This presupposes an implicit estimation of production costs of possible competitors, and of the profits which will be required to attract them.

On the contrary, in order to fight the competition of substitute products, a monopoly must establish its price policy on the basis of a demand curve which will actually take those products into account. When the uses of goods produced by a monopoly are many, the degree of monopoly can vary enormously from one use to another. In case of coal, for instance, sales range from the industrial market- in which the fuel oil competition is extremely active – to blast furnace coke market – in which coal enjoys a technical monopoly.

So profit maximization demands that management collect more detailed econometric data in the environment of monopoly, than in that of perfect competition.

**(c) Temporary Monopoly:**

This situation occurs more frequently. A firm invents a new product and places it on the market. For quite some time the demand will remain low, as consumers are not yet aware of the product. The firm will enjoy a de facto monopoly under the protection of its patents. Then, as the product enters into common usage, demand develops rapidly. Additional firms try to enter the market. They develop new production methods. Gradually, prices and production techniques tend to stabilize. So at the end, the market evolves towards an ordinary competitive one.

A firm which invents a new product must determine a strategy relating to prices and production which leads to a maximum effective income. Following J. Dean, we may consider two extreme cases: that of skimming of demand and that of creating a demand market.

**(d) Skimming Price Policy:**

When the product is new but with a high degree of consumer acceptability, the firm may decide to charge a high mark up and, therefore, charge a high price. The system of charging high prices for new products is known as price skimming for the object is to "skim the cream" from the market. There are many reasons for adopting a high mark-up and, therefore, high initial price:

- i) The demand for the new product is relatively inelastic. The high prices will not stop the new consumers from demanding the product. The new product, novelty, commands a better price. Above all, in the initial stage, cross elasticity of demand is low.
- ii) If life of the product promises to be a short one, the management may fix a high price so that it can get as much profit as possible and, in as short a period as possible.
- iii) Such an initially high price is also suitable if the firm can divide the market into different segments based on different elasticities. The firm can introduce a cheaper model in the market with lower elasticity.
- iv) High initial price may also be needed in those cases where there is heavy investment of capital and when the costs of introducing a new product are high. The initial price of a transistor radio was ₹ 500 or more (now ₹ 50 or even less).

**(e) Duopoly:**

This is the case where there are only two firms in an industry. Each duopolist can choose his production in such a way as to maximize his income for a given value of output. Each duopolist has no interest in modifying his behaviour as long as the other does not modify this.

If both duopolists attempt to take one another's reactions into account, the problem is no longer predetermined. Duopoly is often characterized by instability. Duopolists eliminate their competitors through price wars or through agreements. Duopolists can assure themselves by cooperating, a total income greater than the sum of the revenues that each can insure for himself by non-cooperative behaviour.

**(f) Oligopoly:**

In oligopolistic situations, entrepreneurs attempt to avoid price wars which are ruinous for the industry. Being aware of the fact that their rivals can do the same, they refrain from seeking to increase their share of the market through price cuts. As a result, oligopoly can attain a certain stability characterized by: a) the 'price leadership' of a firm, b) the reduction of hidden prices, and c) competition in fields other than that of price (like promotion, packaging, etc.).

Now, about the lowering of hidden prices. It can assume various forms. It is contingent upon the customer, upon the size of the order, upon the geographical area and the existence of inferior brands. This policy has the advantage that it precedes adjustments of official prices and in this way contributes to the stability of oligopolists.

Finally, non-price competition is a substitute for price competition. It is much less dangerous because its effects are felt in the long run. So the possibilities of reactions from competition are more limited.

**(g) Monopolistic competition:**

In this type of market, price policies are extremely varied because of product differentiation. Each firm is faced with a separate demand curve and a market price.

**The Role of Demand in Pricing Decisions:**

How a business firm's buyers respond to a change in price is an important consideration, for the eventual effect on sales volume and revenue is determined by the degree of buyer's demand sensitivity to price changes. However, price-setters often miss the following four points:

**1. Market Vs Firm Elasticity:**

Price elasticity of demand is a measure of the degree to which buyers are sensitive to price changes. In any market characterized by several functionally substitutable products, there are actually two demand schedules: 1) demand for the general product (primary demand) and 2) demand for the firm's specific offering (secondary demand). In general, secondary demand is found to be more price elastic. But a seller may sometimes mistake relatively inelastic market or primary demand as elastic secondary demand.

**2. Demand for buyer's Output:**

The Market for buyer's products may actually be price-elastic. So a reduction in price by a firm would raise demand for its product. Hence, manufacturers selling to such buyers, and whose product represents a significant portion of these buyers product costs may curtail sales opportunities by eliminating discounts or low margin products.

**3. Likelihood of Competitive Entry:**

K.B. Monroe has pointed out that "an emphasis on high-price strategies may encourage the entry of competitors when entry barriers are minor and when demand is actually price-elastic. Moreover, high prices or rapidly increasing prices may force buyers to reconsider their need and, perhaps, actively seek out competitive substitutes.

**4. Demand Consequences of a Product Line:**

Most firms sell a wide variety of products requiring a variety of different marketing strategies. Within a product line there are usually some products that are functional substitutes for each other and some products that are functionally complementary. For example, a photographic product line includes such items like cameras, films, flash bulbs, projectors, screens and other accessories. Because of the demand interrelationships and because there are usually several price-market targets, the product line pricing problem throws a major challenge before the marketing executives.



**Short Questions & Answers:**

**Q.1.** The necessary condition for equilibrium position of a firm is:

- A.  $MC > MR$ ;
- B.  $MC > \text{Price}$ ;
- C.  $MC = MR$ ;
- D.  $MC$  is falling;
- E.  $MC = AC$ .

**Answer:**

**E.  $MC = AC$**

**Q.2.** At the point of equilibrium of firm (under perfect competition):

- A.  $MC$  curve must be rising;
- B.  $MC$  curve must be falling;
- C.  $MR$  curve must be rising;
- D. None of these.

**Answer:**

**A.  $MC$  curve must be rising**

**Q.3.** Normal profit is:

- A. Part of total cost;
- B. Part of economic profit;
- C. Total revenue minus total cost;
- D. Total revenue minus implicit cost.

**Answer:**

**A. Part of total cost**

**Q.4.** Economic profit is:

- A. Part of total cost;
- B. Total revenue minus total cost;
- C. Total revenue minus explicit cost;
- D. Total variable cost minus total fixed cost.

**Answer:**

**B. Total revenue minus total cost**

**Q.5.** The basic goal of a firm is to:

- A. Maximize revenues;
- B. Maximize welfare of its employees;
- C. Maximize profit;
- D. Maximize output.

**Answer:**

**C. Maximize profit**

**Q.6.** A firm earns economic profit when total profit exceeds:



- A. Normal profit;
- B. Implicit costs;
- C. Explicit costs;
- D. Variable costs.

**Answer:**

**A. Normal profit**

**Q.7.** A firm's total revenue is equal to:

- A. Total quantity produced times marginal cost;
- B. Total quantity produced times market price;
- C. Marginal revenue times total quantity produced;
- D. Market price divided by total quantity produced.

**Answer:**

**B. Total quantity produced times market price.**

**Q.8.** A firm's marginal revenue is defined as:

- A. The ratio of total revenue to total quantity produced;
- B. The additional output produced by lowering price;
- C. The additional revenue received due to technical innovation;
- D. The additional revenue received when selling one more unit of output.

**Answer:**

**D. The additional revenue received when selling one more unit of output.**

**Q.9.** In order to maximize profits, a firm should produce at the output level for which:

- A. Average cost is minimized;
- B. Marginal revenue equals marginal cost;
- C. Marginal cost is minimized;
- D. Price minus average cost is as large as possible.

**Answer:**

**B. Marginal revenue equals marginal cost.**

**Q.10.** If a firm is a price taker, its marginal revenue is:

- A. Equal to market price;
- B. Less than market price;
- C. Greater than market price;
- D. A multiple of market price that may be either greater than or less than one.

**Answer:**

**A. Equal to market price.**

**Q.11.** Which of the following is a characteristic of a perfectly competitive market?

- A. Firms are price setters;
- B. There are few sellers in the market;
- C. Firms can exit and enter the market freely;
- D. All of these.

**Answer:**



**C. Firms can exit and enter the market freely**

**Q.12.** Which of the following is NOT a financial objective of pricing?

- A. Corporate growth;
- B. Return on investment;
- C. Profit maximization;
- D. None of these

**Answer:**

**A. Corporate growth**

**State if the following statements are true or false:**

**Q.13.** A monopoly is a market structure in which there is not only one producer/seller for a product.

**Answer:**

**False.**

**Q.14.** A perfectly competitive firm produces the profit- maximizing quantity of output that equates marginal revenue and marginal cost.

**Answer:**

**True.**

**Q.15.** A monopolist can sell more of his output only at a lower price and can reduce the sale at a high price.

**Answer:**

**False.**

**Q.16.** In Monopolistic competition, pricing policies are extremely varied because of product differentiation.

**Answer:**

**True.**

**Fill in the blanks:**

**Q.17.** \_\_\_\_\_ Price Policy is the system of charging high prices for new products to "skim the cream" from the market.

**Answer:**

**Skimming**

**Q.18.** Dual pricing is a system in which there are \_\_\_\_\_ prices for the same commodity at the same time.

**Answer:**

**two**

**Q.19.** The term administered prices was introduced by \_\_\_\_\_.

**Answer:**

**Keynes**

**Q.20.** Sealed – bid pricing method is more popular in \_\_\_\_\_ and \_\_\_\_\_.

**Answer:**

**tenders, contracts**

# Study Note - 4

## ENTERPRISE RISK MANAGEMENT



### This Study Note includes

- 4.1 Risk Management
- 4.2 Corporate Risk Management
- 4.3 Corporate Failure

### 4.1 RISK MANAGEMENT

Risk management has become the most important topic for banks in the recent years. Addressing risk management in the context of current challenges is a complex matter and a function of appropriate policies, procedures and culture. Risk management will be successful if the word risk is understood well and clearly.

#### Overview

Risk is perceived as probable adverse impact of an action. It has two components or factors viz. probability of adverse impact of a threat and its impact of resource losses. Both these factors are taken together in assessing risk. The probability factor is due to uncertainty (ignorance) of operation of the threat.

An enterprise may have internal and external threats. Changes in technology, demand, regulations as well as competition are potential external threats. Stock-out of critical spares, labour unrest, unbalanced or bottlenecked production capacity, etc are potential internal threats. Other common risks are catastrophe, war, riots, accidents, etc (These are insurable and normally included in commercial contracts as 'forced measure' situations). More the time horizon considered, more is the risk. Some risks are statistically predictable

Strategies for managing risks involve analysis of strength, weakness, opportunity and threat (acronym 'SWOT'). Such analysis develop 'scenarios' (options) for achieving the objectives. The best option is selected. In such selection, pains in not bearing the risk is weighed against gains in bearing risk.

Risk is managed through one of the alternative strategies mentioned below :

- risk avoidance e.g. avoiding rough weather in sailing.
- risk minimization e.g. fire prevention arrangement.
- risk sharing e.g. insurance, limited liability companies, diversification, outsourcing.
- risk bearing i.e. accepting risk with preparations for contingencies. While above three strategies mitigates losses, risk bearing alone gives rise to profits.

ISO has a specific series of standards for risk management. It is noteworthy that too much stress on risk management may delay projects. Therefore, it is advisable to follow standard procedures for assessing risks as a part of planning, using scientific techniques like analysis of industry history, business forecasting, scenario development, cause-effect analysis, testing of hypothesis, etc.

#### Risk

According to Dowd (2005), Risk refers to the chance of financial losses due to random changes in underlying risk factors.

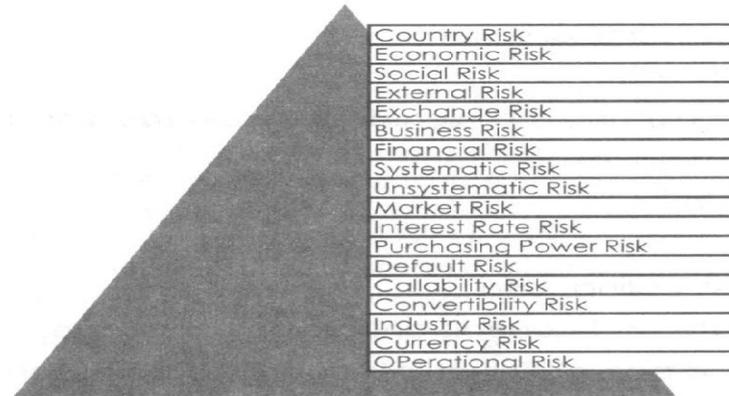
A risk is a random event that may possibly occur and, if it did occur, would have a negative impact on the goals of the organization. It is the probability of incurring loss due to unexpected and unfavorable movement of certain parameters.

Risk is composed of three elements — the scenario, its probability of occurrence, and the size of its impact if it did occur (either a fixed value or a distribution). Risk is thus measured by volatility.

An opportunity is also a random variable which is the other side of the coin! But it has a positive impact on the goals of the organization.

In the corporate world, accepting risks is necessary to obtain a competitive advantage and generate profit. Introducing new product or expanding production facilities involves both return and risk. When a company is exposed to an event that can cause a shortfall in a targeted financial measure or value, this is financial risk.

### Types of RISK



Risk can be of the following types:

**Political Risk:** Political risk is defined as "the possibility of a multinational company being significantly affected by political events in a host country or a change in the political relationships between a host country and one or more other countries". Political risk is the unwanted consequences of political activities that will have effect on the value of the firm. The multinational companies which are making foreign direct investment must assess the political risk, before any such investments are made. The political component in country risk can be subdivided into two categories, internal political risk and external political risk. Internal political risk arises due to internal conflicts such as racial/religious riots, rebellions, rural/separatist insurgency or political turmoil. Such activities tend to destabilize the state, which will in turn result in delays or defaults in the repayment of loans. External political risk is exposure to loss as a result of acts such as war or occupation by foreign powers, while a war may cause a delay in the repayment of debts. Occupation of foreign power may result in default, as the new power may not reorganize the debt obligations of the former Government. The possibility of such political upheaval needs to be carefully evaluated by the lender before releasing funds to a foreign state.

**Country Risk:** The country risk is defined as exposure to a loss in offshore lending, caused by events in a particular country, events which are, at least to some extent, under control of the Government but definitely not under the control of a private enterprise or individual. Country risk is a broad concept encompassing sovereign, political as well as other forms of risks like economic, social and external risks. Since country risk is the sum total of a number of different types of risk, assessing country risk would mean the evaluation of each of these risks that contribute towards it. The country risk is an all embracing term incorporating all types of risks a lender encounters in offshore lending. Country risk means with reference foreign funding the possibility that a borrower will be unwilling or unable to service its debt in a timely fashion - the risk from cross-border lending that arises from events to some degree under the control of the Government of the borrowing country. Country risk is inherent with dealing of state (sovereign risk) or any overseas business. The assessment of country risk, involves both qualitative and quantitative analysis of political, social, economic and natural conditions in the country in which the borrower operates.

**Economic Risk:** Economic risk is concerned with the general economic climate within the country. Some of the factors which reflect the economic climate of a country are:

(a) level of affluence enjoyed by the country.



- (b) the growth rate of income.
- (c) the nation's propensity to save/invest.
- (d) the stability of prices (inflation).
- (e) characteristics of the labour force.
- (f) level of sophistication of the financial system.
- (g) level of foreign debt outstanding.
- (h) major income earners (exports) and their sensitivity to overall global economic changes.
- (i) extent of dependence on major export items.
- (j) trends in balance of payments.
- (k) level of imports
- (l) level of reserve and credit standing, and
- (m) fluctuations of exchange rate and controls on foreign exchange.

**Social Risk:** Social risk refers to the possibilities of loss due to factors such as religious fanaticism, ethnic polarization, dissatisfaction among the people as a result of wide disparity in income distribution, or regionalism. These sociological problems eventually lead to riot and revolutions resulting in loss of lives and property. An economy plagued by riots and revolutions will undoubtedly face problems in repaying its debts.

**External Risk:** The external risk component of country risk arises due to situations outside the country. For instance, if the borrower nation is situated beside a country which is at war, the country risk ratios of the prospective borrower will be higher than what will be the case if its neighbour is at peace. This difference in the risk rating is attributable to external risk. Although the borrower nation may not be directly involved in the conflict, the chance of spillover may exist.

**Exchange Risk:** Since the liability of the borrower of the foreign currency financing remains in the currency in which the borrower obtains loan, so at the time of repayment the rupee liability is determined on the basis of the exchange rate prevailing on the date of repayment. The exchange rate fluctuates widely with the passage of time, so the borrower is subject to exposure to exchange rate fluctuations on the outstanding principal of the foreign currency financing. Further if the borrowing is made at a floating rate of interest, there can be substantial variations in the rate of interest with the passage of time, depends on the variations in the LIBOR.

**Business Risk:** A company's business risk is determined by how it invests its funds i.e., the type of projects which it undertakes, while financial risk is determined by how it finances these investments. A company's competitive position, the industries in which it operates, the company's market share, the rate of growth of the market and the stage of maturity all influence business risk. Business risk relates to volatility of revenues and profits of a particular company due to its market conditions, product mix, input availability, competitive market condition, labour supply etc. The business risk may be due to external factors or internal conditions of a particular business firm. External business risk arises due to change in operating conditions caused by conditions thrust upon the firm which are beyond its control - such as business cycles, Governmental controls etc. Internal business risk is associated with the efficiency with which a firm conducts its operations within the broader environment imposed upon it.

**Financial Risk:** Financial risk is primarily influenced by the level of financial gearing, interest cover, operating leverage, and cash flow adequacy. The financial risk depends on the method of financing adopted by the company. Financial risk is associated with the capital structure of a firm. A firm with no debt financing has no financial risk. The extent of financial risk depends on the leverage of the firm's capital structure. A highly geared firm may face the problems like high cost of equity and debt funds, cash flow problems in servicing off debt obligations, constraints on management control, fall in profits available to equity holders etc. The financial risk will also arise due to short-term liquidity problems, shortage of working capital, inefficiency in collection of receivables, bad debts, funds tied in excess inventories, long operating cycle etc.



**Systematic Risk:** Systematic risk refers to that part of total risk which causes the movement in individual stock price due to changes in general stock market index. Systematic risk arises out of external and uncontrollable factors. The price of individual security reflects the fluctuations and changes of general market. Systematic risk refers to that portion of variation in return caused by factors that affect the price of all securities. The effect in systematic risk causes the prices of all individual shares/bonds to move in the same direction. This movement is generally due to the response to economic, social and political changes. The systematic risk cannot be avoided. It relates to economic trends which affect the whole market. When the stock market is bullish, prices of all stocks indicate rising trend and in the bearish market, the prices of all stocks will be falling. The systematic risk cannot be eliminated by diversification of portfolio, because every share is influenced by the general market trend.

**Unsystematic Risk:** Unsystematic risk is that portion of total risk which results from known and controllable factors. Unsystematic risk refers to that portion of the risk which is caused due to factors unique or related to a firm or industry. The unsystematic risk is the change in the price of stocks due to the factors which are particular to the stock. For example, if excise duty or customs duty on viscose fibre increases, the price of stocks of synthetic yarn industry declines. The unsystematic risk can be eliminated or reduced by diversification of portfolio. Unsystematic risks are those that are unique to a particular company or a particular investment, resulting downward movement in the performance of one company can be offset by an uptrend movement in another and so much of this unsystematic risk can be eliminated through diversification on the part of the shareholders when they hold a portfolio of shares. The systematic risk attached to each of the security is same irrespective of any number of securities in the portfolio. The total risk of portfolio is reduced, with increase in number of stocks, as a result of decrease in the unsystematic risk distributed over number of stocks in the portfolio.

**Market Risk:** The market risk arises due to changes in demand and supply, expectations of the investors, information flow, investor's risk perception etc. Variations in price sparked off due to real social, political and economic events are referred to as market risk.

**Interest Rate Risk:** The return on investment depends on the market rate of interest, which changes from time to time. The cost of corporate debt depends on the interest rates prevailing, maturity periods, creditworthiness of the borrowers, monetary and credit policy of the central bank, riskiness of the investments, expectations of the investors etc. The uncertainty of future market values and the size of future incomes, caused by fluctuations in the general level of interest are known as 'interest rate risk'. Generally, price of securities tend to move inversely with changes in the rate of interest.

**Purchasing Power Risk:** Uncertainties of purchasing power is referred to as risk due to inflation. If investment is considered as consumption sacrificed, then a person, purchasing securities, foregoes the opportunity to buy some goods or services for so long as he continues to hold the securities. In case, the prices of goods and services, increases during this period, the investor actually loses purchasing power. The investors expected return will change due to change in real value of returns. The risk in prices due to inflation will cause to rise in cost of production and reduction in profit due to lower margins. The supply of money, monetary and fiscal policy of the Government will cause the changes in inflation. The investors' expectations will also change with the changes in levels of purchasing power. The purchasing power risk is inherent in all securities, which is uncontrollable by the individual investors.

**Default Risk:** The default risk arises due to the default in meeting the financial obligations as and when due for payment. The non-payment of interest and principal amounts in time will increase the risk of insolvency and bankruptcy costs. The default risk or insolvency risk will cause a sudden dip in company's stock prices.

**Liquidity Risk:** It is that portion of an asset's total variability of return which results from price discounts given or sales commissions paid in order to sell the asset without delay. It is a situation wherein it may not be possible to sell the asset. Assets are disposed off at great inconvenience and cost in terms of money and time. Any asset that can be bought or sold quickly is said to be liquid. Failure to realize with minimum discount to its value of an asset is called liquidity risk.

**Callability Risk:** It is that portion of security's total variability of returns that derives from the possibility that the issue may be called or redeemed before maturity. Callability risk commands a risk premium that comes in the form of a slightly higher average rate of return. This additional return should increase as the risk increases.



**Convertibility Risk:** It is that portion of the total variability of return from a convertible bond or a convertible preferred stock that reflects the possibility that the investment may be converted into the issuer's common stock at a time or under terms harmful to the investor's best interests.

**Industry Risk:** It is that portion of an investment's total variability of return caused by events that affect the products and firms that make upon industry, the stage of the industry's life cycle, international tariffs and/or quotas on the product produced by an industry.

**Currency Risk:** These are associated with international investments not denominated in the home currency of the portfolio manager's beneficiaries. These risks involve the international payment of cash. Currency risks on a global basis may be close to unsystematic, meaning that they are uncorrelated across economies and are not priced.

**Operational Risk:** Operational risk arises primarily due to deviation from planned normal functioning of system, procedures, technology, human failure, omission or commission of errors. It also arises due to inherent fault in the systems, procedures and technologies that affect the revenue of the organization adversely. As the activities of the organization change due to globalization and integration, new factors are continuously influencing and increasing the operational risk.

### Definition of Risk Management

Risk management is the process of measuring or assessing risk and developing strategies to manage it. Risk management is a systematic approach in identifying, analyzing and controlling areas or events with a potential for causing unwanted change. It is through risk management that risks to any specific program are assessed and systematically managed to reduce risk to an acceptable level. Risk management is the act or practice of controlling risk. It includes risk planning, assessing risk areas, developing risk handling options, monitoring risks to determine how risks have changed and documenting overall risk management program.

According to Deventer, Imai & Mesler (2005), it is the discipline which makes us appreciate the risks and returns from various portfolio and transaction-level strategies. At portfolio level, CEO, Chief Risk Officer (CRO), RMD, ALCO manages the risks in a Banking Institution. At transaction level, Trader, Swap dealer, loan officers manages the risk. The risks from individual transactions might be diversified away at the portfolio or institution level.

Risk management is a systematic approach to setting the best course of action under uncertainty by identifying, assessing, understanding, acting on and communicating risk issues. A Key ingredient of the risk measurement process is the accuracy and quality of master data that goes into the computation of different aspects of risk. It is no surprise therefore that Master Data Management is a key area. Risk management is first and foremost a 'science' and then an 'art'. Given the appetite for risk, if one uses accurate and relevant data, reliable financial models and best analytical tools, one can minimize risk and make the odds work in one's favour.

Risk Management process needs to identify measure and manage various risks so that comparison of risks and returns is possible to set corporate strategies. Risk Management is the identification and evaluation of risks to an organization including risks to its existence, profits and reputation (solvency) and the acceptance, elimination, controlling or mitigation of the risks and the effects of the risks.

Risk Management framework need a common metric to rank return and potential losses from different portfolios and risk categories.

Integrated risk management is a continuous, proactive and systematic process to understand, manage and communicate risk from an organization-wide perspective. It is about making strategic decisions that contribute to the achievement of an organization's overall corporate objectives.

### Objectives of Risk Management

Risk management basically has the following objectives:

- (a) Anticipating the uncertainty and the degree of uncertainty of the events not happening the way they are planned.
- (b) Channelizing events to happen the way they are planned.



- (c) Setting right, at the earliest opportunity, deviations from plans, whenever they occur.
- (d) Ensuring that the objective of the planned event is achieved by alternative means, when the means chosen proves wrong, and
- (e) In case the expected event is frustrated, making the damage minimal.

### **Risk Measurement**

Evaluation of the likelihood and extent or magnitude of a risk is known as Risk Measurement. In other words, it can be defined as a real valued function numerically representing an individual decision maker's risk ordering on a given set of alternatives. It quantified the amount of perceived risk. It provides fundamental support to decision making within the insurance industry.

### **Risk Pooling**

One of the forms of risk management mostly practiced by insurance companies is Risk Pool. Under this system, insurance companies come together to form a pool, which can provide protection to insurance companies against catastrophic risks such as floods, earthquakes etc. The term is also used to describe the pooling of similar risks that underlies the concept of insurance. While risk pooling is necessary for insurance to work, not all risks can be effectively pooled. In particular, it is difficult to pool dissimilar risks in a voluntary insurance market, unless there is a subsidy available to encourage participation.

Risk pooling is an important concept in supply chain management. Risk pooling suggests that demand variability is reduced if one aggregates demand across locations because as demand is aggregated across different locations, it becomes more likely that high demand from one customer will be offset by low demand from another. This reduction in variability allows a decrease in safety stock and therefore reduces average inventory.

The three critical points to risk pooling are:

- (1) Centralized inventory saves safety stock and average inventory in the system.
- (2) When demands from markets are negatively correlated, the higher the coefficient of variation, the greater the benefit obtained from centralized systems i.e., the greater the benefit from risk pooling.
- (3) The benefits from risk pooling depend directly on the relative market behaviour. If we compare two markets and when demand from both markets is more or less than the average demand, we say that the demands from the market are positively correlated. Thus the benefits derived from risk pooling decreases as the correlation between demands from the two markets becomes more positive.

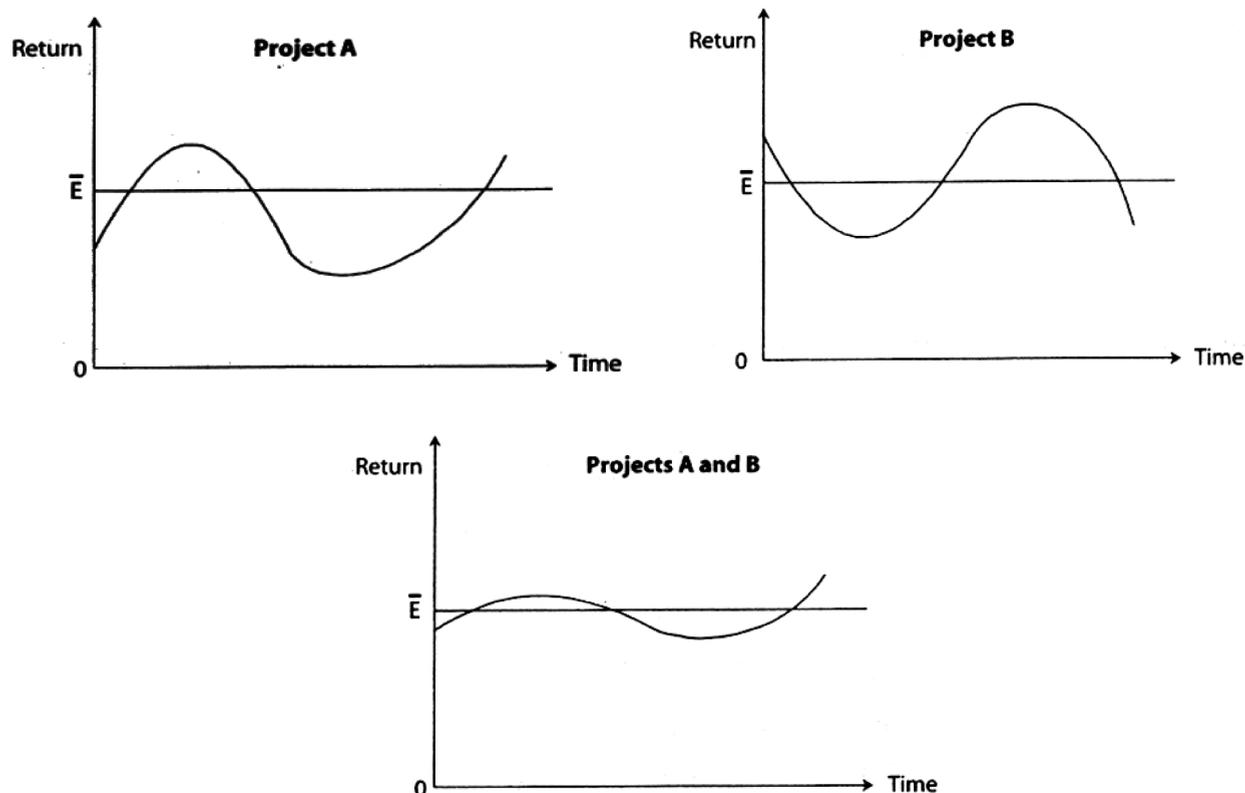
The basis for the concept of risk pooling is to share or reduce risks that no single member could absorb on their own. Hence, risk pooling reduces a person or firm's exposure to financial loss by spreading the risk among many members or companies. Actuarial concepts used in risk pooling include:

- (A) Statistical variation.
- (B) The law of averages.
- (C) The law of large numbers.
- (D) The laws of probability.

### **Risk Reduction through Diversification**

The important principle to consider that in an efficient capital market, investors should not hold all their eggs in one basket; they should hold a well-diversified portfolio. In order to diversify risk for the creation of an efficient portfolio (one that allows the firm to achieve the maximum return for a given level of risk or to minimize risk for a given level of return), the concept of correlation must be understood. Correlation is a statistical measure that indicates the relationship, if any, between series of numbers representing anything from cash flows to test data. If the two-series move together, they are positively correlated; if the series move in opposite directions, they are negatively correlated. The existence of perfectly correlated (especially negatively correlated) projects is quite rare. In order to diversify project risk and thereby reduce the firm's overall risk, the projects that are best combined or added to

the existing portfolio of projects are those that have a negative (or low positive) correlation with existing projects.



### Reduction of Risk through Diversification

By combining negatively correlated projects, the overall variability of returns or risk can be reduced. It shows that a portfolio containing the negatively correlated projects A and B, both having the same expected return,  $E$ , also has the return  $E$ , but less risk (i.e., less variability of return) than either of the projects taken separately. This type of risk is sometimes described as diversifiable or alpha risk. The creation of a portfolio by combining two perfectly correlated projects cannot reduce the portfolio's overall risk below the risk of the least risky project, while the creation of a portfolio combining two projects that are perfectly negatively correlated can reduce the portfolio's total risk to a level below that of either of the component projects, which in certain situations may be zero. Combining projects with correlations falling between perfect positive correlation (i.e., a correlation coefficient of +1) and perfect negative correlation (i.e., a correlation coefficient of -1), can therefore reduce the overall risk of a portfolio.

### Benefits of Diversification

The gains in risk reduction from portfolio diversification depend inversely upon the extent to which the returns on securities in a portfolio are positively correlated. Ideally the securities should display negative correlation. This implies that if a pair of securities has a negative correlation of returns, then in circumstances where one of the securities is performing badly the other is likely to be doing well and vice versa in reverse circumstances. Therefore the 'average' return on holding the two securities is likely to be much 'safer' than investing in one of them alone.

### Total Loss Distribution

Probability distributions can be very useful tools for evaluating the expected frequency and/or severity of losses due to identified risks. In risk management, two types of probability distribution are used: empirical and theoretical. To form an empirical probability distribution, the risk manager actually observes the events that occur, as explained in the previous section. To create a theoretical probability distribution, a mathematical formula is used. To effectively



use such distributions, the risk manager must be reasonably confident that the distribution of the firm's losses is similar to the theoretical distribution chosen.

Three theoretical probability distributions that are widely used in risk management are: the binomial, normal, and poisson.

### Probability of Ruin

Ruin theory also known as collective risk theory, was actually developed by the insurance industry for studying the insurers vulnerability to insolvency using mathematical modeling. It is based on the derivation of many ruin-related measures and quantities and specifically includes the probability of ultimate ruin. This can be also related to the sphere of applied probability as the techniques used in the ruin theory as fundamentally arising out of stochastic processes. Many problems in ruin theory relate to real-life actuarial studies but the mathematical aspects of ruin theory have really been of interest to actuarial scientists and other business research people.

Normally an insurers' surplus has been computed as the net of two opposing cash flows, namely, cash inflow of premium income collected continuously at the rate of  $c$  and the cash outflow due to a series of insurance claims that are mutually independent and identically distributed with a common distribution function  $P(y)$ . The path of the series of claims is assumed to respond to a Poisson process with intensity rate  $\lambda$  which would mean that the number of claims received  $N(t)$  at a time frame of  $t$  is controlled by a Poisson distribution with a mean  $\lambda t$ . Therefore, the insurer's surplus at any time  $t$  is represented by the following-formula:

$$X(t) = x + ct - \sum_{i=0}^{N(t)} Y_i$$

where, the business of the insurer starts with an initial level of surplus capital.  $X(0) = x$  under probability measure as explained in the previous paragraph.

Towards the end of the 20th century, Garbur and Shiu introduced the concept of the expected discounted penalty function derived from the probability of ultimate ruin. This concept was utilized to gauge the behaviour of insurer's surplus using the following formula:

$$m(x) = E^X [e^{-\sigma T} K_T]$$

where,  $\partial$  is the discounting force of interest,  $K$  is a general penalty function representing the economic costs of the insurer at the time of ruin and the expectation relates to the probability measure. Quite a few ruin-related quantities fall into the category of the expected discounted penalty function.

In short, this theory of the probability of ruin is applied in the case of risk of insolvency of a company with diversified business activity. For the purpose of study, resources between diversified activities are allowed to be transferred and are limited by costs of transaction. Terminal insolvency happens when capital transfers between the business lines are not able to compensate the negative positions. Actuarial calculations are involved in the determination of ultimate ruin as discussed.

### Risk Analysis - Risk Mapping and Key Risk Indicator

Risk analysis is a procedure to identify threats & vulnerabilities, analyze them to ascertain the exposures, and highlight how the impact can be eliminated or reduced. In other words, risk analysis refers to the uncertainty of forecasted future cash flows streams, variance of portfolio/stock returns, statistical analysis to determine the probability of a project's success or failure, and possible future economic states. Risk analysts often work in tandem with forecasting professionals to minimize future negative unforeseen effects.

### Risk Mapping

Risk mapping is the first step in operational risk measurement, since it requires identifying all potential risks to which the bank is exposed and then pointing out those on which attention and monitoring should be focused given their current or potential future relevance for the bank. while the risk mapping process is sometimes identified with the usual classification of operational risks in a simple frequency/ severity matrix, what is really needed to map banks' internal processes in order to understand what could go wrong, where, and why, to set the basis for assessing potential frequency and the severity of potential operational events, and to define a set of indicators that can anticipate problems based on the evolution of the external and internal environments. Careful risk mapping is an

important as a first step for operational risk measurement as it is for the audit process, when potential pitfalls have to be identified in advance and properly eliminated or at least monitored. Risk mapping should start from process mapping and from identifying critical risks in each process phase, linked either to key people, to systems, to interdependencies with external players, or to any other resource involved in the process. Subsequently, potential effects of errors, failures or improper behavior should be analyzed. This may also lead to identifying priorities in terms of control actions. Of course, special care should be given to high-severity risks, even if they appear unlikely to occur.

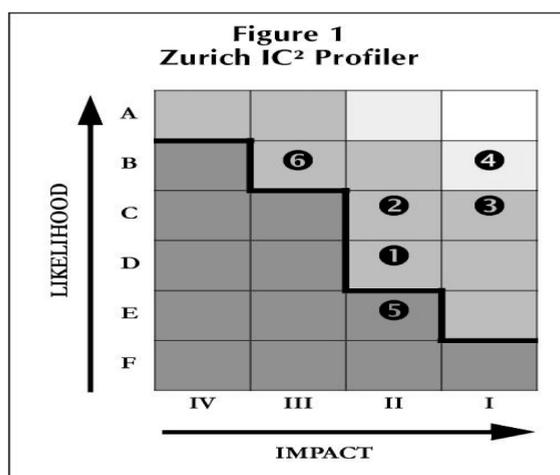
Risks are unanticipated events that may affect the organization's ability to meet its key objectives. These could consist of unfavorable situations or missed opportunities. As such, a clear and effective understanding of the major risks is a key driver for organizational success.

Risk mapping is the process of identifying, quantifying and prioritizing the risks that may interfere with the achievement of your organizational objectives.

Its aim is to arrive at a clear set of action plans that improve risk management controls, in areas where these are necessary and help the management of the organization's direct resources.

### Risk Mapping Defined

A risk map is a graphical depiction of a select number of a company's risks designed to (1) illustrate the impact or significance of risk on one axis, and (2) the likelihood or frequency on the other axis. Many types and variations of risk maps exist. For example, the axes can vary (impact and likelihood on different axes), the scales can vary, and some are even three-dimensional. The following example in the below Figure 1 illustrates a typical risk map.



This risk map depicts likelihood or frequency on the vertical axis, and impact or significance on the horizontal axis. In this configuration, similar to that of a mathematical distribution curve, likelihood increases as you move up the vertical axis, and impact increases from left to right.

The points on the profile represent risks that have been categorized into four impact categories and six likelihood categories. The categories simplify the prioritization process by forcing placement of each risk into a particular box showing its position relative to the others. The "stepped" line is the Critical Issue Tolerance Boundary. Scenarios or risks above this boundary are considered intolerable and require immediate attention, while risks below the boundary do not require immediate attention.

The methodologies used to develop risk maps are as varied as the different risk map types. We will summarize one such process.

### Risk Mapping Process

The risk mapping process is part of a systematic, comprehensive methodology to identify, prioritize, and quantify (at a macro level) risks to an organization. This example of the mapping process is taken from the Zurich IC<sup>2</sup> process



(See Notes at the end of this paragraph). Other methods of capturing information include structured interviews, surveys (written and electronic) or a combination of these. Individual client characteristics and needs dictate the appropriate method of data collection.

[Note : Operational risks are classified in Zurich IC<sup>2</sup> as (1) People risk (human errors, accidents & personal injuries, frauds, etc) (2) Process risk (faulty business process, incorrect working method, etc) (3) Relationship risk (loopholes in contracts rousing disputes/ damages, statutory violations entailing penalties, etc) (4) Technology risk (obsolete plant, unreliable machineries, software bugs/ virus, etc) (5) External risk (disaster, riots, wars, etc). It is possible for any of the above risks to migrate into the other. We will see later Basel Accord scheme which also offers another method of risk classification. Suffice here to note that such classification can be linked to Zurich IC<sup>2</sup> classification].

We will describe the facilitation risk profiling process by highlighting the major elements. These include the workshop, scope, team composition, time horizon, scenario development and categorization, tolerance boundary, profile development, action plan, process and technology transfer, and quantification and modeling.

### Scope

The scope of the exercise is determined at the beginning of the analysis to specify the areas of the business considered. The scope provides the parameters for the analysis. Scope is often defined as identifying, prioritizing, and understanding risks and impediments to achieving corporate and strategic objectives. The scope can be as broad or as narrow as desired; however, a balance exists between the breadth of scope and the value of information derived from the risk mapping process. For example, the value of one risk map for a multi-billion dollar firm would be significantly less than one risk map for each division or business unit of that company. We will address different scope options later in this article.

### Benefits of Risk Mapping

- Promotes awareness of significant risks through priority ranking, facilitating the efficient planning of resources.
- Enables the delivery of solutions and services across the entire risk management value chain.
- Serves as a powerful aid to strategic business planning.
- Aids the development of an action plan for the effective management of significant risks.
- Assigns clear responsibilities to individuals for the management of particular risk areas.
- Provides an opportunity to leverage risk management as a competitive advantage.
- Facilitates the development of a strategic approach to insurance programme design.
- Supports the design of the client's risk financing and insurance programmes, through the development of effective/optimal retention levels and scope of coverage etc.

### Key Risk Indicator

Key risk indicators come out as the result of the mapping process and should be used to provide anticipatory signals that can be useful for both operational risk prevention and measurement. In particular, they should provide early warning signals to anticipate the most critical operational events, and they may also be partly derived from the experience of audit departments defining potential risk scores for different business units as a tool for defining priorities in their audit action plan.



1. The definition of the operational events that should be captured by the data base.
2. The minimum threshold of loss to be recorded
3. The classification criteria that should be applied to operational events



4. The way in which loss should be recorded
5. The architecture of the loss collection process
6. The policies concerning operational events' internal disclosure.

A manufacturing enterprise may assess risks of operational losses by reviewing its competitiveness in regard to technology adopted, competitors' strengths, etc. Key indicators should build up early signals of deficiencies through information system interfacing between enterprise's changing environment and its adaptive organization. Such indicators may include the following :

- Market performance, customers' feedback/complaints & competitors' performance
- Orders-in-hand and inventory
- Input-output performance
- Cycle-times (e.g. work cycle times of different activities in value-chain, order-to-delivery cycles in purchases & sales, etc)
- Suppliers' performance (in terms of delivery & quality compliance)
- Plant utilization (% usage of different machineries)
- Cost per unit of product/ service.
- Financial ratios (ROI, product profitability, capital turnover rate, liquidity ratio, debt-equity ratio, etc).

For banks, they should first decide whether to adopt a stricter definition of operational losses or whether also to record other kinds of events that might be relevant for internal operational risk management purposes. One example is represented by credit losses deriving from operational errors (e.g. missing documentation, making it impossible to take advantage of collateral in a case of default, or human error in handling a loan review process, resulting in missing the chance to take appropriate actions to reduce exposure with a borrower that will eventually default). According to Basel Committee 2006a those losses are already taken into consideration under credit risk MRCR, and hence, correctly, they should be excluded from the operational risk loss data base to prevent double counting. Yet measuring the frequency and severity of these events may be useful for internal purposes, to understand the relevance of the phenomenon and to support remedial actions.

The second issue is to whether also to record the so-called near misses, i.e. those events that might have provoked operational losses even if they (luckily) did not. an example of a near miss is a mistake in recording a trading deal that generated an accidental gain instead of loss. while the severity of such events is clearly zero, their frequency and type may be relevant for providing further data about what could have happened and as useful signals to business line managers who should take these events as a relevant warning signal. Cases of operational error implying faulty profit allocation across business units (e.g. due to an incorrect internal deal transcription, which did not affect overall bank profit) could be placed in this category. A bank may therefore adopt a broader definition of operational event than Basel II suggests, while it should still use a subset of data only when estimating AMA-compliant operational risk capita

The threshold over which losses should be recorded ( with potential exception of near misses) is a particularly critical choice for risk quantification. Intuitively, if the threshold were too high, only a relatively limited number of medium- to high-impact events would be recorded, provided a weaker base for estimating the frequency and severity of all operational events. A lower threshold allows one to model operational risk severity and frequency better but also implies higher collection costs. moreover, lower threshold require greater effort to enforce the rules of the loss collection process at the bankwide level. in fact, larger operational losses cannot clearly be either hidden or forgotten. yet, as the threshold decreases, the risk of incomplete reporting of operational loss in some business units increases, and great care is required to avoid alterations of data quality( with the likely effect of underestimating frequency and overestimating average severity of losses).



## 4.2 CORPORATE RISK MANAGEMENT

Corporate Risk Management works to ensure the safety of the business, guarding it from risk of injury or financial loss. It helps to optimize risk taking of an organization.

### Enterprise Risk Management

The Enterprise Risk Management (ERM) is defined as “a process, effected by an entity’s board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives”.

From the above definition, ERM is:

- (a) A process, ongoing and following through an entity.
- (b) Effected by people at every level of an organization.
- (c) Applied in strategy-setting.
- (d) Applied across the enterprise, at every level and unit, and includes taking an entity-level portfolio view of risk.
- (e) Designed to identify potential events affecting the entity and manage risk within its risk appetite.
- (f) Able to provide reasonable assurance to an entity’s management and board.
- (g) Geared to the achievement of objectives in one or more separate but overlapping categories.

ERM is about designing and implementing capabilities for managing the risks that matter. The greater the gaps in the current state and the desired future state of the organizations risk management capabilities, the greater the need for ERM infrastructure to facilitate the advancement of risk management capabilities overtime. ERM is about establishing the oversight, control and discipline to drive continuous improvement of an entity’s risk management capabilities in a changing operating environment.

ERM deals with risk and opportunities affecting value creation or preservation. ERM is a comprehensive and integrated approach to addressing corporate risk. ERM enables management to effectively deal with uncertainty and associated risk and opportunity, enhancing the capacity to build value. In ERM, a risk is defined as a possible event or circumstance that can have negative influences on the enterprise in question. Its impact can be on the very existence, the resources (human and capital), the products and services, or the customers of the enterprise, as well as external impacts on society, markets or the environment.

### Need for Implementation of ERM

ERM needs to be implemented for the following reasons:

- (a) Reduce unacceptable performance variability.
- (b) Align and integrate varying views of risk management.
- (c) Build confidence of investment community and stakeholders.
- (d) Enhance corporate governance.
- (e) Successfully respond to a changing business environment.
- (f) Align strategy and corporate culture.

Traditional risk management approaches are focused on protecting the tangible assets reported on a company’s Balance Sheet and the related contractual rights and obligations. The emphasis of ERM, however, is on enhancing business strategy. The scope and application of ERM is much broader than protecting physical and financial assets. With an ERM approach, the scope of risk management is enterprise-wide and the application of risk management is targeted to enhancing as well as protecting the unique combination of tangible and intangible assets comprising the organization’s business model.

### ERM Process: Developing a More Risk Aware Culture

Establishing a Risk culture has become a fundamental building block of good enterprise risk management (ERM) practices. Management's actions, as well as consistent, ongoing communication around ethics and risk management, are the first steps in instilling such a culture.

#### Essence of ERM

For monitoring the performance of an organization with respect to corporate objectives, it is imperative to form control mechanisms that enable the identification of risks and which meet the predefined objectives. The COSO framework is based on 2004 publication on Enterprise Risk Management Integrated framework is a very standard and popular framework through which companies should be regulated and measured.

#### COSO ERM Framework

The ERM framework by the Commission of Sponsoring Organizations of the Treadway Commission (COSO) provides a more disciplined and consistent standard against which to implement and assess a company's ERM program.

ERM provides a more holistic approach that enables the alignment of the organization's strategies and operational and compliance processes across the entire company for managing all the key business risks and opportunities with the goal of maximizing value for the entire enterprise.

ERM is a process-based approach where the various components interact as part of an on-going, iterative process. COSO represents these relationships in a three dimensional cube:

Objectives which are what the company wants to achieve whether strategic, operations, reporting and/or compliance.

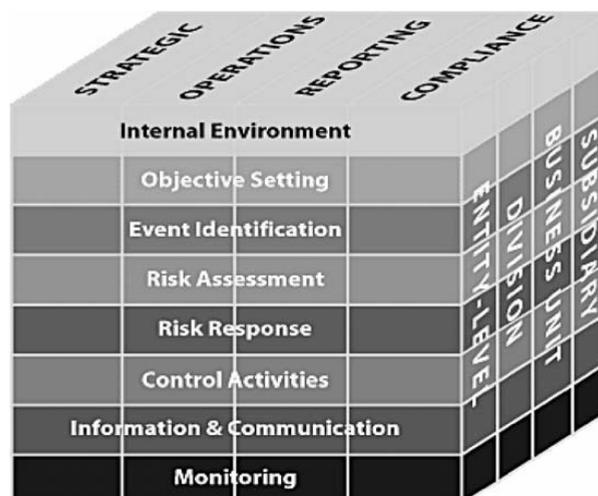
Internal Environment components which represent what is needed to achieve the objectives. This is also called risk culture of an organization

Entity Level which represent the various units of the company.

Many have measured ERM's value in qualitative, "softer" terms — enhanced risk identification and prioritization, a common risk language, improved risk and controls optimization, better risk monitoring and reporting, and stronger risk governance and culture.

Similarly, estimating earnings variability can be feasibly undertaken both before and after ERM risk mitigation activities to demonstrate the impact and value of the ERM program. Applying a risk lens and risk metrics to a business opportunity is also likely to result in improved investment decisions. ERM can assist in identifying areas of the business that would benefit from investment.

#### Chart: Enterprise Risk Management Framework of COSO





Risk Adjusted Return on Capital (RAROC) metric helps banks/FIs to make better decisions when approving, structuring, and pricing deals.

### **Risk Retention**

This denotes acceptance of the loss or benefit arising out of a risk when it takes place. In short, it is also termed as self insurance. This strategy is viable when the risks are small enough to be transferred at a cost that may be higher than the loss arising out of the risk itself. On the other hand, the risk can be so big that it cannot be transferred or insured. Such risks will have to be phased out when the eventuality occurs. War is an example as also are 'Acts of God' such as earthquakes and floods. The reasons for risk retention can be cited as follows:

- (1) Non-insurable business risks are borne for appropriate returns. It is well known a proverb that "no risk, no gain". If everything is predictable to mathematical precision, profits would not have arisen. But business is not a blind speculation. It involves vision to foresee future situations, strategies for keeping ahead of competition (in some way or the other) and finally, leadership for translating envisioned strategies into actions and results.
- (2) Sometimes, such risks are so small that they are ignored and/or phased out when they surface.
- (3) This method is also useful when the probability of occurrence is very low and a reserve built within the system over a period can take care of such losses arising out of risk retention. This is normally resorted to in businesses against credit risks that are inherent due to marketing on credit basis.
- (4) In some cases, the subject, who is susceptible to risk, also becomes fully aware of the nature of risk.

In these situations, there is a certain amount of preparedness in the system due to risk retention.

### **Certain guidelines relating to risk retention should be followed:**

- (1) Determine the risk retention level through proper estimation of risk using sales projections, cash flows, contracts, liquidated damages, and guarantees.
- (2) Though there is no precise formula for estimation of risks to be retained, statistical averages of such losses over a period of time give an indication to estimate such losses. For instance, bad debts occurring over a period of time are taken into consideration as an estimate to create a reserve for doubtful debts.
- (3) It is also necessary to ascertain the capacity for funding a loss arising out of retained risk that is the measure for transferring the risk beyond that level.

Risk retention as an exercise and a strategy is attempted mainly in the case of operational risk in business.

### **Risk Reduction**

Risk reduction or optimization aims at reduction in the severity of laws or the probability that laws may not be passed. While risks can be helpful or harmful, optimization leads to a balance between negative risk and the advantages of the operation. Risk reduction can also be termed as mitigation that would include all measures taken to reduce the effect of the hazard itself as well as the vulnerable conditions leading to the hazard. Risk reduction also includes steps to mitigate physical, economic, and social vulnerability.

The mitigation carried out is such that there should be an ultimate reduction in the loss due to a hazard. Sometimes certain steps taken to mitigate a hazard may turn out to be more damaging, as in the case of certain fire suppression systems. The cost of such steps is so prohibitive that the losses cannot be reduced intrinsically. Outsourcing can be considered an act of risk reduction if the vendor has the expertise and a higher capability in mitigating risk. For example, demolition of an old, risky, high-rise building could be outsourced to an expert vendor who could implode the building without causing any damage to the environment or people.

Risk mitigation also implies a certain extent of preparedness on the part of the risk bearer because he is aware of the risk. This helps identify the parameters that lead to the disaster and mitigate parameters ahead of the eventuality, thus reducing the risk. Studies based on HAZOP are known to help factories develop sufficient preparedness in case of a hazard or explosion. It is sometimes known as 'failsafe' activity. For example, the introduction of a rupture disc in the pressure equipment as a failsafe against excessive pressure buildup. The rupture disc saves the equipment when the actual risk takes place by blowing out the contents or by reducing the pressure.



In case of physical disasters, detailed disaster management preparedness is a plan for mitigation. These mitigation measures can be either structural or non-structural and can also be described as passive or active. The passive approach can be code of conduct and training to personnel who may have to face a risk while active measures actually rely on providing incentives for disaster reduction.

Mitigation embraces all measures taken to reduce both the effect of the hazard itself and the conditions vulnerable to it, in order to reduce the scale of a future disaster and its impacts. Mitigation also includes measures aimed at reducing physical, economic, and social vulnerability. Therefore, mitigation may incorporate community-related issues such as land ownership distribution. Depending on their purpose, mitigation measures can be categorized as structural or non-structural.

Both structural and non-structural mitigation measures may be termed either 'passive' or 'active'. Active measures are those that rely on providing incentives for disaster reduction. They are often more effective than passive measures, which are based on laws and controls. For example, while codes and land use planning may provide a legal context for mitigation, they are ineffective unless rigorously enforced. Instead, measures that provide incentives such as Government grants or subsidies, reduction in insurance premiums for safer construction and provision of Government technical advice are more effective. Structural mitigation measures relate to those activities and decision making systems that provide the context within which disaster management and planning operates. They are organized and include measures such as preparation of preparedness plans, training and education, public education, evacuation planning, institution building, warning systems, and land use planning.

The existence of a disaster-preparedness plan is the foremost step of importance. Distraught officials have at hand a set of instructions that they can follow to issue directions to their subordinates and affected people. This speeds up the rescue and relief operations and boosts the morale of victims. Disaster plans are also useful for pre-disaster operations, when warnings have been issued. Time, which might otherwise be lost in consultations with senior officers and getting formal approval, is saved. Response plans are formulated by different agencies that need to co-ordinate during emergencies. For example, the electricity board would be responsible for preparing an action plan, which would be used following a disaster event to restore full services quickly. A Contingency Action Plan (CAP) already exists at the national level that lists out in detail the actions to be taken in various levels of Government at the time of calamity. There is, however, a need to carry out a comprehensive revision of CAP followed by clear-cut operational guidelines. Recently, a high power committee has been established to prepare a disaster management plant at central/state and district levels.

### **Mitigation strategy**

The plans recognize the fact that effective community involvement and public awareness can largely minimize the impact of disasters. The community-based mitigation strategy strengthens and stabilizes the efforts of the administration. The focus is on community capacity building including formation of Community Emergency Response Teams (CERT).

Mitigation strategy also focuses on micro-risk assessment and vulnerability analysis including hazard mapping, applied research and technology transfer to improve the quality of forecast and disseminate warnings quickly. It also highlights the need for a disaster management legislation and relief and rehabilitation policy that would define specific roles and responsibilities as well as set-up permanent administrative structures and institutional mechanisms for disaster management. The importance of land use planning and regulations for sustainable development, which include development and implementation of building codes, serve as a guideline to managing disaster. Structural and non- structural measures, given in the mitigation strategy document, are used to avoid damages during disasters.

### **Training strategy**

Training of the key community and social functionaries is an essential element for the successful execution of a Disaster Management Action Plan. The DMAP cannot be fully operationalized without keeping in mind a training strategy, manuals for warning and evacuation, and the roles of the Emergency Operations Center (EOC), and District Control Room (DCR). The manuals list the tasks to be undertaken by the responsible branch authority. Information on important contact persons and emergency officials is also provided in the manual. The state and the district plans specify guidelines for the community as well as NGOs and local community based organizations in the advent of any disaster.



### Community-based preparedness strategy

For calculated response in case of a disaster, a plan for community preparedness is essential. The plan must incorporate the following points:

- Clearly perceived vision of hazards and developed hazard profile of the community and its neighbourhoods.
- Assessment of risk and its vulnerability.
- Identification of individual and community resources.
- Must be clear and simple, specific in details, define duties and responsibilities of each member, ear-mark various escape routes, and locate shelter sites.
- Written as a simple concise 'checklist' so that one does not have to refer to it in depth when emergency arises.
- The Panchayat/local body/local community forms resilient focal communities or target groups.

This, however, is possible only with the concerted efforts and conscious policy at top level of administration.

### Geographic Information System (GIS)

Disaster planning involves predicting the risk of natural hazard and possible impact. The use of GIS can be successfully made in communication, risk and vulnerability assessment, study of loss patterns, and searches. Hazard maps could be created for cities, districts, states or even for the entire country. Such maps prove helpful for analysis and determination of hazard zones and for the likely effects during disasters. The maps can be successfully used in establishing response priorities, developing actions plans, quickly assessing disaster location, carrying out search and rescue operations effectively, and zoning operations accordingly to risk magnitudes, population details, and assets at risk. Geographic Information Systems (GIS) and remote sensing facilitate record-keeping and obtainment of status or ongoing works that are the most critical task for disaster management.

### Value at Risk

Value at Risk (VaR) is one of the popular methods of measuring financial risks. There are different types of VaR—long-term VaR, marginal VaR, factor VaR, and shock VaR. VaR is also defined as the threshold value such that the probability of a portfolio making a market to a market loss over a specific time horizon exceeds this value. For example, if a portfolio stock has a one day 3 per cent VaR of `10 million, there is 0.03 probability that the portfolio may face a reduction in value by more than `10 million over a specific time period. This is on assuming that normal market operations and there is no trading. A loss which exceeds VaR threshold is known as 'VaR break'. VaR has applications in financial risk management, risk measurement, control and reporting. It can also be used in calculating regulatory capital.

VaR essentially identifies the boundary between normal days and extreme occurrences. The probability level is specified as 1 minus probability of a VaR Break. Normally VaR parameters are 1 per cent and 5 per cent probabilities and 1 day and 2 week horizons. While VaR represents loss, a negative VaR would indicate that a portfolio has a high probability for making profits.

There are two types of VaR—one is applied primarily in risk management and the other in risk measurement. For a manager who is managing financial risk, VaR is essentially a system and not just a number as it runs periodically and is compared with the movement of computed prices in opening positions over the particular time horizon. An interesting application of VaR is the governance of endowments, trusts and pension plans. VaR utilized for this purpose is to monitor risk.

VaR has the advantage of a structured methodology for critically analysing a risk that is available as part of management function. Daily publication of a number on time and with particular statistical data enables an organization to maintain a high objective standard. However, robust backup systems and assumptions regarding default need to be established. A quotation runs thus, 'risk taking institution that does not compute VaR might escape disaster but an institution that cannot compute VaR will not' according to Aaron Brown.

Another advantage of VaR is that it differentiates risks into two regimes, that is, normal days and extreme occurrences. Inside the VaR limit, application of the conventional statistical methods is reliable. Out VaR limit risk



should be analyzed with stress testing on the basis of data available on the long-term and in the broad market. Distribution losses beyond VaR point are both impossible and useless. As such the finance manager should concentrate on developing plans to limit the loss if possible or to survive the loss.

VaR as a risk measurement is usually reported with other risk measurements such as standard deviation, expected shortfall, partial derivatives of portfolio value, etc.

Application of VaR is to segregate extreme occurrences in a systematic way. They can be studied over the long-term in a qualitative manner on the basis of day-to-day movement of prices, both quantitatively and qualitatively. As VaR can at best be utilized to define risk as a market to market loss on a fixed portfolio over a fixed time horizon in normal markets, it is not useful in abnormal situations.

There has been criticism against VaR. It is said that this concept has led to excessive risk taking and leveraging by financial institutions. Again VaR is not sub-additive which means that VaR of a combined portfolio can be larger than the sum of the VaRs of its components.

### **Introduction to Capital Adequacy Norms in Banking Industry [Evolution of Basel Regime]**

The Basel Committee on Banking Supervision, after an extensive consultation process, redrafted its recommendations for credit institutions' regulatory capital requirements (Basel I) issued in 1988. The revision was motivated by the wish to adequately reflect current developments in banking and to strengthen the stability of the international financial system. On November 15, 2005, the Basel Committee on Banking Supervision presented the revised version of the "Basel II" Capital Accord's framework agreement, initially released under the title "International Convergence of Capital Measurement and Capital Requirements" on June 26, 2004. The major difference between this document and the Basel I framework, which merely imposed minimum capital requirements on credit institutions, is that Basel II foresees also a supervisory reviewing process (Pillar 2) and broader disclosure obligations (Pillar 3).

#### **Basel-I**

As on date the provisions of Basel Accord of 1988 has undergone a number of changes made year after year. Though Basel II accord has become operational some of the covenants of Basel I (1988) are still relevant. Under the 1988 accord, Banks and security firms have been given different treatment. In the ensuing paragraphs we will focus on these developments.

#### **The Basel Accord (BASEL I)**

In 1988, the Basel Committee published a set of minimal capital requirements for banks. These became law in G-10 countries in 1992, with Japanese banks being permitted an extended transition period. The requirements have come to be known as the 1988 Basel Accord.

**What is a 'Bank' for the purpose of Basel accord:** To understand the scope of the 1988 accord, we need to clarify what we mean by 'bank.' This is because, some jurisdictions distinguished between banks and securities firms, and the Basel accord (Basel I) applied only to the former.

#### **Commercial Banks and Universal Banks - Glass Steagal Act, USA (1933-1999)**

Under its Glass-Steagal Act, the United States had quite some time back made a distinction between commercial banks and securities firms (investment banks or broker-dealers). Following World War II, Japan adopted a similar legal distinction. The United Kingdom also distinguished between banks and securities firms, although this was more a matter of custom than law. By comparison, Germany had a tradition of universal banking, which made no distinction between banks and securities firms. Under German law, securities firms were banks and a single regulatory authority oversaw banks. France and the Scandinavian countries had similar regimes. The USA revoked the Glass Steagal Act in 1999.

#### **Exclusive Focus on Credit Risk during 1988-1998**

The 1988 Basel Accord -Basel I- primarily addressed banking in the sense of deposit taking and lending (commercial banking under US law), so its focus was credit risk. Under this dispensation, bank assets were assigned 'risk weights.' Generally, G-10 government debt was weighted 0 per cent, G-10 bank debt was weighted 20 per cent, and other debt was weighted 100 per cent. Following this the Government of India Securities were assigned zero risk weight.



Having assigned and aggregated the risk, Banks were required to hold capital equal to 8 per cent of the risk weighted value of assets. Additional rules applied to contingent obligations, such as letters of credit or derivatives.

### **Market Risk - Recognition of the Need for Capital - Amendment of Basel I In 1996**

With banks increasingly taking market risks, in the early 1990s, the Basel Committee decided to update the 1988 accord to include bank capital requirements for market risk. This would have implications for non-bank securities firms. Any capital requirements the Basel Committee adopted for banks' market risk were to be incorporated into future updates of Europe's Capital Adequacy Directive (CAD) and thereby apply to Britain's non-bank securities firms. If the same framework were extended to non-bank securities firms outside Europe, then market risk capital requirements for banks, and, securities firms could be harmonized globally. In 1991, the Basel Committee entered discussions with the International Organization of Securities Commissions (IOSCO) to jointly develop such a framework. The two organizations formed a technical committee, and work commenced in January 1992.

### **Commercial Banks & Securities Firms - Universal Banks**

Glass Steagal Act revocation in 1999 by USA: Historically, capital requirements for banks and securities firms had served different purposes.

#### **Banks**

Banks were primarily exposed to credit risk. They often held illiquid portfolios of loans supported by deposits. Such loans could be liquidated rapidly only at 'fire sale' prices. This placed banks at risk of 'runs.' If depositors feared that a bank might fail, they would withdraw their deposits. Forced to liquidate its loan portfolio, the bank would succumb to staggering losses on those sales.

Though Deposit insurance and lender-of-last-resort provisions implemented eliminated the risk of bank runs, they introduced a new problem. Depositors no longer had an incentive to consider a bank's financial viability before depositing funds. Without such marketplace discipline, regulators were forced to intervene often at huge cost to the exchequer. One solution was to impose minimum capital requirements on banks. Because of the high cost of liquidating a bank, such requirements were generally based upon the value of a bank as a going concern.

#### **Securities Firms**

The primary objective behind stipulation of capital requirements for securities firms was to protect clients who might have funds or securities on deposit with a firm. Securities firms were primarily exposed to market risk. They held liquid portfolios of marketable securities supported by secured financing such as repos. A troubled firm's portfolio could be unwound quickly at market prices. For this reason, capital requirements were based upon the liquidation value of a firm.

### **Capital for Banks & Securities Firms**

In a nutshell, banks entailed systemic risk. It was thought then that Securities firms did not. Regulators would strive to keep a troubled bank afloat but would gladly unwind a troubled securities firm. Banks needed long-term capital in the form of equity or long-term subordinated debt. Securities firms could operate with more transient capital, including short-term subordinated debt.

### **Segregation of Banking Book & Trading Book for Holding Capital**

In April 1993, the Basel Committee released a package of proposed amendments to the 1988 accord. This included a document proposing minimum capital requirements for banks' market risk.

- Banks would be required to identify a trading book and hold capital for market risk under trading book and organization-wide foreign exchange exposures.
- Capital charges for the trading book would be based upon a crude value-at-risk (VaR) measure broadly consistent with a 10-day 95 per cent VaR metric. Similar to a VaR measure used by Europe's CAD, this partially recognized hedging effects but ignored diversification effects.
- Later VaR measure was changed modestly from the 1993 proposal, still reflecting a 10-day 95 per cent VaR metric. Market risk capital requirements were set equal to the greater of either the previous day's VaR, or the average VaR over the previous six days, multiplied by 3.

Banks to have independent risk management function and satisfy the regulator regarding its risk management practices.

The Basel Committee's new proposal was adopted in 1996 as an amendment to the 1988 accord. It is known as the 1996 amendment. It went into effect in 1998.

The Basel Committee published a set of minimal capital requirements for banks and distinguished between banks and securities firms. Bank assets were assigned 'risk weights'. The primary purpose of capital requirements for securities firms was to protect clients who might have funds or securities on deposit with a firm.

#### Basel II:

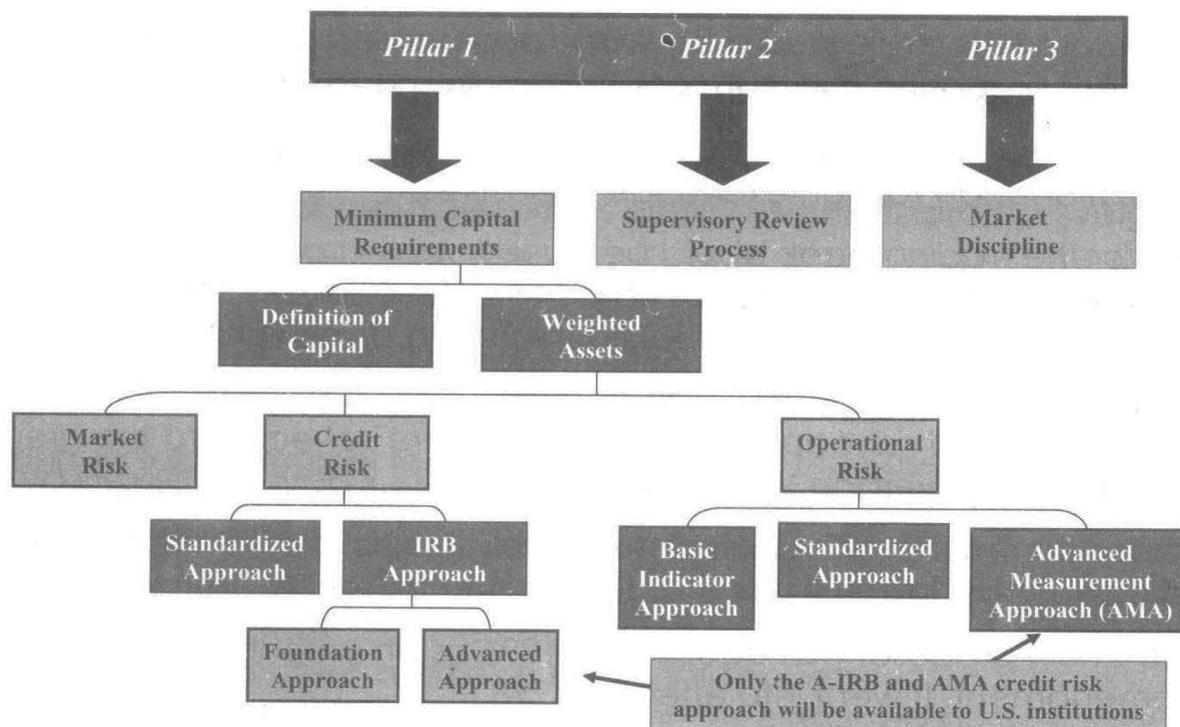
Broadly speaking, the objectives of Basel II are to encourage better and more systematic risk management practices, especially in the area of credit risk, and to provide improved measures of capital adequacy for the benefit of supervisors and the marketplace more generally.

The introduction of Basel II has incentivized many of the best practices banks, both internationally and in the Indian economy to adopt better risk management techniques and to reconsider the analyses that must be carried out to evaluate their performance relative to market expectations and relative to competitors.

Under Basel II regime, banks need to implement sound processes and systems to ensure that they are adequately capitalized at all times in view of all material risks. It has to ensure that Regulatory Capital requirements are more in line with Economic Capital requirements of banks and by this, make capital allocation of banks more risk sensitive.

The Basel Committee replaced the 1988 accord (amended in 1996 and adopted in 1998) in April 2006. This has been dubbed Basel 1.1. It includes more sophisticated treatment of credit risk. Basel II also addressed 'Operational risk', among other things.

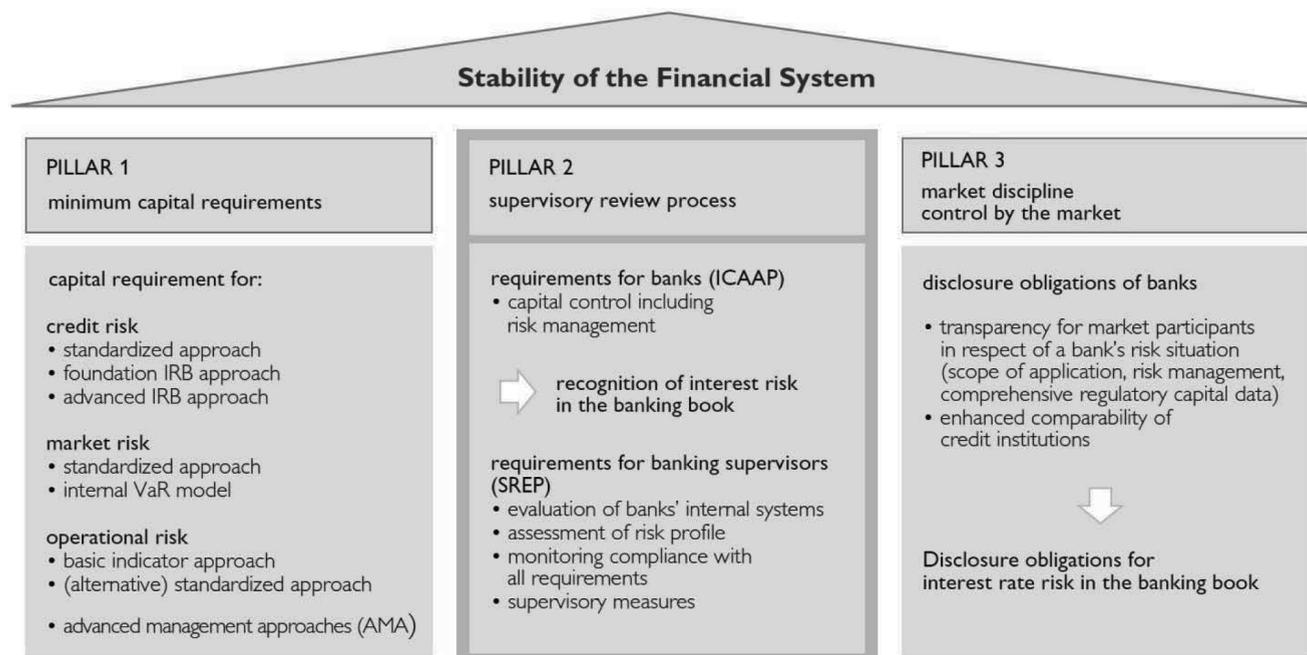
#### Chart: Basel II Structure



Under the new Basel II regulatory capital requirement, interest rate risk in the trading book continues to carry a minimum capital charge (Pillar 1 of Basel II). What is new is that interest rate risk in the banking book needs to be assessed in the review of capital adequacy (Pillar 2 of Basel II).

To calculate the minimum regulatory capital requirements, banks must differentiate between interest rate risks in the trading book (Pillar I capital) and interest rate risks in the banking book (pillar II capital).

**Chart: Three-Pillar Architecture of Basel II**



The above chart explains various approaches for calculating Pillar 1 and Pillar 2 risk capital under Basel II regime. For market risk, Banks have to report capital requirement for interest rate risk, equity position risk and foreign exchange risk (including Gold) to the regulator. Similarly, for credit risk, Banks in India currently follow the standardized approach and they report risk weighted assets for various credit exposures depending upon their external rating positions and hence compute capital requirement for credit risk. Better the rating of the borrower (hence lower the risk), lower is the risk weights assigned by the regulator (here RBI). For example, where a AAA corporate rated by CRISIL will attract a risk weight of only 20%, a relative higher risky BBB corporate loan exposure will have to be weighed 100% to estimate risk weighted assets. Finally, all these risk weights need to be added and multiplied by 9% to estimate minimum capital requirement for taking credit risk.

Amount of loan × Risk-weight × 9% = the capital required to be held against any given loan.

Similarly, for retail loans (e.g. residential housing loans, personal loans etc.) risk weights are different for different sizes of exposures depending on the availability of collateral margins (risk weights are less for higher margin, better collateral and smaller loan size).

Banks also use various credit conversion factors (CCFs) to convert their off balance sheet exposures (e.g. CCF=50% for credit guarantees; CCF=20% for cash credit etc.) into on balance sheet to estimate risk capital. Similarly, standard supervisory haircuts are used to take into account the benefit of eligible collaterals (like gold, bonds, NSC, KVP etc.) that reduces their credit risk exposures.

Under the Foundation Internal Rating Based Approach (FIRB), banks are allowed to develop their own empirical model to estimate the PD (Probability of Default) for individual clients or groups of clients. The other important risk parameters like EAD and LGD will be supplied by the regulator. Banks can use this approach only subject to approval from their local regulators.

Under Advanced IRB (AIRB) approach, banks are supposed to use their own quantitative models to estimate PD (Probability of Default), EAD (Exposure at Default), LGD (Loss Given Default) and other parameters required for calculating the RWA (Risk-Weighted Asset). Then total required capital is calculated as a fixed percentage of the estimated RWA.

For measuring market risk, Banks in India generally follows the standardized method that has been prescribed by the regulator. However, for advanced approaches, Banks can use internal VaR models coupled with stress testing exercises to estimate market risk capital charge.

For operational risk capital estimation, there are three approaches: Basic Indicator Approach (BIA), The Standardized Approach (TSA) and Advanced Measurement Approach (AMA). Under BIA, the capital charge is derived as a fixed multiple (alpha=15%) of three years average gross income of Banks. Under TSA, different business lines are assigned individual gross activity measures and the regulators determine the appropriate fixed multiple (beta) to calculate the regulatory capital requirement. The exposure indicator is gross income of various business lines of the Bank. The beta values range from 12% to 18%. Many Banks of India have already adopted BIA as well as TSA. Under the advanced measurement (AMA) banks have to use their internally defined risk parameters based on their historical internal loss data on Frauds, Business disruption & system failures, Execution, Delivery and Process, Transaction processing risk, Employment practices, Business Practices etc. Loss history represents the inherent operational risks and the state of the controls at a point in time. Loss data to be categorized according to an event-driven taxonomy that enables banks to have a risk profile for each event. Finally Banks can use Value at Risk (VaR) models to estimate figure for unexpected loss and operational risk capital subject to the regulatory review and approval. Some banks in India have applied for AMA. Involvement of Board of directors and senior management is a must for adopting AMA in a Bank.

As per existing Basel II rules, banks need to maintain minimum regulatory capital at 9% of the risk- weighted assets (internationally 8%). Out of this, not less than 50% should be Tier 1 capital. Capital Risk Weighted Assets Ratio (CRAR) = 
$$\frac{\text{Eligible Tier I \& Tier II Capital}}{\text{Risk Weighted Assets}}$$

Major elements of Tier I Capital are retained earnings, paid-up equity capital, statutory reserves and other disclosed free reserves & some innovative capital instruments that are eligible for inclusion in Tier I Capital which also comply with the regulatory requirements (e.g. most junior claims, permanency, quality issue etc.). Elements of Tier II capital are revaluation reserves, hybrid debt instruments, subordinated debt instruments and general provisions and loss reserves.

These prudential norms have been stipulated by RBI in India. For details, please refer to the Master Circular - Prudential Guidelines on Capital Adequacy and Market Discipline- New Capital Adequacy Framework (NCAF) of RBI issued in July 2, 2012.

The first component of Pillar 2 is the internal capital adequacy assessment process (ICAAP). Under ICAAP, credit institutions must have effective systems and processes in place to determine the amount, composition and distribution of internal capital on an ongoing basis and to hold capital commensurate with the required level. The second component of Pillar 2 is the Supervisory Review and Evaluation Process (SREP). The purpose of SREP is to evaluate banks' risk profile, to assess qualitative aspects (management, strategy, internal processes), and to impose supervisory measures if necessary. Under the Supervisory Review and Evaluation Process (SREP), the supervisors would conduct a detailed examination of the ICAAP of the banks, and if warranted, could prescribe a higher capital requirement, over and above the minimum capital envisaged in Pillar 1.

Pillar 3 is about market discipline as it mainly addresses the disclosure requirements by Banks to complement the minimum capital requirements (Pillar I) and the supervisory review process (Pillar II). The purpose of Pillar 3 is to ensure greater transparency in terms of banks' activities and risk strategies, as well as to enhance comparability across credit institutions-which are all in the interests of market participants. Pillar 3 recognizes the fact that apart from regulators, banks are also monitored by markets. It is based on the premise that markets would be quite responsive to disclosures - the banks would be duly rewarded or penalized, in tune with the nature of disclosures, by the market forces. Pillar 3 do not entail additional capital requirements but are limited to mandating the publication of key data, the disclosure of which neither weakens banks' competitive positions nor violates banking secrecy.

### Comparison between Basel I and Basel II

**Introduction:** In the previous paragraphs we have given the highlights of Basel I and Basel II. In this chapter we compare the two for better understanding.

**Comparison between Basel I and Basel II**

Basel - I (1988 and amended in 1996) – Based on Methodology for Capital Adequacy. Basel - II (to be in place by 2006 in G-10.	Basel- II (to be in place by 2006 in G-10 countries and in India in 2008)- Basel II based on 3 pillars.
1. Capital adequacy based on Risk Weighted Assets	1. Capital adequacy based on Risk Weighted Assets
2. Not risk sensitive. Prescriptive.	2. Risk sensitive.
3. All credit exposures carried risk weight of 100 per cent - except for some sovereign exposures and mortgages.	3. Credit exposures carry risk weights based on credit qualities.
4. Risk Capital = Credit exposure * Risk Weights * 8 per cent can have lesser Capital than others.	4. Risk capital: Similar to Basel I. But efficient Banks can have lesser capital than others.

Implications were	Implications are
<ul style="list-style-type: none"> <li>• Every bank had to maintain same 8 per cent capital. Thus Banks with good quality assets had no incentives. As a result credit quality had to be lowered to increase returns</li> <li>• Low rated exposures were subsidized by high rated exposures</li> <li>• No provision for economic pricing by banks</li> </ul>	<ul style="list-style-type: none"> <li>• Banks with good quality assets have incentives because they can manage with lower capital</li> <li>• Better quality assets requires lesser capital</li> <li>• Risk pricing can be done by banks based on credit risk perception</li> <li>• Provision exists for economic pricing by banks</li> </ul>

**Basel III:**

Reserve Bank of India in May 02, 2012 has released its final guidelines on implementation of Basel III capital regulation in India. These guidelines would become effective from January 1, 2013 in a phased manner. The Basel III capital ratios will be fully implemented as on March 31, 2018. This entails higher global minimum capital standards for banks. Implementation of Basel III is essential for restoring confidence in the regulatory framework for banks and to ensure safe and stable global banking system.

The Basel III framework sets out the following:

- Higher and better equity capital
- Better risk coverage
- Introduction of a leverage ratio
- Measures to promote the build-up of capital for periods of stress
- Introduction of new liquidity standards

A key element of new definition is the greater focus on “common equity” (paid up equity capital, reserves, retained earnings etc.). In addition to raising the quality of the capital base, banks need to ensure that all material risks are captured in the capital framework. What counts as core capital may impact the Indian banking sector’s competitiveness significantly.

As per the RBI’s new Basel III capital regulation, common equity (or core Tier I) should be at least 5.5% (1% higher than the original Basel III rule) & minimum Tier I capital should be at least 7% of total risk weighted assets. There should be predominance of common equity and Tier I regulatory capital. Common equity 78.57% of Tier I capital & total Tier I capital should be at least 77.58% of total minimum capital (as per RBI’s Basel III circular).

Basel III regulation expects that Banks for its survival in future must understand the importance of people perception



about a Bank's liquidity condition (short term as well as long term) besides internal management of liquidity. It emphasized that banks' liquid assets should be sufficient enough to cover net cash outflow. Two liquidity standards/ratios are proposed:

- (i) **Liquidity coverage ratio (LCR)** which is the ratio of Liquid assets to net cash outflow for short term (30 days) liquidity management and
- (ii) **Net stable funding ratio (NSFR)** for long term structural liquidity mismatches.

The regulator expects that LCR should be more than 100 percent and it will act as an indicator of short term (30 days) resilience of a bank under a stress situation. LCR will require banks to have sufficient high-quality liquid assets to withstand a stressed funding requirement. As a long term liquidity measure, bank should ensure that their Net Stable Funding Ratio (i.e. the ratio of available stable fund to required stable fund is >100%). The NSFR aims to limit over reliance on wholesale funding during times of buoyant market liquidity and encourages better assessment of liquidity risk across all on and off balance sheet items.

Basel III also wants to ensure that banks' leverage ratio (Tier I capital divided by all on & off balance sheet items) should be at least greater than 3%. Unlike debt equity ratio, it is just the reverse ratio that indicates bank solvency. It must be calculated as an average over the quarter. Minimum leverage ratio should be at least 3% during parallel run (January 1, 2013-January 1, 2017). Bank level disclosure of leverage ratio is proposed to start from January 1, 2015.

Basel III urges banks to maintain high credit ratings to ensure greater solvency and to avoid costs of raising additional capital under unavoidable market conditions. It expects that bank should create buffer in good time so that it can be used in bad time. The regulator may take Credit to GDP ratio as a measure of balancing factor and calibrating measure.

### 4.3 CORPORATE FAILURE

The major issue arising in the present times, for both management academics and practitioners, relates to the principles which determine corporate successes and failures that is why some organization prosper and grow while other collapse. The often unexpected collapse of large companies during the early 1990's and more recently in 2002 has lead analysts to look for ways of predicting company failure. Corporate failures are common in competitive business environment where market discipline ensures the survival of fittest. Moreover, mismanagement also leads to corporate failure. Predicting corporate failure is based on the premise that there are identifiable patterns or symptoms consistent for all failed firms.

#### Definition

According to Altman (1993), there is no unique definition of corporate failure. Corporate failure refers to companies ceasing operations following its inability to make profit or bring in enough revenue to cover its expenses. This can occur as a result of poor management skills, inability to compete or even insufficient marketing.

#### Symptoms of Corporate Failure

There are three classic symptoms of corporate failure. These are namely:

1. Low profitability
2. High gearing
3. Low liquidity

Each of these three symptoms may be indicated by trends in the company's accounts. Symptoms are interrelated. The classic path to corporate failure starts with the company experiencing low profitability. This may be indicated by trends in the ratios for:

- Profit margin
- Return on Capital Expenditure
- Return on Net Assets



A downward trend in profitability will raise the issue of whether and for how long the company can tolerate a return on capital that is below its cost of capital. If profitability problems become preoccupying, the failing of the company may seek additional funds and working capital by increasing its borrowings, whether in the form of short term or long-term debt. This increases the company's gearing, since the higher the proportion of borrowed funds, the higher the gearing within the capital structure. The increased debt burden may then aggravate the situation, particularly if the causes of the decreasing profitability have not been resolved.

The worsening profit situation must be used to finance an increased burden of interest and capital repayments. In the case of a publicly quoted company, this means that fewer and fewer funds will be available to finance dividend payments. It may become impossible to obtain external credit or to raise further equity funds.

Confidence in the company as an investment may wither away leaving the share price to collapse. If the company is sound, for instance, but ineptly managed, the best that can be hoped for is a takeover bid for what may be now a significantly undervalued investment.

At this point, a company may not be really failing but unfortunately, more often rescue attempts are not mounted. This may be because the company's management does not recognize the seriousness of the situation, or is by now too heavily committed or too frightened to admit the truth to its stakeholders, when refinancing is attempted profits fail to cover payments leading to a cash flow crisis.

What are the causes of corporate failure, and can they be avoided? Numerous studies reveal the alarmingly high failure rate of business initiatives, and corporate survival rates have recently declined across the major European economies. This article examines the range of explanations for failure, before considering whether failure can sometimes even be 'good'.

After addressing growth strategies in the last Henley Manager Update, we'll now review recent writing on corporate failures. What are the causes of company failure and how can these be stopped? In what ways can companies learn from failure? Of course, not all failures in business actually lead to the failure of the business. There are, though, many examples in recent times of growth strategies that failed. Unilever, for example, embarked upon its well-publicised Path to Growth strategy in 2000. Since then, it has not only failed to grow profitably but has also seen its European sales decline. Part of the problem was in not being quicker to address emerging market trends, such as the one for low-carb diets. Similarly, Volkswagen embarked on a burst of growth in the late '90s by acquiring other well-known automobile brands, only to find these began competing against each other as competition intensified by the middle of this decade.

### **Corporate Distress Analysis – Causes**

#### **1. Technological Causes**

Traditional methods of doing work have been turned upside down by the development of new technology. If within an industry, there is failure to exploit information technology and new production technology, the firms can face serious problems and ultimately fail.

By using new technology, cost of production can be reduced and if an organization continues to use the old technology and its competitors start using the new technology; this can be detrimental to that organization. Due to high cost of production, it will have to sell its products at higher prices than its competitors and this will consequently reduced its sales and the organization can serious problems.

This situation was seen in the case of Mittal Steel Company taking over Arcelor Steel Company. Arcelor Steel Company was using its old technology to make steel while Mittal Steel Company was using the new technology and as a result, Mittal Steel Company was able to sell steel at lower price than Arcelor Steel Company due to its low cost of production. Arcelor Steel Company was approaching corporate failure and luckily, Mittal Steel Company merged with Arcelor Steel Company and became Arcelor Mittal Steel Company, thus preventing Arcelor from failure.

#### **2. Working Capital Problems**

Organizations also face liquidity problems when they are in financial distress. Poor liquidity becomes apparent through the changes in the working capital of the organization as they have insufficient funds to manage their daily expenses.



Businesses, which rely only on one large customer or a few major customers, can face severe problems and this can be detrimental to the businesses. Losing such a customer can cause big problems and have negative impact on the cash flows of the businesses.

Besides, if such a customer becomes bankrupt, the situation can even become worst, as the firms will not be able to recover these debts.

### **3. Economic Distress**

A turndown in an economy can lead to corporate failures across a number of businesses. The level of activity will be reduced, thus affecting negatively the performance of firms in several industries. This cannot be avoided by businesses.

The recent economic crisis in the USA led to many cases of corporate failures. One of them is the insurance AIG insurance company. It is facing serious problems and it might close its door in the near future.

### **4. Mismanagement**

Inadequate internal management control or lack of managerial skills and experience is the cause of the majority of company failures. Some managers may lack strategic capability that is to recognize strengths, weaknesses, opportunities and threats of a given business environment. These managers tend to take poor decisions, which may have bad consequences afterwards.

Furthermore, managers of different department may not have the ability to work closely together. There are dispersed department objectives, each department will work for their own benefits not towards the goal of the company. This will bring failure in the company. One example can be WorldCom, where the finance and legal functions were scattered over several states and communication between these departments were poor.

### **5. Over-expansion and Diversification**

Research has shown that dominant CEO is driven by the ultimate need to succeed for their own personal benefits. They neglect the objective set for the company and work for their self-interest. They want to achieve rapid growth of the company to increase their status and pay level. They may do so by acquisition and expansion.

The situation of over expansion may arise to the point that little focus is given to the core business and this can be harmful as the business may become fragment and unfocused. In addition, the companies may not understand the new business field. Enron and WorldCom can be an example for this situation where the managers did not understand how growing overcapacity would influence its investment and therefore did not comprehend the risks associated with it.

### **6. Fraud by Management**

Management fraud is another factor responsible for corporate collapse. Ambitious managers may be influenced by personal greed. They manipulate financial statements and accounting reports. Managers are only interested in their pay checks and would make large increase in executive pay despite the fact that the company is facing poor financial situation. Dishonest managers will attempt to tamper and falsify business records in order to fool shareholders about the true financial situation of the company. These fraudulent acts or misconduct could indicate a serious lack of control. These frauds can lead to serious consequences: loss of revenue, damage to credibility of the company, increased in operating expenses and decrease in operational efficiency.

### **7. Poorly Structured board**

Board of Directors is handpicked by CEO to be docile and they are encouraged by executive pay and generous benefits. These directors often lack the necessary competence and may not control business matters properly. These directors are often intimidated by dominant CEO and do not have any say in decision making. Example Enron and WorldCom where poorly structured board was a contributor towards their failure.

### **8. Financial Distress**

Firms that become financially distressed are found to be under-performing relative to the other companies in their industry. Corporate failure is a process rooted in the management defects, resulting in poor decisions, leading to



financial deterioration and finally corporate collapse. Financial distresses include the following reasons also low and declining profitability, investment Appraisal, Research and Development and technical insolvency amongst others.

A firm may fail, as its returns are negative or low. A firm that consistently reports operating losses probably experiences a decline in market value. If the firm fails to earn a return greater than its cost of capital, it can be viewed as having failed. Falling profits have an obvious link with both financial and bankruptcy as the firm finds it is not generating enough money to meet its obligations as they fall due.

Another cause that will lead the company to fail is the investment appraisal. Many organizations run into difficulties as they fail to appraise investment projects carefully. The long-term nature of many projects means that outcomes are difficult to forecast and probabilities are usually subjective. "Big project gone wrong" is a common cause of decline. For example, the acquisition of a loser company, this has happened in the case for the failure of Parmalat Co Ltd of Italy, which made the acquisition of several losses making company where inappropriate evaluation of the acquired company, its strengths and weaknesses.

### **Causes of Sickness for a Project**

"Prevention is better than cure" is the proverb that reflects the need for knowing the likely causes of industrial sickness so that one can plan to avoid the same. Just as human beings fall sick by two ways, viz.. either born sick or acquiring sickness during growth, an industry can either run into trouble even during the implementation stage itself or develop sickness during its lifetime.

The causes of sickness can be categorized into two viz., internal causes and external causes. Internal causes are those that are internal to the organization over which the management of the organization has control. Sickness due to internal causes can be avoided if the management is shrewd enough to identify the causes and eliminate them at their initial stage itself. External causes are those that are external to the organization over which the management of the organization has little control. Government's plans and actions, failure of monsoon which affects agriculture and allied industries, emergence of strong competitors etc.. are some of the external factors. Though sickness may be caused either by internal or external factors, sometimes, the management may be able to revamp its organization, plan suitable strategies and take on the external factors to reduce their impact.

The areas/stages in which these causes may exist and their effects can be studied under the following heads.

- Project formulation.
- Project implementation.
- Production.
- Marketing.
- Finance.
- General and personnel administration.

**Project Formulation:** Most of sickness is attributed to ill-conceived projects. A project that may, prima- facie present a rosy picture may have many hidden pitfalls. Irrational, hasty, over-optimistic decisions may result in choosing projects that may have inherent weaknesses. A project that has an inherent weakness is very unlikely to be a successful project. The existence of a few players in the chosen field who are doing well, is not always a sound proof that the project will be a success. The existing players may have their own special advantages due to which they could have overcome the hurdles and pitfalls that are present in the project.

A thorough investigation of the project during the identification and formulation stage is the sine- qua-non of any project proposal. "Think before you act"— is the proverb that is worth practising, Any amount of time and efforts spent at this stage is worth it as any hasty decision made at this stage will be very costly.

External factors play a major role in project formulation stage. The present stage of and the future course of the external environment are to be carefully studied for their influence on the project.



**Project Implementation:** Delayed implementation gives a project a difficult start. Unduly long time taken for project implementation results in time-overrun which is invariably followed by cost-overrun. Cost-overrun has the ill effect of affecting the financial viability of the project since a project that is viable at a capital cost of say ` 100.00 lakhs may prove to be unviable when the cost raises to say ` 150.00 lakhs due to cost-overrun. The problem of Cost-Overrun will get more compounded if the finance necessary to meet the increased cost can not be arranged in time. Any delay in arranging for the finance needed to meet the cost overrun will only further tend to increase the cost and this may land the project in trouble leading eventually to the death of the project and the project may not take off.

The following are some of the problem areas in implementation stage.

- The promoters may not be in a position to bring in funds to the required extent in time. In general. Banks/ Financial institutions, of late, insist that the promoters shall bring in their capital contribution to the project upfront before release of loan. Any delay in bringing the stipulated capital by the promoters will delay the drawal of loan, which will lead to delay in implementation,
- The loan disbursement may be delayed if the promoters are not able to comply with major terms and conditions of the loan agreement, For example, the loan agreement, iwer-alia, may stipulate that collateral security to cover, say 25% of the loan amount shall be offered, The value of the property that the promoters offer as collateral security to the bank/financial institution may be short of the requirement. Or, when the value of the property meets the requirement, there may be other impediments like legal hurdles for clear, unencumbered title to the property etc.
- The cost of different components of project-cost may increase due to price escalation. The cost provided for some of the elements of project-cost might have been underestimated. It is also likely that some elements which are essential might have been left out. These factors lead to cost- overrun which may delay the project implementation,
- There may be delay in getting power connection, water connection, approval from local bodies. Approval from pollution control authorities etc., which may postpone project implementation/ commencement of production.
- When more than one institution are involved in funding a project, there may be delay in tying up the financial arrangements with the different institutions. This is more so when term loan and working capital loan are provided by two different institutions. The institution that is to lend working capital loan may wish to see that the project comes through successfully and reaches a ready-to- start stage before committing sanction of working capital finance. There is likelihood of the capital investment on the project having been fully made and the project waiting for sanction/release of working capital finance to commence commercial operations. Any delay in release of working capital finance due to procedural- formalities involved will harm the project heavily, as the capital investment will be lying idle, without earning any return.
- 'Rethinking' of the project during the course of implementation, like changes in production process, use of alternate raw material, changes in technology etc., may hold up project implementation.
- Over spending on travel, entertainment and non-productive assets like guest houses, compound walls, staff quarters etc., may result in cost-overrun, which in turn may delay project implementation.
- Adverse foreign currency exchange rate fluctuations may affect projects involving imported plant and machinery and may result in cost-overrun. This is an external factor over which the management has no control. However, a prudent management can guard against adverse foreign currency movement by entering into forward contracts etc.,

**Production:** The major aspects of production that may lead to sickness are

- Increase in the cost of product ion.
- Decrease in the quantity of production.
- Quality of product not meeting the standards/customer expectation.
- Producing more quantity than can be sold, leading to accumulation of stock.



The increase in cost of production may be due to external factors like increase in the cost of raw materials, increase in the cost of consumables, power, etc., or due to internal factors like improper choice of raw material/ raw material-source, wrong choice of production process etc.

Decrease in quantity of production may be due to defects/under performance of plant and machinery, defects in production process etc.,

Defects in quality of products may be due to defects in raw material used, or due to unsatisfactory performance of machinery or due to ineffective supervision. In spite of the raw material, machinery and supervision being good, the advent of new technology may bring in product-obsolence and the product may lose customer preference.

Lack of proper planning of product mix and lack of co-ordination between production and marketing departments may lead to piling up of inventory, which will only add to the cost of the product.

### **The Models to Predict Corporate Failure**

Several techniques have been developed to help predict why companies fail. However, these are not accurate and do not guarantee that the prediction will turn out to be true. These models are The Z-Score, Argenti Model, and the VK model amongst others.

Beaver was one of the first researchers to study the prediction of bankruptcy using financial statement data. The established practice for failure prediction is therefore a model based on financial ratio analysis. Published financial reports contain a great deal of information about the company performance and prospects. Therefore, ratio analysis is not preferred for financial accounts interpretation however; it has also played a central role in the development of bankruptcy prediction models.

#### **(i) The Altman Model: Z-Score**

Edward I. Altman developed a Multivariate Model of Corporate Distress Prediction on the basis of Multiple Discriminant Analysis (MDA). In his study, Altman selected 33 failed and 33 non-failed firms, of which 22 Accounting and Non-accounting Ratios, which had been deemed to be the predictors of Corporate Distress, were taken into consideration. Of the 22 Accounting Ratios, Prof. Altman selected 5 ratios which had been deemed as the best predictors of Corporate Distress Prediction. The purposes of these five selected ratios are as follows:

- (i) To measure liquidity position of the firms.
- (ii) To measure reinvestment of earnings of the firms.
- (iii) To measure profitability of the firms.
- (iv) To measure financial leverage condition of the firms.
- (v) To measure sales-generating ability of firm's Assets.

In 1968, the following Discriminant Function was developed by Altman:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Where

Z = Overall Index of Multiple Index Function

And the five variables are

$X_1$  = Working Capital to Total Assets (a liquidity measure)

$X_2$  = Retained Earnings to Total Assets (a measure of reinvestment of earnings)

$X_3$  = EBIT to Total Assets (a profitability measure)

$X_4$  = Market Value of Equity & Preference to Book Value of Total Debt (a measure of leverage)

$X_5$  = Sales to Total Assets (a measure of sales-generating ability of the firm's assets)



### Analysis of Value of Z-score

- (i) If the calculated value of Z-score is greater than 2.99, it is predicted that the firm belongs to non-bankrupt class (i.e., non-failed firm).
- (ii) If the calculated value of Z-score is smaller than 1.81, it is predicted that the firm belongs to bankrupt class (i.e., failed firm).
- (iii) If the calculated value of Z-score of a firm falls between 1.81 and 2.99 (referred to as Grey Area), it is predicted that the firm consists of both bankrupt and non-bankrupt class (i.e., mixture of failed and non-failed elements) and, therefore, requires further investigation to determine its solvency status.

As per Altman's Multivariate Model of Distress Prediction —

- (i) If  $Z > 2.99$ : Non-failed or non-distressed firm.
- (ii) If  $Z < 1.81$ : Failed or distressed firm.
- (iii) If  $Z \geq 1.81$  but  $\leq 2.99$ : Mixture of failed and non-failed elements which requires further investigation to determine its solvency status.

In 1983, Altman developed a revised Z-score model for privately held firms. "Credit analysis, private placement dealers, accounting auditors, and firms themselves are concerned that the original model is only applicable to publicly traded entities (since  $X_4$  requires stock price data)". The revised Z-scores substitute the book value of equity for the market value in  $X_4$ . The new Z-score model ratios are listed below:

$X_1$  = Working capital / total assets

$X_2$  = Retained earnings / total assets

$X_3$  = EBIT / total assets

$X_4$  = Book value of Equity/total liabilities

$X_5$  = Sales / total assets

A change in the weight factor is also calculated. The revised Z-Score formula follows:

$$Z = 0.717(X_1) + 0.847(X_2) + 3.107(X_3) + 0.420(X_4) + 0.998(X_5)$$

Zones of Discrimination:

$Z > 2.9$  – "Safe" Zone

$1.23 < Z < 2.9$  – "Grey" Zone

$Z < 1.23$  – "Distress" Zone

Z-score estimated for manufacturers, industrials, non-manufacturers & emerging markets

$X_1$  = (Current Assets – Current Liabilities) / Total Assets

$X_2$  = Retained Earnings / Total Assets

$X_3$  = Earnings before Interest and Taxes / Total Assets

$X_4$  = Book Value of Equity / Total Liabilities

$$\text{Z-Score bankruptcy model: } Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Zones of discriminations:

$Z > 2.60$  – "Safe" Zone

$1.1 < Z < 2.60$  – "Grey" Zone

$Z < 1.1$  – "Distress" Zone



**(ii) NCAER Model**

According to NCAER, an industrial undertaking may be financially viable, if its three elements are proved to be positive. The NCAER Study on Corporate Distress Prediction prescribed the following three elements/ parameters for predicting the stages of corporate sickness:

- (i) Cash profit position (a profitability measure).
- (ii) Net working capital position (a liquidity measure).
- (iii) Net worth position (a solvency measure).

In a firm, if any of the above three elements/parameters are found to be negative, it may be considered that the firm has a 'tendency of becoming sick'. If any two of the above three elements/parameters are found to be negative in a firm, it may be considered that the firm possesses 'incipient sickness'. If all the above three elements/parameters are found to be negative in a firm, it may be considered that the firm is 'fully sick'.

**SHORT QUESTIONS & ANSWERS**

**MULTIPLE CHOICE QUESTIONS & ANSWERS:**

1. Financial risks do not include:
- (a) trade cycles;
  - (b) interest rate risk;
  - (c) inflation rate risk;
  - (d) exchange risk.

**Answer:**

**(a) trade cycles**

2. Risk Management techniques do not include:
- (a) risk avoidance;
  - (b) risk premium;
  - (c) risk retention;
  - (d) risk transfer.

**Answer:**

**(b) risk premium**

3. Project risk does not include:
- (a) Institutional risk;
  - (b) Turbulence;
  - (c) Completion risk;
  - (d) Uncertainty.

**Answer:**

**(d) Uncertainty**



4. Risk is defined as:
- (a) A variation from the actual;
  - (b) A variation from the expected;
  - (c) A possible event;
  - (d) A possible uncertainty.

**Answer:**

**(a) A variation from the actual**

5. Risk Management Strategies are:
- (a) Avoid Risk, Reduce Risk, Retain Risk, Combine Risk;
  - (b) Transfer Risk, Share Risk and Hedge Risk;
  - (c) Both (a) and (b);
  - (d) None of the above.

**Answer:**

**(c) Both (a) and (b)**

6. Unsystematic Risk relates to:
- (a) Market Risk;
  - (b) Beta;
  - (c) Inherent Risk;
  - (d) Interest Rate Risk.

**Answer:**

**(c) Inherent Risk**

7. Variability in return on investment in the market is referred to as:
- (a) Market Risk;
  - (b) Physical Risk;
  - (c) Pooling Risk;
  - (d) Business Risk.

**Answer:**

**(a) Market Risk**

8. Types of risks do not include:
- (a) Business risks;
  - (b) Market risks;
  - (c) Interest rate risks;



- (d) Default risks;
- (e) Uncertainty.

**Answer:**

**(e) Uncertainty**

9. Physical Risk includes:

- (a) Natural calamities: fire, tsunami, floods, earthquake, etc.;
- (b) Factory accidents due to fire, mishandling of equipment, breakdown and explosions;
- (c) Occupational hazards;
- (d) Both b and c;
- (e) All the above.

**Answer:**

**(e) All the above**

10. Business Risk which is inherent to a business due to:

- (a) Its nature and susceptibility to environment, e.g., change of fashion, business cycles;
- (b) Its nature and susceptibility to environment, e.g., conflicts like war, insurgency;
- (c) Its nature and susceptibility to environment, e.g., cross border terrorism, technological obsolescence, etc.;
- (d) All of the above;
- (e) None of the above.

**Answer:**

**(d) All of the above**

11. Financial Risk arises out of:

- (a) The nature of financial transactions;
- (b) Conduct of business and investment;
- (c) Both (a) and (b);
- (d) Increased competition;
- (e) None of the above.

**Answer:**

**(c) Both (a) and (b)**

12. Physical risk arising out of Social, Political, Economic and Legal Environments are often identified:

- (a) Through the performance of lead indicators;
- (b) Through the performance of lagging indicators;
- (c) Through the performance of lead and lag indicators;



- (d) Through the performance of the government;
- (e) None of the above.

**Answer:**

**(a) Through the performance of lead indicators.**

13. The concept of \_\_\_\_\_ is the process of identification of separate risks and put them all together in a single basket, so that the monitoring, combining, integrating or diversifying risk can be implemented:

- (a) Physical risk
- (b) Financial risk
- (c) Pooling risk
- (d) Business risk
- (e) Sharing risk

**Answer:**

**(c) Pooling risk**

14. \_\_\_\_\_ refers to the uncertainty of market volumes in the future and the quantum of future income caused by the variations in the interest rates:

- (a) Market risk;
- (b) Physical risk;
- (c) Interest rate risk;
- (d) Pooling risk;
- (e) Exchange risk;

**Answer:**

**(c) Interest rate risk**

15. \_\_\_\_\_ is the uncertainty of the purchasing power of the monies to be received, in the future:

- (a) Purchasing power risk;
- (b) Market risk;
- (c) Physical risk;
- (d) Interest rate risk;
- (e) Exchange risk.

**Answer:**

**(a) Purchasing power risk**

**Fill in the blanks:**

16. \_\_\_\_\_ is a comprehensive and integrated approach to addressing corporate risk.

**Answer:**

**Enterprise Risk Management**



17. \_\_\_\_\_ is the process of identifying, quantifying and prioritizing the risks that may interfere with the achievement of your organizational objectives.

**Answer:**

**Risk mapping**

18. The Z-Score model is a quantitative model developed by \_\_\_\_\_ to predict bankruptcy or financial distress of a business.

**Answer:**

**Edward Altman**

19. As per Altman, if the calculated value of Z-score is greater than \_\_\_\_\_, it is predicted that the firm belongs to non-bankrupt class

**Answer:**

**2.99**

**20. Match the following:**

A. Risk pooling	1. quantification of the amount of perceived risk
B. Risk Avoidance	2. involves identifying both systematic and unsystematic risks
C. Risk Measurement	3. adopted when risk cannot be avoided, reduced or transferred
D. Risk Diversification	4. mostly practiced by insurance companies
E. Risk Retention	5. complete elimination of exposure to loss due to a specific risk

**Answer:**

**A → 4**

**B → 5**

**C → 1**

**D → 2**

**E → 3**

**Illustration 1.**

From the information given below relating to Bad Past Ltd., calculate Altman's Z-score and comment:

$$\left( \frac{\text{Working capital}}{\text{Total assets}} \right) = 25\%$$

$$\left( \frac{\text{Retained earnings}}{\text{Total assets}} \right) = 30\%$$

$$\left( \frac{\text{Earnings before interest & taxes}}{\text{Total assets}} \right) = 15\%$$



$$\left( \frac{\text{Market value of equity}}{\text{Book value of total debt}} \right) = 150\%$$

$$\left( \frac{\text{Sales}}{\text{Total assets}} \right) = 2 \text{ times}$$

**Solution:**

As per Altman's Model (1968) of Corporate Distress Prediction

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Here, the five variables are as follows:

$$X_1 = \text{Working Capital to Total Assets} = 25\%$$

$$X_2 = \text{Retained Earnings to Total Assets} = 30\%$$

$$X_3 = \text{EBIT to Total Assets} = 15\%$$

$$X_4 = \text{Market Value of Equity Shares to Book Value of Total Debt} = 150\%$$

$$X_5 = \text{Sales to Total Assets} = 2 \text{ times}$$

$$\begin{aligned} \text{Hence, Z-score} &= (1.2 \times 25\%) + (1.4 \times 30\%) + (3.3 \times 15\%) + (0.6 \times 150\%) + (1 \times 2) \\ &= 0.30 + 0.42 + 0.495 + 0.90 + 2.00 = 4.115 \end{aligned}$$

**Note :** As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company.

**Illustration 2.**

From the information given below relating to Unfortunate Ltd., calculate Altman's Z-score and comment:

$$\left( \frac{\text{Working capital}}{\text{Total assets}} \right) = 0.45$$

$$\left( \frac{\text{Retained earnings}}{\text{Total assets}} \right) = 0.25$$

$$\left( \frac{\text{Earnings before interest \& taxes}}{\text{Total assets}} \right) = 0.30$$

$$\left( \frac{\text{Market value of equity}}{\text{Book value of total debt}} \right) = 2.50$$

$$\left( \frac{\text{Sales}}{\text{Total Assets}} \right) = 3 \text{ times}$$

**Solution:**

As per Altman's Model (1968) of Corporate Distress Prediction:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$



Here, the five variables are as follows:

$$X_1 = \text{Working Capital to Total Assets} = 0.45$$

$$X_2 = \text{Retained Earnings to Total Assets} = 0.25$$

$$X_3 = \text{EBIT to Total Assets} = 0.30$$

$$X_4 = \text{Market Value of Equity Shares to Book Value of Total Debt} = 2.50$$

$$X_5 = \text{Sales to Total Assets} = 3 \text{ times}$$

$$\text{Hence, Z-score} = (1.2 \times 0.45) + (1.4 \times 0.25) + (3.3 \times 0.30) + (0.6 \times 2.50) + (1 \times 3) = 0.54 + 0.35 + 0.99 + 1.50 + 3 = 6.38$$

**Note:** As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

### Illustration 3.

Using Altman's Multiple Discriminant Function, calculate Z-score of S & Co. Ltd., where the five accounting ratios are as follows and comment about its financial position:

$$\text{Working Capital to Total Assets} = 0.250$$

$$\text{Retained Earnings to Total Assets} = 50\%$$

$$\text{EBIT to Total Assets} = 19\%$$

$$\text{Book Value of Equity to Book Value of Total Debt} = 1.65$$

$$\text{Sales to Total Assets} = 3 \text{ times}$$

### Solution:

As the Book Value of Equity to Book Value of Total Debt is given in the problem in place of Market Value of Equity to Book Value of Total Debt, the value of Z-score is to be computed as per Altman's 1983 Model of Corporate Distress Prediction instead of Altman's 1968 Model of Corporate Distress Prediction that we followed earlier.

As per Altman's Model (1983) of Corporate Distress Prediction,

$$Z = 0.717 X_1 + 0.847 X_2 + 3.107 X_3 + 0.420 X_4 + 0.998 X_5$$

Here, the five variables are as follows:

$$X_1 = \text{Working Capital to Total Assets} = 0.250$$

$$X_2 = \text{Retained Earnings to Total Assets} = 0.50$$

$$X_3 = \text{EBIT to Total Assets} = 0.19$$

$$X_4 = \text{Book Value of Equity Shares to Book Value of Total Debt} = 1.65$$

$$X_5 = \text{Sales to Total Assets} = 3 \text{ times}$$

$$\text{Hence, Z-score} = (0.717 \times 0.25) + (0.847 \times 0.50) + (3.107 \times 0.19) + (0.420 \times 1.65) + (0.998 \times 3)$$

$$= 0.17925 + 0.4235 + 0.59033 + 0.693 + 2.994 = 4.88$$

**Note:** As the calculated value of Z-score is much higher than 2.9, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

### Illustration 4.

From the information provided relating to a company, calculate Altman's Z-score and comment on the financial condition of the company:

Particulars	₹
Equity Share Capital (of ₹ 10 each)	2,00,000
12% Preference Share Capital (of ₹ 100 each)	1,00,000
Fixed Assets	3,00,000
Current Assets	2,00,000
Fictitious Assets	25,000
Current Liabilities	1,00,000
10% Debentures	2,00,000
General Reserve	75,000
Profit & Loss A/c (Cr.)	50,000
Sales	10,00,000
Earnings before Tax	1,30,000
Interest on Debentures	20,000
Market Value of each Equity Share	15
Market Value of each Preference Share	150

**Solution:**

As per Altman's Model (1968) of Corporate Distress Prediction

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Here, the five variables are as follows:

$$X_1 = \text{Working Capital to Total Assets} = \left( \frac{\text{₹ } 1,00,000}{\text{₹ } 5,00,000} \right) = 0.20$$

$$X_2 = \text{Retained Earnings to Total Assets} = \left( \frac{\text{₹ } 1,00,000}{\text{₹ } 5,00,000} \right) = 0.20$$

$$X_3 = \text{EBIT to Total Assets} = \left( \frac{\text{₹ } 1,50,000}{\text{₹ } 5,00,000} \right) = 0.30$$

$$X_4 = \text{Market Value of Equity and Preference Shares to Book Value of Total Debt} = \left( \frac{\text{₹ } 4,50,000}{\text{₹ } 3,00,000} \right) = 1.50$$

$$X_5 = \text{Sales to Total Assets} = \left( \frac{\text{₹ } 10,00,000}{\text{₹ } 5,00,000} \right) = 2 \text{ times}$$

$$\begin{aligned} \text{Hence, Z-score} &= (1.2 \times 0.20) + (1.4 \times 0.20) + (3.3 \times 0.30) + (0.6 \times 1.50) + (1 \times 2) \\ &= 0.24 + 0.28 + 0.99 + 0.90 + 2 = 4.41 \end{aligned}$$

**Notes:****1. Calculation of Working Capital**

Working Capital = Current Assets - Current Liabilities

Here, Working Capital = ₹ (2,00,000 - 1,00,000) = ₹ 1,00,000

**2. Calculation of Total Assets**

Total Assets = Fixed Assets + Current Assets

Here, Total Assets = ₹ (3,00,000 + 2,00,000) = ₹ 5,00,000

**3. Calculation of Retained Earnings**

Retained Earnings = Reserves & Surplus - Miscellaneous Expenditure  
 = General Reserve + Profit & Loss A/c (Cr.) - Fictitious Assets = ₹ (75,000 + 50,000 - 25,000) = ₹ 1,00,000

**4. Calculation of Earnings before interest & Tax (EBIT)**

EBIT = EBT + Interest on Debts  
 Here, EBIT = ₹ (1,30,000 + 20,000) = ₹ 1,50,000

**5. Calculation of Market Value of Equity & Preference Shares**

Market Value of Equity Shares	20,000 shares x ₹15	₹ 3,00,000
Market Value of Preference Shares	1,000 shares x ₹150	₹ 1,50,000
		₹ 4,50,000

**6. Calculation of Book Value of Total Debts**

Book Value of Total Debts = Long-term Debts + Current Liabilities  
 Here, Book Value of Total Debts = 10% Debentures + Current Liabilities = ₹ (2,00,000 + 1,00,000) = ₹ 3,00,000

As the calculated value of Z-score is much higher than 2.99, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

**Illustration 5.**

Using Altman's Model, compute the value of Z from the provided data (Balance Sheet extract):

Liabilities	₹	Assets	₹
Share Capital (@ ₹10 each)	2,00,000	Fixed Assets	4,20,000
Reserves & Surplus	60,000	Inventory	1,80,000
10% Debentures	3,00,000	Book Debts	70,000
Sundry Creditors	80,000	Loans & Advances	20,000
Outstanding Expenses	60,000	Cash at Bank	10,000
	7,00,000		7,00,000

Additional Information:

- Market value per share ₹ 12.50.
- Operating Profit (20% on sales) ₹ 1,40,000.

**Solution:**

As per Altman's Model (1968) of Corporate Distress Prediction

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Here, the five variables are as follows:

$$X_1 = \text{Working Capital to Total Assets} = \left( \frac{\text{₹ 1,40,000}}{\text{₹ 7,00,000}} \right) = 0.20$$

$$X_2 = \text{Retained Earnings to Total Assets} = \left( \frac{\text{₹ 60,000}}{\text{₹ 7,00,000}} \right) = 0.0857$$

$$X_3 = \text{EBIT to Total Assets} = \left( \frac{\text{₹ } 1,40,000}{\text{₹ } 7,00,000} \right) = 0.20$$

$$X_4 = \text{Market Value of Equity and Preference Shares to Book Value of Total Debt} = \left( \frac{\text{₹ } 2,50,000}{\text{₹ } 4,40,000} \right) = 0.568$$

$$X_5 = \text{Sales to Total Assets} = \left( \frac{\text{₹ } 7,00,000}{\text{₹ } 7,00,000} \right) = 1 \text{ times}$$

$$\begin{aligned} \text{Hence, Z-score} &= (1.2 \times 0.20) + (1.4 \times 0.0857) + (3.3 \times 0.20) + (0.6 \times 0.568) + (1 \times 1) \\ &= 0.24 + 0.11998 + 0.66 + 0.3408 + 1 = 2.36078 \end{aligned}$$

**Notes:****1. Calculation of Working Capital**

Working Capital = Current Assets - Current Liabilities

$$\begin{aligned} \text{Here, Working Capital} &= (\text{Inventory} + \text{Book Debts} + \text{Loans \& Advances} + \text{Cash at Bank}) - (\text{Sundry Creditors} \\ &\quad + \text{Outstanding Expenses}) \\ &= \text{₹}(1,80,000 + 70,000 + 20,000 + 10,000) - (80,000 + 60,000) \\ &= \text{₹}1,40,000 \end{aligned}$$

**2. Calculation of Total Assets**

Total Assets = Fixed Assets + Current Assets

$$\text{Here, Total Assets} = \text{₹} [4,20,000 + (1,80,000 + 70,000 + 20,000 + 10,000)] = \text{₹ } 7,00,000$$

**3. Calculation of Retained Earnings**

Retained Earnings = Reserves & Surplus = ₹60,000

**4. Calculation of Earnings before Interest & Tax (EBIT)**

EBIT = Operating Profit = ₹1,40,000

**5. Calculation of Market Value of Equity**

Market Value of Equity Shares = 20,000 shares × ₹12.50 = ₹2,50,000

**6. Calculation of Book Value of Total Debts**

Book Value of Total Debts = Long-term Debts + Current Liabilities

$$\begin{aligned} \text{Here, Book Value of Total Debts} &= 10\% \text{ Debentures} + (\text{Sundry Creditors} + \text{Outstanding Expenses}) \\ &= \text{₹}[3,00,000 + (80,000 + 60,000)] = \text{₹}4,40,000 \end{aligned}$$

**7. Calculation of Sales**

Here, Operating Profit = 20% on Sales = ₹1,40,000

$$\text{Hence, Sales} = 100/20 \times \text{₹}1,40,000 = \text{₹}7,00,000$$

As the calculated value of Z-score lies between 1.81 and 2.99, which is marked as Grey Area, it is predicted that the company consists of both bankrupt and non-bankrupt elements (i.e., a mixture of failed & non-failed elements) and, therefore, requires further investigation to determine its conclusive solvency status.

**Illustration 6.**

Following is the extract of a Balance Sheet of a company as on 31 March, 2014:

Liabilities	₹	Assets	₹
Equity Share Capital (₹ 100)	4,00,000	Fixed Assets	10,00,000
Reserves & Surplus	2,25,000	Trade Investment	2,00,000
12% Debentures	3,00,000	Stock	1,25,000
10% Bank Loan	2,00,000	Debtors	75,000
Current Liabilities	3,00,000	Preliminary Expenses	25,000
	14,25,000		14,25,000

Additional Information

- (i) Net sales for 2013-14 were ₹ 20,00,000.
- (ii) Price-Earnings Ratio is ₹ 10.
- (iii) Dividend Pay-out Ratio is 50%.
- (iv) Dividend per Share in 2013-14 is ₹ 20.
- (v) Corporate Tax Rate is 50%.

Using Altman's Model, calculate the Z-score of the company and interpret the result.

**Solution:**

As per Altman's Model (1968) of Corporate Distress Prediction —

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Here, the five variables are as follows:

$$X_1 = \text{Working Capital to Total Assets} = \frac{(1,00,000)}{14,00,000} = (0.07143)$$

$$X_2 = \text{Retained Earnings to Total Assets} = \frac{2,00,000}{14,00,000} = 0.1429$$

$$X_3 = \text{EBIT to Total Assets} = \frac{3,76,000}{14,00,000} = 0.2686$$

$$X_4 = \text{Market Value of Equity and Preference Shares to Book Value of Total Debt} = \frac{16,00,000}{8,00,000} = 2.00$$

$$X_5 = \text{Sales to Total Assets} = \frac{20,00,000}{14,00,000} = 1.4286 \text{ times}$$

$$\begin{aligned} \text{Therefore, Z-score} &= \{1.2 \times (-) 0.07143\} + (1.4 \times 0.1429) + (3.3 \times 0.2686) + (0.6 \times 2) + (1 \times 1.4286) \\ &= -0.0857 + 0.2001 + 0.8864 + 1.2 + 1.4286 = 3.6294 \end{aligned}$$

**Notes:****1. Calculation of Working Capital**

Working Capital = Current Assets - Current Liabilities

Here, Working Capital = (Stock + Debtors) - Current Liabilities

$$= ₹ [(1,25,000 + 75,000) - 3,00,000]$$

$$= (₹ 1,00,000)$$



## 2. Calculation of Total Assets

Total Assets = Fixed Assets + Investments + Current Assets

Here, Total Assets = ₹ [10,00,000 + 2,00,000 + (1,25,000 + 75,000)] = ₹ 14,00,000

## 3. Calculation of Retained Earnings

Retained Earnings = Reserves & Surplus - Preliminary Expenses = ₹ (2,25,000 - 25,000) = ₹ 2,00,000

## 4. Calculation of Earnings before Interest & Tax (EBIT)

$$\text{Dividend Payout Ratio} = \frac{\text{Dividend per share (DPS)}}{\text{Earnings per share (EPS)}}$$

Here dividend payout ratio = 50% and DPS in 2013 - 14 = ₹ 20.

$$\text{Hence, EPS} = \frac{\text{DPS}}{\text{Dividend payout ratio}} = \frac{20}{50\%} = \text{Rs. } 40.$$

$$\text{Here, number of equity shares} = \frac{\text{₹ } 4,00,000}{\text{₹ } 100} = 4,000.$$

Particulars	₹
Earnings available to equity shareholders = 4,000 x ₹ 40	1,60,000
Add: Corporate tax added back 50/ 50 x 1,60,000	1,60,000
Earnings before Tax (EBT)	3,20,000
Add: Interest on loan added back:	
On Debentures (12% on ₹ 3,00,000) = ₹ 36,000	
On Bank Loan (10% on ₹ 2,00,000) = ₹ 20,000	56,000
Earnings before Interest & Tax (EBIT)	3,76,000

## 5. Calculation of Market Value of Equity Shares

$$\text{Price Earnings Ratio} = \frac{\text{Market value per equity shares (MPS)}}{\text{Earnings per share (EPS)}}$$

Here, Price Earnings Ratio = 10 and EPS in 2013 - 14 = ₹ 40

Hence, Market Value per Equity Share (MPS) = Price Earnings Ratio x EPS = 10 x ₹ 40 = ₹ 400

Market Value of Equity Shares = 4,000 shares x ₹ 400 = ₹ 16,00,000

## 6. Calculation of Book Value of Total Debts

Book Value of Total Debts = Long-term Debts + Current Liabilities

Here, Book Value of Total Debts = 12% Debentures + 10% Bank Loan + Current Liabilities

= ₹ (3,00,000 + 2,00,000 + 3,00,000) = ₹ 8,00,000.

As the calculated value of Z-score is much more greater than 2.99, it can be strongly predicted that the company is a non-bankrupt company (i.e., non-failed company).

### Illustration 7.

Balance Sheet (extract) of Q Ltd. as on 31 March 2014.

Liabilities	₹ in Crores	Assets	₹ in Crores
Equity Shares	20.80	Fixed Assets	105.60



Long-term Liabilities Current	104.00	Current Assets	57.60
Liabilities	78.40	Profit & Loss A/c	40.00
	203.20		203.20

Additional Information:

- (i) Depreciation written off ₹ 8 crores.
- (ii) Preliminary Expenses written off ₹ 1.60 crores.
- (iii) Net Loss ₹ 25.60 crores.

Ascertain the stage of sickness.

**Solution:**

The NCAER Study on Corporate Distress Prediction prescribed the following three parameters for predicting the stage of Corporate Sickness:

- (i) Cash profit position (a profitability measure)
- (ii) Net working capital position (a liquidity measure)
- (iii) Net worth position (a solvency measure)

In the given case, we need to judge the above-mentioned parameters to ascertain the stage of sickness of the company.

- (i) Cash profit = Net profit + (Non-cash expenses/losses debited to Profit & Loss A/c) – (Non-cash incomes/Gains credited to Profit & Loss A/c)

Here, Cash Profit = Net Profit + Depreciation Written Off + Preliminary Expenses Written Off

$$= ₹ [(25.60) + 8 + 1.60] = ₹ 16 \text{ crores}$$

- (ii) Net Working Capital = Current Assets – Current Liabilities

$$= ₹ [57.60 - 78.40] = ₹ 20.80 \text{ crores}$$

- (iii) Net Worth = Share Capital + Reserves & Surplus - Miscellaneous Expenditure - Profit & Loss A/c (Dr.)

Here, Net Worth = Equity Share Capital - Profit & Loss A/c (Dr.)

$$= ₹ [20.80 - 40.00] = ₹ 19.20 \text{ crores}$$

**Prediction about Corporate Sickness:** As per NCAER Research Study, out of mentioned three parameters, if any one parameter becomes negative in case of a firm, it can be predicted that the firm has a tendency towards sickness. In the given company, all the three parameters [as calculated under (a), (b) and (c)] show negative value. Therefore, it can strongly be predicted that the company is a sick company and its stage of sickness is 'fully sick'. Immediate necessary drastic revival measures are essentially required for the survival of the company.



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**Section B**  
**Business Valuation**  
**(Syllabus - 2016)**

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# Study Note - 5

## BUSINESS VALUATION BASICS



### This Study Note includes

- 5.1 Basis for Valuation - Introduction
- 5.2 Principles and Techniques of Valuation
- 5.3 Role of Valuation

### 5.1 BASIS FOR VALUATION - INTRODUCTION

**“Valuation is not an objective exercise, and any preconceptions and biases that an analyst brings to the process will find their way into value”.** **Damodaran (2002, p.9)**

Simply defined, a business valuation is an activity conducted towards rendering an estimate or opinion as to the fair market value of a business interest at a given point in time. Generally, when valuing a business, a notional transaction is assumed, that is, one which has not been subjected to the bargaining process. Like accounting, valuation is an art rather than an exact science, and a properly conducted valuation is nothing more than an expression of informed opinion, which is based on fact of past financial performance and judgmental estimation for future. By their very nature, valuations are not precise. Consequently, valuation estimates and opinions are generally stated as a range of values.

Business valuation is no precise science. There is no universal legal framework which dictates how the valuation should be performed. Therefore, it is no right way to estimate the value of a company, its equity shares or an identified cash generation unit.

Examples of when a business valuation may be required include any or more of the following instances:

- Mergers and acquisitions;
- Business restructuring;
- Initial public offering and listing of equity shares in stock exchanges;
- Shareholders' disputes settlement;
- Purchase / sale of a business interest and step up acquisitions;
- Non-arm's length transaction;
- Disgruntled minority shareholders' actions;
- Damage claims;
- Estate planning;
- Deemed disposition at death

#### **Value**

In order to understand valuation, first we need to understand value. It is often the most complicated and misunderstood phenomenon. Value is a subjective term as what is a specific measured value to one person may not be the same for other. It is easy to understand the concept of value with the help of value of a property because all of us are well versed with it. But it is not easy to value this well-known asset.



A property might be more valuable to one person in comparison to another, because that person values certain features of the property higher than the other person. Alternatively, the property might have a higher utility to one person than to another. There may be many forces, which influences the value of a property, e. g., location, environmental and physical characteristics of the property, social standards, economic trends like GDP, per capita income, inflation etc. and government regulations.

The US Appraisal Foundation defines market value as, "The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and non-happening assuming the price is not affected by undue stimulus." However, the concepts of open market, fair sale, action with prudence, knowledge and non-happening of undue stimulus are all subjective and most often, unrealistic assumptions.

There may be substantial gap between subjective valuations and fluctuations of the free market. Thus, the value of a property does not always correspond to its price. As a result, despite rigorous efforts by time series econometricians the forces of supply and demand cannot be scientifically predicted.

In a nutshell, value is the "typical price a product fetches in an unregulated market". There are different types of values which are used in different ways of everyday business. These are original value, book or carrying value, depreciated or written down value, sale value, purchase value, replacement value, market value, economic value, residual value, scrap value etc. What investors buy is the future benefits and not the past. The point to be carefully noted that there is nothing called the 'correct value' or the 'right value'. It all depends upon the type of value which is being measured, the purpose of valuation, the methods adopted and the assumptions made. The valuation which seems to be 'base' today may be criticised and rejected tomorrow based on variations in the subjective conditions that we have discussed.

#### **Distinction between Price and Value**

The price may be understood as 'the amount of money or other consideration asked for or given in exchange for something else'. The price is therefore, an outcome of a transaction whereas the value may not necessarily require the arrival of a transaction. The value exists even if some assets become unable to generate cash flows today but can generate in future on the happening of some events.

"Experts are of the opinion that valuation must be differentiated from price. While the fair value of an asset is based on the assessment of intrinsic value accruing from fundamentals on a stand-alone basis, varying return expectation and underlying strategic aspects for different bidders could influence the price. A purchase and sale would be possible only when two parties while forming different views as to the value of an asset, are eventually able to reach agreement on the same price. It would be better appreciated by recognition of the fact that Government can only realise what a buyer is willing to pay for the PSU, as the purchase price ultimately agreed reflects its value to the buyer.

Another notable point is that valuation is a subjective figure arrived at by the bidder by leveraging his strengths with the potential of the company. Depending on the level of business synergy with the target company, perception of specific value realization and varying assessment regarding productivity, capex, etc., this figure may vary from bidder to bidder."

The oil reserve of an identified basin owned by a hydrocarbon exploration company may not have any value when the oil price is say ₹ 70 per barrel and the extraction cost of that oil is ₹ 110. However, when the price reaches to ₹ 130 and is expected to prevail around this figure, it may have significant value.

Another example reaffirms that price and value is not same. A lawyer is having some question regarding a professional assignment having remuneration of ₹ 2,50,000. He browses through some pages of a book at a bookshop and buys it for ₹ 40,000. He has an idea in his mind that the book is essential for earning professional services fees of ₹ 2,50,000 and expected contribution from the book would be around ₹ 80,000. At this stage the value / worth of that book is ₹ 80,000. However, after reading the book he feels that the book is not useful for his assignment. If the same book cannot be returned to the shop, its disposal value would be negligible.

## Valuation

Knowing what an asset is worth and what determines that value is a pre-requisite for intelligent decision making. Valuation is an essential prerequisite in choosing investments for a portfolio, in deciding on the appropriate price to pay or receive in a takeover, and in making investment, financing and dividend choices while running a business. The basic premise of a valuation exercise is that the valuer can make reasonable estimates of value for most assets. The same fundamental principles determine the values of all types of assets, real as well as financial. Some assets are easier to value than others as the details of valuation vary from asset to asset and the uncertainty associated with value estimates is different for different assets. However, the core principles remain the same.

The value of any asset must equal the present value of its future cash flows, discounted at a rate that reflects its inherent risk. Since neither the future cash flows nor the appropriate discount rate can be known with certainty, valuation is always estimation. Several valuation methods are used to value a business but not a single method can be vouched to predict the exact price at which an entity can be sold.

Valuing a business is a pivotal function while acquiring a company as the buyer will be willing to pay the price depending on the synergy value that will result when the companies are combined. The more the synergy value a particular acquisition can generate, the higher the price an acquirer will be willing to pay.

In case of equity shares valuation is used for

1. stock selection,
2. concluding market expectation,
3. evaluating corporate events,
4. setting up an opinion,
5. evaluating business strategies,

as a communication among management, shareholders and analysts, appraisal etc.

## Business Valuation

The art of valuation as an exercise is not just a discipline for finance professionals and investors. Used properly, it can be a powerful, perhaps the most powerful, way that managers can run their companies in an increasingly competitive world. By integrating accounting and performance measures with strategic thinking and day-to-day operations, managers can learn to take decisions that enhance their businesses and add real value. As knowledge capital becomes increasingly important, traditional financial measures such as earnings and book value are accounting for less and less of a company's actual market price. Investors are paying great attention to non-financial factors in their efforts to assess the value of corporations.

In the USA, the importance of 'shareholders' value' is almost universally accepted in business. The concept is here defined as being not only the 'market value added' (MVA) – this is the difference between the stock market capitalization of a company and the capital that has been invested in it – but also growth in employment and high productivity. Although share prices fluctuate, over time they tend to reflect the underlying value of a company.

American CEOs and senior managers are expected to focus on creating shareholders' value in their corporations. This is not true in case of Europe and Asia. In these regions, corporations are seen as having other obligations to their communities. Governments often define and regulate a company's duties towards its 'stakeholders'. Stakeholders include employees, customers, suppliers, the state, lenders, investors and the general public of the society as a whole. Critics condemn the shareholders' value approach as harmful to society as a whole. Rights and obligations of stakeholders are given greater weight. Supporters of the stakeholder system have argued that focusing on shareholders' value may hurt the interests of other stakeholders, in particular the employees of the company.

However, there remains possibilities of counter argument that most successful companies in any given market would tend to enjoy better productivity, better Market Value Added (MVA) and employ more people than their competitors. MVA is the difference between market value of its equity and debt and its economics book value



of capital. In other words, successful companies are maximising shareholders' value even if they do not explicitly say so. In doing so they are also benefiting, not damaging, the other stakeholders' interests. Shareholders' value implies a stock market where company shares are widely held by the public. Information about a Company is less easily available in countries such as Germany and Japan, where shareholdings are concentrated in the hands of promoters and financial institutions. Share prices may not reflect values as closely as they do in more efficient stock markets. There is less incentive for managers to strive to create shareholder value.

Furthermore, the spectre of a hostile takeover does not loom as powerfully as it does in the USA. The USA has a huge market for mergers and acquisitions (M&A) that is partly driven by perceived weaknesses in the current management. Elsewhere, managers may not be as concerned that inefficiency may lead to a takeover.

[A hostile takeover is the acquisition of one company (called the target company) by another (called the acquirer) that is accomplished by going directly to the company's shareholders or fighting to replace management to get the acquisition approved.]

**Purpose of Business Valuation**

Purpose of Valuation	Examples
Valuation for transactions	Purchase and sale of an entity or an independent Cash Generating Unit or Division, M&A, reverse merger, recapitalisation, capital restructuring, Equity participation by an external investor like Private Equity and Venture Capital Funds, Leverage Buy Out (LBO), Management by Objective (MBO), Management Buy In, Disinvestment by Joint Venture Partner or a Promoter, IPO, ESOPs, buy back of shares, project planning and so on
Valuation for court cases	Bankruptcy, contractual disputes, ownership disputes, dissenting and oppressive shareholder cases, divorce cases, intellectual property disputes and others.
Valuation for compliances	Fair value accounting, tax issues
Valuation for planning	Estate planning, personal financial planning, M&A planning, strategic planning

The list is inclusive and not exhaustive.

**Different approaches to Business Valuation**

Analysts use a wide spectrum of models, ranging from the simple to the sophisticated. These models often make very different assumptions about the fundamentals that determine value, but they do share some common characteristics and can be classified in broader terms. There are several advantages to such a classification as such classified items make it is easier to understand where individual models fit in to the big picture, why they provide different results and when they have fundamental errors in logic.

In general terms, there are three approaches to valuation. The first, discounted cash flow valuation, relates the value of an asset to the present value of expected future cash flows on that asset. The second, relative valuation, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common financial variable like future earnings, cash flows, book value or sales. The third, contingent claim valuation uses option pricing models to measure the value of assets that share option characteristics. While they can yield different estimates of value, one of the objectives of discussing valuation models is to explain the reasons for such differences, and to help in picking the right model to use for a specific task.

These three methods, however, does not consider another method and that is explored value through auction bidding or public tendering. One may argue that this is not a process for valuation as such since the bidders will conduct their own valuation exercise before putting up their respective bids.

**Stakeholders of Valuation**

For whom do we value? The fundamental role of valuation is to offer a base for negotiation between buyer and seller. It has a great repercussion that can affect the whole financial and strategic dynamics of decision for which the valuation is being conducted. However, an inclusive list of entities that are presumed to be affected by wrong

or improper valuation will help understanding the role of valuation.

- **Shareholders** — who provide capital to the business;
- **The company itself** — they may become a takeover target or the prospective acquirer of the target company or may merge with another company;
- **Financial experts** — who help in financial decision making;
- **The buyers of property and business** — who help in creating orderly market;
- **Banks and others**—who provide loan by taking the property or financial assets like equity shares as a collateral;
- **Mutual funds and Hedge funds, Private Equity Players, Venture Capitalists, etc.** — who heavily invest in listed and unlisted companies and / or securities;
- **Insurance companies** — who provide risk mitigating products and invest in securities
- **Governments** — who buy products and services and deposit money with banks, mutual funds and others and / or participate in equity capital as a co-investor or acquirer.
- **Whole economy** — a robust banking system is the necessary for the economy to move.

Global financial crisis (GFC) has reminded us the crucial significance of the issue of valuation. Fair value accounting has been blamed as one of the main reasons behind GFC.

With the increase in cross border flow of capital in the form of foreign direct investments (FDI), acquisitions and M&A transactions, the subject of valuation has become a global issue. Following entities may require valuation to be carried out; (i) buyer or seller (ii) lender (iii) intermediary like agent, broker etc., (iv) regulatory authorities such as tax authorities, (v) revenue authorities and (vi) general public. Value can also be estimated, assessed or determined by professional valuers. Global /corporate investors have become highly demanding and are extremely focused on maximising corporate value. The list of investors includes high net worth individuals, pension and hedge funds and investment companies. They no longer remain passive investors but are keen followers of a company's strategies and actions aimed at maximising and protecting the value of their investments. Valuation should be done of all assets and liabilities to know 'what we own' and "what we owe". Assets must include both tangibles as well as intangibles. Liabilities include both apparent and contingent.

### **Key Areas of Valuation**

Globalisation has enhanced IT capabilities, all pervasive role of the media and financial analysts and growing awareness of investors have rendered the situation more complex. Mergers, acquisitions, disinvestments and corporate takeovers have become the order of the day across the globe and are a regular feature today.

Mentioned below are certain major areas of decision making where valuation plays a key role.

- Valuation of equity share in the primary, secondary as well as derivative market;
- Private placement of equity shares;
- Corporate restructuring and turnaround;
- Secured lending including project finance;
- Securitization and other debt instruments;
- Implementation of Basel-III recommendation;
- Portfolio management - Mutual fund, hedge fund and professional investors like PE, VC and Angels;
- Long term and medium term investment decisions, M&A, takeovers, divestiture, disinvestment, capital budgeting, private equity investment, venture capital investment, strategic investors, financial investors and others;
- Dividend decision and buy back of shares;
- Borrowing decisions, including by keeping equity shares as collaterals;



- Financial risk management decisions;
- Court case related decisions;
- Tax related valuation including transfer pricing;
- Development projects valuation;
- Intangible assets;
- Financial reporting valuation;
- Equity research;
- Forensic accounting and financial fraud investigation;
- Dissolution of firm, partner buyout and admission;
- Insurance product valuation;
- Estate planning and financial planning;
- Corporate planning;
- Property valuation;
- Value based performance measurement;
- Credit rating;
- Fairness and solvency opinion; and
- Charitable donation.

Apart from the above, there could be reasons like 'divorce' etc. which could often be treated as occasions for valuation. However, we will consider it beyond the scope of our study.

### **Valuer**

There are different types of providers of valuation services. Like International Financial Reporting Standards (IFRS) for accounting, and reporting, there is no single consistent valuation standard applicable across the world. In USA, UK, Canada and other developed countries the valuation service provide there exist professional institutes that provide necessary education training for valuation services and the profession is regulated to a large extent. In India, valuation profession is yet to be regulated; there is no specified qualification for performing valuation. As of today, the profession is fragmented and may be considered at its developing phase. This probably could be the reason, why there is lack of clarity, consistency, transparency and quality in valuation reports.

Several Cost & Management Accountant firms are providing valuation services. With the introduction of fair value accounting under Indian Accounting Standards (Ind AS), the professional service field of valuation practice is bound to grow. It is relevant to mention here that India has adopted a new set of standards called Ind AS with the objective to converge towards IFRS.

Merchant bankers, venture capitalists and private equity investors perform valuation usually as a part of a transaction. Banks, financial institutions, and investment banking consulting and advisory services professionals also participate in valuations of their companies or segments of their companies or for their investment activities. Large brokerage houses have their own stock analysts' team who perform valuation on a regular basis and use this information for publishing research reports and advising clients. Services of valuation are really broad based and should not be confused with that of actuaries who render much specialised services.

In today's financial world, equity and business valuation services as a profession has become a commodity. Any and every professional provides these services. It is therefore, absolutely essential that quality differentials are maintained with absolutely dispassionate and independent involvement in valuation activities, so that the provided valuation of any asset and expert opinion on the same can be relied upon for informed judgement and business decisions.

## 5.2 PRINCIPLES AND TECHNIQUES OF VALUATION

### Principles of Valuation

Like other areas of finance, valuation is also based on some basic foundations which we refer to as principles. We find six principles of valuation that provide basic ground work for different techniques of valuation we will refer to in the next part. Principles of valuation are:

- Principle of Substitution,
- Principle of Alternative,
- Principle of Time Value of Money,
- Principle of Expectation,
- Principle of Risk & Return, and
- Principle of Reasonableness and Reconciliation of value.

#### (i) Principle of Substitution

If business 'A' can be replicated at 'X' amount then that business is worth 'X' amount. If a similar business 'B' is available at a price less than 'X' amount, then business 'A' has worth less than 'X' amount. This principle ensures that understanding of market is important and forced comparison would lead to flawed valuation. This simply indicates that risk-averse investor will not pay more for a business if another desirable substitute exists either by creating new or by buying. Yet at the same no two businesses can be considered as exactly equal. Selection of the nearest comparable transaction for validation of the valuation done for any given asset is, therefore, very critical and equally challenging.

#### (ii) Principle of Alternatives

No single decision maker is confined to one transaction. Each party to the transaction has alternatives to fulfilling the transaction for a different price and with different party. Since no single transaction could be a perfect substitute to another transaction one may consider paying some premium or deduct some amount by way of adjustment if the investment meets strategic interest.

When someone is buying a business it should be kept in mind that the same should not be bought at any cost as if no alternative exists. In stock market and auction market in most of the cases bidders bid simply because of the fact that others are bidding and that simply raises the price. This Case is simply explained as 'near miss' situation where one realizes that price is far greater than value.

#### (iii) Principle of Time Value of Money

This is the most basic and frequently used tool used in corporate finance as well as valuation. It suggests that value can be measured by calculating present value of future cash flows discounted at the appropriate discount rate. Such discount rate may be weighted average cost of capital invested / to be invested, or risk equated rate in addition to the risk free return. In certain cases of valuation, it can be estimated rate of inflation in the economy. Investment opportunities may offer differing cash flows, business and earnings growth prospects and risk profile. Principle of time value of money helps us to discriminate those opportunities and to select the best subject to given parameter.

#### (iv) Principle of Expectation

Cash flows are based on the expectations about the performance in future and not the past. In case of mature companies, we may conservatively assume that growth from today or after some certain period would be constant. The difficult part is not only to determine or estimate the extent and direction of business growth but also estimated price(s) of product and / or services as well as various elements of cost of goods sold keeping in view the general condition of the business ecosystem in future years. These assumptions will have significant impact on valuation.



### **(v) Principle of Risk & Return**

Harry Markowitz, the father of modern finance was first to quantify risk and used the same in portfolio decision making. Based on risk- return criteria he suggested ways to identify optimal portfolio.

Markowitz has made two important assumptions. First, an investor is risk averse. Second, an investor would prefer higher amount of wealth than the lower one. The reason is higher wealth leads to possibility of higher consumption. Given two possible portfolios with similar risk profile, the one with higher expected return will be preferred. These two assumptions are most integral part of valuation exercise.

### **(vi) Principle of Reasonableness & Reconciliation**

In valuation exercise we need to deal with large number of uncertainties and we have to go for assumptions. This sixth principle suggests how far these assumptions are reasonable and it reconciles different values obtained under different approaches.

In valuation we should be careful about:

- Inconsistency in judgement and assumptions;
- Conceptual flaws;
- Projection modelling and formula errors;

A valuation without reasonable check and reconciliation exercise is not complete and would be difficult to defend. It is pertinent to note Revenue Ruling 59-60 of USA that offers seven factors which must be considered in any valuation exercise.

- The nature of the business and the history of the enterprise from its inception;
- Economic outlook in general and condition of the outlook of the specific industry in particular;
- The book value of the stock and financial condition of the business;
- The earnings and dividend paying capacity of the company;
- Whether the business is having any intangible assets;
- Sales of the stock and the size of the block of stock to be valued; and
- The market price of stocks of companies engaged in similar business having their respective stocks actively traded in a free and open market or an exchange or over the counter.

### **Valuation Bias**

A valuation specialist starts valuing a firm with certain assumptions and certain preconceived conditions about how the business ecosystem related to the company and sector to which it belongs, will shape up. All too often, views on a company are formed before the specialist starts inserting the numbers, determined using those assumptions, into the financial / econometric models that is used. Not surprisingly, conclusions tend to reflect his / her preconceived conditions, biases both about the company and assumptions. A reviewer will begin by considering the sources of bias in valuation and then move on to evaluate how biases manifest in the valuation and to what extent it has been impacted. The reviewer then closes with a discussion of how best to minimise or at least deal with bias in valuations.

### **Sources of Valuation Bias**

The bias in valuation starts with the companies that is chosen to be valued. These choices are almost never random, and how valuers are made can start laying the foundation for bias. It may be that the valuer has read some news item or research based data points, good or bad, in the press or any other published literature about the company and its related business sector or heard from an expert that it was under or overvalued. Thus, valuers already begin with a perception about the company that they are about to value. Valuer add to the bias when we collect the information they need to value the firm. The annual report and other financial statements include not only operating results and financial state of affair is but also management discussions and analysis of performance,

guidance for near future outlook and various risk factors for the sector in general and the entity in particular. All these often put the best possible revolve on the numbers, with many larger companies. It is easy to access what other analysts following the stock think about these companies.

In many valuations, there are institutional factors that add to this already substantial bias. For instance, it is an acknowledged fact that equity research analysts are more likely to issue buy rather than sell recommendations, i. e., that they are more likely to find firms to be undervalued than overvalued. This can be traced partly to the difficulties analysts face in obtaining access and collecting information on firms that they have issued sell recommendations on, and partly to pressure that they face from portfolio managers, some of whom might have large positions in the stock, and from their own firm's investment banking arm which have other profitable relationships with the firms under valuation exercise.

The reward and punishment structure associated with finding companies to be under and overvalued is also a contributor to bias. An analyst whose compensation is dependent upon whether he / she finds a firm is under or overvalued will be biased in his / her conclusions. This should explain why acquisition valuations are so often biased upwards. The analysis of the deal, which is usually done by the acquiring firm's investment banker, who also happens to be responsible for carrying the deal to its successful conclusion, can come to one of two conclusions. One is to find that the deal is seriously overpriced and recommends rejection, in which case the analyst receives the eternal gratitude of the stockholders of the acquiring firm but little else. The other is to find that the deal makes sense, no matter what the price is and to reap large financial windfall gain from getting the deal done.

### **Perceptions (bias) about Companies are manifested in Business Valuation**

There are three ways in which an analyst's views, perceptions on a company and most likely human biases that creep in can manifest themselves in value. The first is in the inputs that are used in the valuation. When analysts value companies, they constantly make assumptions to move on. These assumptions can be optimistic or pessimistic. For a company with high operating margins now, one can either assume that competition will drive the margins down to industry averages very quickly (pessimistic) or that the company will be able to maintain its margins for an extended period (optimistic). The chosen path will reflect prior biases of the analyst. It should come as no surprise that at the end of a day the value that is arrived at is reflective of the optimistic or pessimistic choices made along the way.

There are two more important factors. The first one is the PESETL\* analysis done prior to develop the financial model, to help conducting predictive analysis of business environment for the sector under which the concerned business falls, that will influence assumptions and estimation of financial variables. And the second one is due diligence conducted to estimate how the internal factors and directional changes that have been planned will affect operational and financial performance of the company in future. Many research scholars have pointed out that a large number of M&A transactions have either failed or not generated the predicted results, as considered in valuation model, due to wrong assumptions, which again could have been free from bias and more accurately considered if findings from due diligence would have been more bearing with facts.

**\*Note:** PESETL analysis means analyses of Political, Economic, Societal, Environmental and Legal aspects of business ecosystem that prevailed at the time of conducting the valuation exercise and will shape up in future which will influence market conditions, operations and financial factors related to the business entity which or whose equity shares are being valued.

The second is in what is called post-valuation tinkering, where analysts revisit assumptions after a valuation in an attempt to get a value closer to what they had expected to obtain starting off. Thus, an analyst who values a company at ₹150 per share, when the market price is ₹250, may revise his growth rates upwards and his risk downwards to come up with a higher value, if he /she believed that the company was undervalued to begin with.

The third is to leave the value as is but attribute the difference between the estimated value and the value he / she thinks is the right one to a qualitative factor such as synergy related savings or strategic considerations. This is a common device in acquisition valuation where analysts are often called upon to justify the unjustifiable. In fact, the use of premiums and discounts, where the estimated value is augmented or reduced, provides a window on the bias in the process. The use of premiums control and synergy are good examples of commonplace in acquisition valuations, where the bias is towards pushing value upwards to justify high acquisition prices to use of discounts illiquidity and minority discounts.



### Process to Minimize Valuation Bias

Bias cannot be regulated or legislated out of existence. Analysts are human beings and both knowingly and unknowingly bring their biases to the table. However, there are ways and means by which we can mitigate the effects of bias on valuation:

- (i) Reduce institutional pressures:** A significant portion of bias can be attributed to institutional factors. Equity research analysts in the 1990s, for instance, in addition to dealing with all of the standard sources of bias had to grapple with the demand from their employers that they bring in investment banking business. Institutions that want honest sell-side equity research should protect their equity research analysts who issue sell recommendations on companies, not only from irate companies but also from their own sales people and portfolio managers.
- (ii) De-link valuations from reward/punishment:** Any valuation process where the reward or punishment is conditional to the outcome of the valuation will result in biased valuations. In other words, if we want acquisition valuations to be unbiased, we have to separate the deal analysis from the deal making to reduce bias.
- (iii) No pre-commitments:** Decision makers should avoid taking strong public positions on the value of a firm before the valuation is complete. An acquiring firm that comes up with a price prior to the valuation of a target firm has put analysts in an untenable position, where they are called upon to justify this price. In far too many cases, the decision on whether a firm is under or overvalued precedes the actual valuation, leading to seriously biased analyses. Therefore, analysts should both be independent and dispassionate without any direct and indirect link to the purpose and objective for which the valuation statement will be used.
- (iv) Self-Awareness:** The best antidote to bias is awareness. An analyst who is aware of the biases he or she brings to the valuation process can either actively try to confront these biases when making input choices or open the process up to more objective points of view about a company's future. For this purpose, they have to also validate the inferences drawn from findings of PESTEL analysis and due diligence exercise without any preconceived notion or perception. Otherwise bias will creep into their assumptions and estimations of numbers to be used as inputs for the valuation model.
- (v) Honest reporting:** In Bayesian statistics, analysts are required to reveal their priors (biases) before they present their results from an analysis. Thus, an environmentalist will have to reveal that he or she strongly believes that there is a hole in the ozone layer before presenting empirical evidence to that effect. The person reviewing the study can then factor that bias while looking at the conclusions. Valuations would be much more useful if analysts revealed their biases up front.

While we cannot eliminate bias in valuations, we can try to minimize its impact by designing valuation processes that are more protected from overt outside influences and by report our biases with our estimated values.

### Uncertainties in Business Valuation

Starting early in life, peoples are taught that if they do things right, they will get the right answers. In other words, the precision of the answer is used as a measure of the quality of the process that yielded the answer. While this may be appropriate in mathematics or physics, it is a poor measure of quality in valuation. Barring a very small subset of assets, there will always be uncertainty associated with valuations, and even the best valuations come with a substantial margin for error. In this section, we examine the sources of uncertainty and the consequences for valuation.

The value of a business is not a static figure. It depends on change in purpose or circumstances. There are number of uncertainties involved in the valuation process which if not handled appropriately, would lead to an absurd value. Valuer may design complex financial models with several inputs to handle uncertainties but that does not mean that the value derived is reasonable or the process is sound. What valuer need to understand is the impact of each input on the value. Giving attention to following factors is crucial:

- The macro economic factors.
- The business.

- Its growth potential in the industry in which it operates.
- How is the business positioned?
- Who are the competitors?
- What is the quality and stability of the company's management?

The principles and methods of valuation are well settled and they are more or less the same across the classes of transactions. What changes in the course of deriving value is the selection of approaches and methods. Seller would like to get as much as possible and buyer would like to pay as little as possible. Somewhere between these two the deal takes place. Could it be mentioned that value is the price at which the deal takes place? What if there is no buyer or there is no intention to sell. Could it be concluded that the object or business is worth nothing? The answer is 'No'. There is a 'bigger fool theory' which says 'any price can be justified if a buyer is ready to pay the price. It might be you who is the last buyer ready to pay the any price. The theory makes us understand that every price cannot be value and vice versa. We need to differentiate between value and price.

### **Misconceptions about Valuation**

There are many areas in valuation where remains the scope for disagreement, including how to estimate true value and how long it will take prices to adjust to true value. But asset prices cannot be justified merely by using the argument that other investors are willing to pay higher price in future. Like all analytical disciplines, valuation has developed its own Myths.

#### **Myth 1: A valuation is an Objective search for true value.**

There will hardly be any valuation exercise which can remain cent percent free from bias of the valuation team members or valuer. However, the question is how much and in which direction. Understandably all ethically sound professional valuers, worth the name, will make all possible efforts to objectively conduct the exercise to find out the near actual value with certainty equivalent approach. However, the direction in magnitude of whatever little or more impact of bias creeps into the assumptions and tool selection is directly proportional to who pays for the asset being valued and how much professional fee is being paid to the valuer.

#### **Myth 2: Since valuation models are quantitative, valuation is better.**

However, one's understanding of a valuation model is inversely proportional to the number of inputs required for the model. Moreover, simpler valuation models work out much better than complex ones.

It seems obvious that making a model more complete and complex should yield better valuation. But it is not necessarily so. As models become more complex the number of inputs needed to value a firm tends to increase. Problems are compounded when models become too complex to become "black boxes." When a valuation fails the blame gets attached to the model rather than the analyst. Valuer often complains "It was not my fault. The model did it."

The following three points are common and important in all valuation works:

- Principle of parsimony, which essentially states that you do not use more inputs than what is actually needed.
- There should be trade-off between additional benefit arising from more inputs and cost arising from input errors and using more number of inputs.
- The models or tools adopted do not value companies but the valuer does.

All information inputs and data points considered to frame the assumptions are a time of excessive information. Identifying the minimum relevant information is almost as important as the valuation models and techniques that a valuer uses to value a firm.

#### **Myth 3: A well-researched and well done valuation tends to be timeless**

The value obtained in any valuation model is affected by firm-specific as well as market related information. As a consequence, the value will change as new information is revealed. Given the constant flow of information into financial markets, a valuation done on a firm quickly becomes dated and has to be updated to reflect correct



information. In practice many stock brokerage firms publish bi-yearly follow up valuation updates for large listed companies after publishing a detailed research based valuation.

Information about the state of the economy and the level of interest affects all valuation in an economy. When analysts change their valuation, they will undoubtedly be asked to justify the change and in some cases the fact that valuation change over time is viewed as a problem. The best response may be the one that John Maynard Keynes gave when he was criticized for changing his position on a major economic issue: "When the facts change I change my mind and what do you do, sir?"

**Myth 4: A good valuation provides a precise estimate of value.**

The truth remains that there is no concept of precise valuation. The recompense of valuation is greatest when valuation is least precise.

**Myth 5: To make money on valuation, you have to assume that markets are inefficient.**

If a market is efficient then market price is the best estimate of value. However, it has been empirically tested that no single market is efficient for estimating price. It is recognised that market makes mistakes but finding those mistakes requires a combination of skill and knowledge. This view of markets generally leads to the following conclusions:

- If something looks good to be true, a stock looks obviously undervalued or overvalued is properly not true.
- When the value from an analysis is significantly different from the market price, start-off with the presumption that the market is correct; then valuer has to convince himself that this is not the case before valuer to conclude that something is over or undervalued. The higher standard may lead you to be more cautious in following through on valuation but given the difficulty of beating the market this is not an undesirable outcome.

**Myth 6: The product of valuation (i.e., value) matters and not the valuation**

Valuation models focus exclusively on the outcome. That is the value of the company and whether it is over or undervalued. In most of the cases valuable internal points are missed out that can be obtained from the process of valuation and can answer some of the most fundamental questions, e.g.,

- What is the appropriate price to pay for high growth?
- What is a brand name worth?
- How important is to return and project?
- What is the effect of profit margin on value?

**Myth 7: How much a business is worth depends on what the valuation is used for?**

The value of a business is its fair market value, that is what a willing buyer will pay to a willing seller when each is fully informed and under no pressure to transact.

**Standard of Value**

Standard of value is nothing but a definition of the type of value being sought. Important at the stage is to refer the definition of standard of value as per the International glossary of business valuation terms which is "The identification of the type of value being utilised in a specific engagement; for example, fair market value, fair value, investment value." This definition is inclusive but not exhaustive. Standard of value can be taken depending upon the purpose of the valuation. The standard of value depends upon time of engagement which gives the purpose of valuation. Five most common 'standard of value' which are used practice are;

- Fair market value,
- Investment value,
- Intrinsic value,
- Fair value, and
- Market value.

Choice of appropriate standard of value may be dictated by circumstances, objective, contract and operation of law or other factors. Pertinent questions to be answered before choosing an appropriate standard of value are;

- What is being valued?
- What is the purpose of valuation?
- Does the property or business changes hands or does controlling power to manage the asset is being handed over to the person paying for the value since such a transfer will be at a premium?
- Who are the buyer and seller?

We will describe each of those five standards of values. But to begin with we introduce book value.

### **Book Value**

Book value is an accounting concept and implies historical assets less outside liabilities. It is rarely used in valuation. The book value per share is simply the networth of the company, which is equal to paid up equity capital plus reserves and surplus, divided by the number of outstanding equity shares. For example, if the net worth of Zenith Limited is ₹ 37 million and the number of outstanding equity shares of Zenith is 2 million, the book value per share works out to ₹ 18.50, i. e., ₹ 37 million divided by 2 million shares .

How relevant and useful is the book value per share as a measure of investment value? The book value per share is firmly rooted in financial accounting and hence can be established relatively easily and the same is automatically attested by the statutory auditors. Due to this, its proponents argue that it represents an 'objective', measure of value. A closer examination, however, quickly reveals that what is regarded as 'objective' is based on accounting conventions and policies, which are characterised by a great deal of subjectively and arbitrariness, unless otherwise mitigated by the mandatory accounting standards, and disclosure requirements to be followed. An allied and a more powerful criticism against the book value measure is that the historical balance sheet figure on which it is based are often very diverged for current economic value. Numbers in financial statements really reflect earning power and hence the book value per share cannot be regarded as a proxy for true investment value.

### **Liquidation Value**

This method assesses the value of a business by gauging its value if were to cease operations and sell its individual assets. Under this approach, the business owner would receive no compensation for business goodwill, brand value for the entity and its products, which are not recognised in financial statements, —and other intangible assets such as the company's name, location, customer base, or accumulated experience. This method is divided into forced liquidations say in case of bankruptcy and orderly liquidations. Values are typically figured higher in the latter instances. Asset-based lenders and banks tend to favour this method, because they view the liquidation value of a company's tangible assets to be the only valuable collateral to the loan. But it is unpopular with most business owners because of the lack of consideration given to goodwill, brand values and other intangible assets.

The liquidation value per share is equal to:  $\frac{X - Y}{Z}$

X : Value realized from liquidating all the assets of the firm.

Y : Amount to be paid to all the creditors and preference shareholders.

Z : Number of outstanding equity shares.

To illustrate let's assume that M Limited would realise ₹ 40 million from the liquidation of its assets and pay ₹ 20 million to its creditors and preference shareholders in full and final settlement of their claims. If the number of equity share of M Limited is 2 million, the liquidation per share works out to (₹ 40 million – ₹ 20 million) / 2 million = ₹ 10 per share.

When the liquidation value appears more realistic than the book value, there are two serious problems in applying it:-

- (I) It is very difficult to estimate what amount should be realised from the liquidation of various assets.
- (II) the liquidation value does not reflect earning capacity.



International Glossary of Business Value Terms (IGBVT) defines three types of liquidation value:

**Liquidation value:** The net amount that would be realised if the business is terminated and the assets are sold piecemeal. Liquidation can either be orderly or forced.

**Force Liquidation value:** Liquidation value at which the asset or assets are sold as quickly as possible such as at an auction.

**Orderly Liquidation value:** Liquidation value at which the assets are sold over a reasonable period of time to maximise value to be realised from assets and payments to be made.

**Now we describe the five most common 'Standard of Value'**

### (1) Fair Market Value (FMV)

FMV is the most widely used standard of value in business valuation. The AICPA of USA, while issuing Statement on Standards for Valuation Services, has adopted IGBVT. It defines FMV as

"The price expressed in terms of cash equivalents, at which property would change hands between a hypothetical willing and able buyer and a hypothetical willing and able seller, acting at arm's length in an open and unrestricted market, when neither is under compulsion to buy or sell and when both have reasonable knowledge of the relevant facts."

**Following example makes FMV simple.**

Mr. 'A' owns 20% of a business and the balance 80% is owned by the other people. Here Mr. A has what is called a minority interest in the business. The question is whether worth of Mr. A will be taken as proportionate value of the business under FMV standard of value. Let's assume business is worth ₹ 200 million.

The 20% interest in the business would be worth less than ₹40 million. In the open market willing and able buyers pay perhaps 15% of the total value for a 20% interest because they are subject to control of the 80% owners. That means there will be discount known as DLOC, i. e., called as discount for lack of control. It does not necessarily mean the minority owner of 20% of the company will have to depend upon the managerial capability of the controlling shareholder and have to leave his asset at his disposal. He is taking a risk of probable lower return than market rate and hence the new buyer will look for a discount. If it is a case of closely held company, then there would be further discount on account of what is called as DLOM or discount for lack of marketability. This discount is counted to cover the fact that it will be difficult to sell the minority shares of closely held companies.

If a business is marketable, then FMV seems to be the appropriate standard of value. If a closely held business cannot be compared with a listed company FMV may not be the appropriate standard. The issue is not whether it can be used or not. Rather the issue is whether it can be determined or not.

### (2) Investment Value

IGBVT defines 'Investment value' as "the value to a particular investor based on his / her investment requirements and expectations". Simply stated, it gives the value of an asset or business to a specific unique investor and, therefore, considers the investor's specific knowledge about the business, own capabilities, expectation of risks and return and other associated factors. Synergies are considered to a specific purchaser. For these reasons investment value may result in higher value than FMV. Some of the factors which may cause difference between FMV and investment value are:

- Estimates of future cash flows or earnings;
- Perception of risk;
- Tax advantages;
- Synergy to other products;
- Other strategic advantages and so on.

An example makes the concept of investment value clear.

Mr. A owns 20% of a business and the balance 80% is owned by the other people. Whether, worth of Mr. 'A's share' will be taken as proportionate value of the business, if intrinsic value is used as standard of value. Even it can be more than the proportionate value if this 20% acquisition meets some strategic interest of the investor. The question of DOLM need not necessarily come as the investor is looking for long term strategic investment. In case of small business, the investment value should be the definition of value as only an investor with specific knowledge of the business would be interested in buying the business. Under this one values the business in the hands of specific investor.

### **(3) Intrinsic Value or Fundamental Value**

Intrinsic or fundamental value is used when an investor wants 'true' or 'real' value on the basis of an analysis of fundamentals without considering the prevailing price in the market. It is true economic worth of a share, business or property.

IGBVT defines intrinsic value as "the value that an investor considers, on the basis of an evaluation or available facts to be the "true" or "real" value that will become the market value when other investors reach the same conclusion." Graham & Dodd has defined the intrinsic value as "the value which is justified by assets, earnings, dividends definite prospects and factor of management." There are four major components of intrinsic value of a going concern:

- Level of normal earning power and profitability in the employment of assets as distinguished from the reported earnings which may be and frequently are, distorted by transient influences;
- Dividends actually paid or the capacity to pay such dividends currently and in the future;
- A realistic expectation about the trend line growth of earning power; and
- Stability and predictability of those quantitative and qualitative projections of the future economic value of the enterprise.

Intrinsic value and investment value may seem like similar concepts but they are different. The first represents an estimate of value based on the expected cash flow of the business and not of the investor. The second represents an estimate of value based on expected cash flow in the hands of a specific investor.

### **(4) Fair Value**

The fair value as standard of value is understood differently in the two situations mentioned below:

- (i) In legal matters
- (ii) In financial reporting purpose

Financial Accounting Standard Board is the accounting standards setting body for US-GAAP (Generally Accepted Accounting Principle) reporting has issued SFAS (Statement of Financial Accounting Standard) No. 157 - Fair Value Measurements. This is also known as mark to market standard. These establish a frame work for measurements of fair value and require discloser about measurement but it does not require fair value accounting for any position. Its guidance is relevant only when accounting standard require or permit position to be accounted for at fair value.

The standard provides the single authoritative definition of fair value for the US-GAAP reporting. The definition of fair value reads as "The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date". International Financial Reporting Standard (IFRS) which for the timing does not have a single authority definition of fair value. The guidance on measuring fair value is scattered throughout IFRSs and they are also not consistent. A general definition of fair value under IFRS reads as the amount for which an asset could be exchanged or a liability settled between knowledgeable, willing parties in an arm's length transaction.

#### **Exit Price Vs Entry Price:**

An exit notion where an organisation can get out of the assets and the liability position through orderly transaction with market participants at the measurement date. Simply stated, this standard requires valuing assets on what



they could fetch in the market or what is to be paid on transfer of liability that is the "exit price" (Sale price). This does not require the entity intention or its ability to sell assets or transfer liability at the measurement date. As far FASB price shall not be adjusted for transaction costs as they are not an attribute of the assets or liability. A willing buyer may like to pay more because of his strategic intent of using the same set of assets post acquisition with his own plan and he is confident generate more value than what it can by the present management in the given condition.

Further a fair value measurement assumes the highest and best use of the asset from the perspective of market participant without considering how the company is going to use it. This also requires considering that the use of the asset physically possible, financially feasible and legally permissible. The word "Exchanged" under IFRS definition can have both situations "Exit price as well as entry price" (Purchase price).

### **Market participants in an orderly transaction**

The focus in SFAS is on a market-based measurement. The standard refers to orderly transaction between market participants:

- Are willing to transact without acting under any pressure or influence.
- Are independent.
- Are knowledgeable having full understanding about the asset or liability and is capable to settle the transaction.
- Reliable to transact.

The orderly transaction is not forced and not done in a hurry. If the market is not active and prices are not reflective on an orderly transaction, then an adjustment may be required to arrive at fair value. The unique feature is that the standard creates a hierarchy of inputs for fair value measurement from most to least reliable.

**Level 1** input or evidence for valuation that is based on unadjusted quoted market price in active market for similar assets. It may be considered for determination of value of an asset, say equity shares of an unlisted company because the features of its listed peers are almost equivalent to its own.

**Level 2** input is based on observed market data, which is directly not comparable vis-à-vis the asset to be valued and needs some adjustment to give effect of dissimilarities. For example, between two similar pharmaceutical companies the listed one has a successfully tried-out drug under patenting, which may yield more income generation in future but for that rest of the present features are similar.. Accordingly the future earnings forecast has to be adjusted before arriving at the cash flow stream to be discounted.

**Level 3** evidence is based on unobservable input which could be internal models or an estimate of the management. This is the subject intense debate. It should be kept in mind that fair value measurement requires significant judgement. The standard has sufficient discloser requirements to counter any manipulation. The investor can always assess the assumptions and accordingly they may modify decision of investment.

### **Difference between Fair Value and Fair Market Value**

There is no authoritative clarification either under US-GAAP or IFRS about the difference between fair value and FMV except that these terms are consistent in accounting. This seems to be the reality. However, a few differences may be traced out as stated below:

- Fair value has a hierarchy of inputs for valuation but FMV does not have it.
- Fair value considers highest and best use of an asset from the perspective of market participants. This may result in maximising the value as against consensus value under FMV.
- DOLM adjustments may require in certain cases under fair value but adjustment for DOLC is doubtful.
- Fair value disregard blockage discount (a decline in the value resulting from the size of position).

The opinion of FASB is clear that when a quoted price is available in the active market it should not be further reduced for blockage discount. Because the quoted price is without any regard to the intent of the firm to transact at that price. Without the blockage discount comparability will improve.

**Note:** Hierarchy for inputs used in measuring fair value that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that the observable inputs be used when available.

Blockage discount: The difference between the market value of a security and its sale price when transacted under a block trade. Each blockage discount is negotiated by the involved institutional investors, which incorporates such factors as market liquidity and the size of the trade.

### (5) Market value

Market value standard is generally used in realised valuation. Definition of the term 'market value' is taken from IVS1, propounded by IVS committee — the leading property valuation standard setting body.

"Market value is the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without any compulsion."

#### Highlights of the definition include;

- **Estimated amount:** The determination of highest and best use or most probable use is the first step in estimating market value. This considers physical possibilities, financial feasibility and highest possible value to the property.
- **Exchange:** Exchange means an estimated amount rather than a predetermined or actual sale price. It also assumes simultaneous exchange. It however, is not depended of actual price on the date of valuation. Intact it is an estimate of the price.
- **On the date:** Price is time specific and excludes past or future date market circumstances.
- **Willing buyer** is motivated but not compelled to buy.
- **Willing seller** is motivated to sell at whatever price is available in the current market but not over eager and not acting under any compulsion.
- **Proper marketing:** The asset should be exposed to market in the most appropriate manner to effects its disposal at the reasonably obtainable best price.
- **Acted knowledgeably and prudently:** Buyer and seller should reasonably be informed about the nature and characteristic of the asset, its actual and potential use and the state of the market.
- **Without compulsion:** The transaction should not be forced or coerced.

Another definition of market value can be taken from uniform standard of professional appraisal practice (USPAP) (2008-2009) which is the property valuation standard setting body in the USA. The USPAP defines market value as "a type of value stated as an opinion, that presume the transfer of a property, meaning is the write of ownership or a bundle of such rights, as of a certain date under specific conditions set forth in the definition of the term identified by the appraiser as applicable in an appraisal."

Forming an opinion of market value is the purpose of many real property appraisal assignments. Particularly when client's intended use more than one intended users, the conditions included in the market value definitions established market perspective for development of the opinion. Conditions may vary from one definition to other but generally fall into three categories.

- The relationship, knowledge and motivation of the parties, i.e., seller and buyer;
- The terms of sell and mode of settlement, e.g., cash, cash equivalent or other terms; and
- The condition of sale i.e., expose in a comparative market for a reasonable time prior to sale.

The most important part in property valuation is to define the market value by quoting authority.

#### Premise of Value

Premise of value represents the general concept under which standard of value falls. IGBVT defines standard of value as:



"An assumption regarding the most likely set of transaction of circumstances that may be applicable to the subject valuation for example going concern, liquidation etc."

There are two premise of value, going concern and liquidation. Impact of premise can easily be observed in case of a loss making company or a company with a poor track record of profit. Going concern is generally taken as a premise of value. Liquidation is also considered to be another premise. If it offers negative valuation, one may conclude that business has either no value or very little value.

IGBVT defines going concern as "an ongoing operating business enterprise." In other words, the valuer assumes that the entity will continue with business operations for generating returns against investment. IGBVT further defines going concern value as "the value of a business enterprise that is expected to continue to operate into the future. The intangible elements of going concern value result from factors such as having a trained work force, an operational plan and the necessary licenses, system and procedures in place."

Going concern value should not be considered as a standard of value. This should be referred as premise of value. While resolving litigation in a one court case on valuation, the learned Justice rejected standard of value described as going concern and ruled that the standard to be used in the valuation of a business was FMV. The going concern is an attribute of the standard of value like the liquidation.

### General Premises of Value

Apart from going concern and liquidation there are four general premises of value.

- (1) Value in exchange:** This premise contemplates value assuming exchange of an asset representing a business interest or a property. Some sort of hypothetical transaction is assumed in the valuation. The FMV or market value and the fair value standard to a very limited exchange can be categorised under value in exchange premise.
- (2) Value in use:** This premise contemplates value assuming that assets are engaged in produce in income.
- (3) Value in place:** This premise contemplates value assuming that assets are ready for use but not engaged for producing income.
- (4) Value to the specific holder:** This premise contemplates the value in the hands of a particular buyer or holder of the assets. Marketability is not the criteria in this place. The investment value falls under the premise of value and in certain cases even fair value.

### Following example distinguishes between values in exchange and value to the specific holder.

Ms. P is an actress in Bollywood and runs a film production company along with her spouse who is not a film star. P's film has always been a success because of her style of storytelling and she has established a big reputation in the film industry. The success of the company is largely depended on her reputation. Of late P has developed a close relationship with an actor of her company and wants divorce from her spouse.

If the valuation is to be performed for divorce under value in exchange premise, then personal goodwill need to be separated as only assets of the enterprise could be sold to a hypothetical buyer. Reputation, skills personal goodwill of P cannot be distinguished from the individual. However, if we change premise of value to value to specific holder then this goodwill of P should also be considered.

The selection of premise of value mainly depends upon court cases decided in the past and / or specific circumstances of the cases under consideration as for example the said divorce.

## 5.3 ROLE OF VALUATION

### Role of Valuation in Business Acquisition

Valuation should play a central part of acquisition analysis. The bidding firm or individual has to decide on a fair value for the target firm before making a bid, and the target firm has to determine a reasonable value for itself before deciding to accept or reject the offer.

There are special factors to consider in takeover valuation. First, there is synergy, the increase in value that many managers foresee as occurring after mergers because the combined firm is able to accomplish things that the individual firms could not.

When a large FMCG manufacturing company runs its own logistics operations, many operating synergies help saving costs. The most important of which is not paying for the profit of the external service provider while taking contracts from others at times of spare capacity. Accordingly, in an assumed takeover bid by a FMCG Company of such a logistics entity, additional benefits that will be generated, due to consolidation post takeover, should be considered as a strategic element with consequential cost savings while valuing the business to be taken over

The effects of synergy on the combined value of the two firms, viz., the target plus the bidding firm have to be considered before a decision is made on the bid. Second, the value of control, which measures the effects on value of changing management and restructuring the target firm, will have to be taken into account in deciding on a fair price. This is of particular concern in hostile takeovers.

As we noted earlier, there is possibility of a significant problem with bias in takeover valuations. Target firms may be over-optimistic in estimating value, especially when the takeover is hostile, and they are trying to convince their stockholders that the offer price is too low. Similarly, if the bidding firm has decided, for strategic reasons, to do an acquisition, there may be strong pressure on the analyst to come up with an estimate of value that backs up the acquisition.

### **Role of Valuation in Corporate Finance**

There is a role for valuation at every stage of a firm's life cycle. For small private businesses thinking about expanding, valuation plays a key role when they approach venture capital (VC) and private equity (PE) investors for more capital. The share of a firm that a venture capitalist will demand in exchange for a capital infusion will depend upon the value estimates for the firm.

In the present context of India when thousands of start-ups are vying for VC and PE investors, valuation as a professional service has assumed critical importance. The business and / or its share capital is to be valued both at the entry and exit point keeping in view future earning potentials. News items can be read every morning in financial newspapers about such valuation issues like that of Snapdeal, Flipkart, Zomato, etc.

As the companies get larger and decide to go public through initial public offer for PE or VC firms to exit, valuations determine the prices at which they are offered to the market in the public offering. At times it is found that PEs tend to retain some portion of their holdings even after handing over controlling rights and major part of their earlier holdings. Once established, decisions on where to invest, how much to borrow and how much to return to the owners will be all decisions that are affected by valuation. If the objective in corporate finance is to maximize firm value, the relationship between financial decisions, corporate strategy and firm value has to be delineated.

### **Role of Valuation in Legal and Tax Purposes**

Mundane though it may seem, most valuations, especially of private companies, are done for legal or tax reasons. A partnership has to be valued, whenever a new partner is taken on or an old one retires, and businesses that are jointly owned have to be valued when the owners decide to break up. Businesses have to be valued for estate tax purposes when the owner dies and for divorce proceedings when couples break up. While the principles of valuation may not be different when valuing a business for legal proceedings, the objective often becomes providing a valuation that the court will accept rather than the "right" valuation.

### **Role of Valuation in Portfolio Management**

The role that valuation plays in portfolio management is determined in large part by the investment philosophy of the investor and to what extent he / she is ready to take risks. Valuation plays a minimal role in portfolio management for a passive investor, whereas it plays a larger role for an active investor. Even among active investors, the nature and the role of valuation is different for different types of active investments. Market timers use valuation much less than investors who pick stocks, and the focus is on market valuation rather than on firm- specific valuation. Among security selectors, valuation plays a central role in portfolio management for fundamental analysts, and a peripheral role for technical analysts.



The following sub-section describes, in broad terms, different investment philosophies and the roles played by valuation in each one.

- (1) **Fundamental Analysis:** The underlying theme in fundamental analysis is that the true value of the firm can be related to its operational and financial characteristics, particularly related to its growth prospects, risk profile and cash flows. Any deviation from this true value is a sign that a stock is under or overvalued.
- (2) **Activist Investors:** Activist investors take positions in firms that have a reputation for poor management and then use their equity holdings to push for change in the way the company is run. Their focus is not so much on what the company is worth today but what its value would be if it were managed well. Investors like Carl Icahn, Michael Price and Kirk Kerkorian have prided themselves on their capacity to not only pinpoint badly managed firms but to also create enough pressure to get management to change its ways. How can valuation skills help in this pursuit? To begin with, these investors have to ensure that there is additional value that can be generated by changing management. In other words, they have to separate how much of a firm's poor stock price performance has to do with bad management and how much of it is a function of external factors. The former are fixable but the latter are not.

They then have to consider the effects of changing management on value. This will require an understanding of how value will change as a firm changes its investment, financing, operating and dividend policies as well as execution methodologies. These are some of the managerial functions as leadership level. As a consequence, they have to not only know the businesses that the firm operates in but also have an understanding of the interplay between corporate finance decisions and value. Certain investors through secondary market generally concentrate on a few businesses they understand well, and attempt to acquire undervalued firms, which in other words is called 'Value Investment.' Warren Buffett, the second richest man and the most cerebral investor of the world at all times, follows this major investment policy of value investment. Often, value investors with large shareholding wield influence on the management of these firms and can change financial and investment policy.

- (3) **Chartists:** Chartists believe that prices are driven as much by investor psychology as by any underlying financial variables. The information available from trading measures like price movements with short and longer term trends, trading volume and short sales, relationship between movements in prices vis-à-vis trading volumes, etc. —give collective indications of investor psychology and future price movements. The assumptions here are that prices move in predictable patterns, that there are not enough marginal investors taking advantage of these patterns to eliminate them, and that the average investor in the market is driven more by emotion than by rational analysis. At times there is another group of very short term traders, called Noise Traders who make big volume transactions based on some information about the company to their advantage or following one or two major players in the market who deals with certain motives of his / their own. While valuation does not play much of a role in charting, there are ways in which an enterprising chartist can incorporate it into analysis. For instance, valuation can be used to determine support and resistance lines on price charts.

The methodology applied by such chartists for predicting the value of a stock in near term future is also called 'Technical Valuation'

- (4) **Information Traders:** Prices move on information about the firm and the industry sector to which it belongs. Information traders attempt to trade in advance of new information or shortly after it is revealed to financial markets. They at times have their own channels of gathering large value impacting information which becomes a public information shortly after his using the same at the market place for trading. The other underlying assumption is that these traders can anticipate information announcements and gauge the market reaction to them better than the average investor in the market.

For an information trader, the focus is on the relationship between information and changes in value, rather than on value, per se. Thus an information trader may buy an 'overvalued' firm if he believes that the next information announcement is going to cause the price to go up, because it contains better than expected news. If there is a relationship between how undervalued or overvalued a company is, and how its stock price reacts to new information, then valuation could play a role in investing for an information trader as his / her sole objective is to make profit through buying and selling after a short interval when price increases.

- (5) **Market Timers:** Market timers note, with some legitimacy, that the pay-off to calling turns in markets is much greater than the returns from stock picking. They argue that it is easier to predict market movements than to select stocks and that these predictions can be based upon factors that are observable. However, timing the market is a very risky proposition particularly from the perspective of buying and selling within a short time frame. This needs continuous watch on the market and analyses of intra-day price movements and volume of trading so that the investor can hit the appropriate time to buy at lower and sell at higher price points
- (6) **Efficient Marketers:** Efficient marketers believe that the market price at any point in time represents the best estimate of the true value of the firm, and that any attempt to exploit perceived market efficiencies will cost more than it will make in excess profits.

They assume that:

- Markets aggregate information quickly and accurately,
- Marginal investors promptly exploit any inefficiencies, and
- Any inefficiencies in the market are caused by friction, such as transactions costs, and cannot be exploited.

For efficient marketers, valuation is a useful exercise to determine why a stock sells for the price that it does. Since the underlying assumption is that the market price is the best estimate of the true value of the company, the objective becomes determining what assumptions about growth and risk are implied in this market price, rather than on finding under or overvalued firms.

### Efficient Market Hypothesis (EMH)

The purpose of any stock market of the world is to bring together those people who have funds to invest with those who need funds to undertake investments. Entities which seek to raise equity are asking investor for a permanent investment. Investors may not be incorrect to invest unless they are convinced that they would be able to realize their investments at a fair price at any time in the future.

For these to happen stock market must price shares efficiently. Efficient pricing means incorporating into the share price, determined and or decided for trading, impacts of all factors that could possibly effect. In an efficient market, investors can buy and sell share at a fair price and entities can raise funds at a cost that reflects the risk of the investment they are seeking to undertake.

A considerable body of financial theory has been building a hypothesis that in an efficient market, prices fully and instantaneously reflect all available information. The efficient market hypothesis is, therefore, concerned with information and pricing efficiency.

Three levels or forms of efficiency have been defined. These are depended on the amount of information available to the participants in the market.

- (1) **Weak form:** Weak form efficiency implies that current share price reflects all the information which could be gleaned from a study of past share prices. If this holds, then no investor can earn above average return by developing trading rules based on historical process or return information. This form of the hypothesis can be related to the activities of chartists, analysts whose belief in share prices can be charted and a pattern identified that can be used to predict future prices.
- (2) **Semi-strong form:** Semi-strong form efficiency implies that the current share price reflects all other published information. If they are sold, then no investors can be expected to earn above average return from trading rules based on any publicly available information. This form of the hypothesis can be related to fundamental analysis, in which estimates of future prices are based on the analysis all known information.
- (3) **Strong form:** Strong form efficiency implies that the current share prices incorporates all information, including unpublished information. In other words, the proponents of EMH is of the firm belief that market discounts the effect of any information either in positive or negative direction immediately upon the same being known to any or more of the market participants. Thus the value of equity price gets reset through the next trading transaction.



One of the examples of this is that many times one can observe prices of many stocks are moving in positive direction a few days before the finance minister declares his budget proposal for the next fiscal year. This happens because of the anticipation of market players that certain provision(s) will be there which will impact the entity or the sector. That is why one can observe market volatilities a few days before and after the budget declaration. Irrespective of the type of information at times such information would include insider information and views held by the directors of the entity. If this would be happen then no investor can earn above average return using any information whether publicly available or not.

### **Equity (Securities) Research**

Loxicon defines Research as Scientific or Scholarly Investigation. Types of Security Researchers popularly known as 'Analysts'.

#### **What a Researcher/ Analyst does with what objective?**

- to Seeks to develop, and communicate to investors insights regarding (i) Value (ii) Risks and (iii) Volatility and (iv) Resource Allocation
- Assist investors to decide whether to (i) buy, (ii) hold, (iii) sell, (iv) sell short, or (v) avoid the security

William Peter Hamilton developed on Dow's Principles and developed the theory in 1922 as is known today Dows Theory. Dows Theory is the most oldest and published method for identifying major trends

#### **Dow view about behaviour of the Stock Market.**

- As a barometer of business condition rather than basis for forecasting stock prices
- Majority of stocks follow the underlying trend of the stock market more of time
- Constructed two indices – Industrial and Rail Road

#### **Certain assumptions for these theories are:**

- Market discount every thing
- Market has three movements – Primary, Secondary and Minor
- Primary movements can be Bullish and Bearish
- Price-Volume Relationship provides background
- Price action determines trend
- Averages must be confirmed – Industrial and Rail Road Indices

#### **Method of Research**

**Fundamental** – Futuristic analyses of all attributes for valuation

**Technical** – Evaluation by analysing the statistics generated out of market activities including past trends (price & Volume)

#### **Critical assumption:**

- Market discounts every factor – Fundamental, Economic, Geographical, Psychological etc.
- Price moves in trends – Once a trend is formed future movements are likely to be in same direction
- Market value is a reflection of supply and demand
- History tends to repeat itself – Market participants tend to provide same reactions to similar kind of stimulants and dampeners.

#### **Advantages**

- Easy and quick to prepare using software
- Quick to understand and appreciate

- Does not require any financial statements
- Does not wait for intrinsic value to be reflected in financials

### **Criticisms and Challenges**

- Subjective – Cannot consider futuristic data
- Rely on efficient market hypothesis
- Completely disregards fundamentals of the company
- Cannot be used to make consistent decisions
- Signals, trends and oscillations can change even before a trend is formed
- Time horizon can be too small that of a week and even a day

### **Common Valuation Errors (VE)**

**VE 1** : When the valuation report does not expressly include valuation purpose.

**VE 2** : When the valuation report does not define the standard of value.

**VE 3** : When the valuation report does not consider the premise of value.

**VE 4** : When the valuation report treats going concern as the standard of value.

### **Common Sequential Steps in Business Valuation**

**Step 1** : Determine the purpose of valuation.

**Step 2** : Define the standard of value.

**Step 3** : Select premise of value.

**Step 4** : Carry out historical analysis.

**Step 5** : Carry out environment scan.

**Step 6** : Select appropriate valuation approaches.

**Step 7** : Select appropriate methods.

**Step 8** : Calculate value.

**Step 9** : Carry out reconciliation and reasonableness check.

**Step 10** : Value conclusion.

### **Valuation Process**

The valuation process comprise of five broad steps:

#### **(a) Understanding the business**

This includes evaluating industry prospects, competitive position of the company in the industrial environment, corporate strategies - its planning and execution, overall economic environment where the company operates, the technological edge etc.

#### **(b) Forecasting Company Performance**

This can be achieved by doing economic forecasting and studying company's financial information. Two approaches to economic forecasting are top-down forecasting and bottom-up forecasting. In top-down forecasting analysts use macroeconomic forecasts to develop industry forecasts and then make individual company and asset forecast consistent with the industry forecasts. In bottom-up forecasting analysts aggregate individual company forecasts with industry forecasts and finally aggregate it with macroeconomic forecasts.



While evaluating financial information of a company, the analyst can consider both qualitative and quantitative factors. This involves careful scrutiny and interpretation of financial statements, and other financial/accounting disclosures.

**(c) Selecting the appropriate valuation model**

While selecting a valuation model an analyst can use different perspectives. One of the widely used methods is determining the intrinsic value, which is fully dependent on the quality of information and the inherent assumptions. There are other value measures. We know that a company has one value if dissolved today and other if it continues operation.

One of the popular notions of value finding is the going concern assumption, which says that the company will maintain its business activities into the foreseeable future. Two broad types of going concern valuation models are absolute valuation models and relative valuation models.

An absolute valuation model is a model that specifies an asset's intrinsic value. This model specifies a value of a company at a particular point of time and is compared with the existing market prices for decision making. Present value or discounted cash flow approach is the most popular type of absolute model approach. Present value models based on dividends are called dividend discount models and those based on free cash flow concept, are called free cash flow to equity and free cash flow to firm models. When a company is valued on the basis of market value of the assets or resources it controls we call it asset based valuation approach.

The second main type of going concern valuation is relative valuation model. Here we specify an asset's value relative to that of another asset. The basic notion of relative valuation model is that similar assets should sell at similar prices. We usually denote this using price multiples. Popular relative price multiples are Price to Earnings (P/E), Price to Book Value (P/BV), Price to Sales etc. The approach of relative valuation as applied to equity valuation is often called method of comparables.

The prime decision on selecting the valuation model is based on the following three broad criteria:

- (1) The valuation model should be consistent with the characteristics of the company being valued;
- (2) The valuation model should be appropriate given the availability and the quality of data; and
- (3) The valuation model should be consistent with the purpose of valuation, including the analyst's own perspective.

**(d) Converting forecasts to valuation**

Analysts play a vital role of collecting, organising, analysing, communicating and monitoring the corporate information which they have used in the valuation analysis. They help clients achieve their investment objective and contribute to efficient functioning of the capital markets.

**(e) Communicating the information - preparation of research report.**

**SHORT QUESTION AND ANSWER:**

**(a) State whether the following statements are true or false:**

- (i) "Valuation is not an objective exercise, and any preconceptions and biases that an analyst brings to the process will find their way into value."
- (ii) The Value may be defined as 'the amount of money or other consideration asked for or given in exchange for something else'.
- (iii) Discounted cash flow valuation, relates the value of an asset to the present value of expected future cash flows on that asset
- (iv) One of the consequences of Efficient Market Hypothesis (EMH) is that the market will always have equilibrium price of a company's share as determined by its fundamentals.
- (v) The method of capitalization of earnings for valuation of a business assumes constant earnings for infinite time.
- (vi) The value of a firm's equity is equal to value of the firm less the value of non- equity claims.
- (vii) Point estimation of the value of a business is the only right way to determine its value.

- (viii) A lower discount would be applied to the cash flows of the government bonds, as compared to shares of a company.
- (ix) Book value is an accounting concept and implies historical assets less outside liabilities.
- (x) There are two premise of value, going concern and liquidation.

**Answer:**

- (i) True
- (ii) False
- (iii) True
- (iv) False
- (v) True
- (vi) True
- (vii) False
- (viii) True
- (ix) True
- (x) True

**(b) Fill in the blanks by using the words / phrases given in the brackets:**

- (i) The \_\_\_\_\_ can value the company's flexibility to alter its initial operating strategy in order to capitalize on favourable future growth opportunities or to react so as to mitigate losses. (Real option technique approach / DCF approach)
- (ii) Business is supposed to have a value for its performances \_\_\_\_\_. (done in past /expected in future)
- (iii) Relative valuation approach is also known as \_\_\_\_\_ approach. (market/income)
- (iv) \_\_\_\_\_is one in which security prices fully reflect the available information. (Efficient Market/Stock Market)
- (v) Key to income based approach of valuation is -----(capitalization rate/ internal rate of return)
- (vi) If a firm defers taxes, the taxes paid in the current period will be at a rate-----than the marginal tax rate. (lower / higher)
- (vii) The value of an asset must equal the ----- of its future cash flows.(Present value/ expected value)
- (viii) A Valuation is an objective search for-----value.(Fair/ True)
- (ix) ----- measures the variation of distribution for the expected returns. (Standard deviation/ Regression)
- (x) Production capacity is a \_\_\_\_\_variable for valuation. (operational / financial)

**Answer:**

- (i) Real option technique approach
- (ii) Expected in future
- (iii) Market
- (iv) Efficient Market
- (v) Capitalization rate
- (vi) Lower



(vii) Present value

(viii) True

(ix) Standard deviation

(x) Operational

**(c) In each of the questions given below one out of the four options is correct. Indicate the correct answer:**

- (i) Which one of the following statements is not true about Efficient market?
- (A) Share prices behave randomly and do not show any systematic pattern in the behavior
  - (B) Price of one share is independent of the price of other shares in the market
  - (C) Share prices fully reflect all available information
  - (D) None can earn abnormally high profits on a constant basis
- (ii) The value of an asset by looking at the pricing of 'Comparable' assets relative to a common variable like earnings, cash flows, book value or sale, is.....
- (A) Discounted cash flow valuation
  - (B) Relative valuation
  - (C) Contingent claim valuation
  - (D) Free cash flow valuation
- (iii) Which of the one is not the principles of Valuation
- (A) Principles of Substitution
  - (B) Principle of Time Value of Money
  - (C) Principle of Risk & Return
  - (D) Discounted cash flow Valuation
- (iv) ..... is the "Typical price a product fetches in an unregulated market"
- (A) Value
  - (B) Price
  - (C) Valuer
  - (D) Mutual fund
- (v) If the expected rate of return on a stock exceeds the required rate
- (A) The stock is experiencing super normal growth
  - (B) The stock should be sold
  - (C) The company is not probably trying to maximize price per share
  - (D) The stock is a good buy

**Answer:**

- (i) (B) Price of one share is independent of the price of other shares in the market
- (ii) (B) Relative valuation
- (iii) (D) Discounted Cash Flow Valuation
- (iv) (A) Value
- (v) (D) The stock is a good buy

# Study Note - 6

## VALUATION MODELS



### This Study Note includes

- 6.1 Valuation Models - Introduction
- 6.2 Discounted Cash Flow Valuation
- 6.3 Relative Valuation
- 6.4 Free Cash Flow Valuation
- 6.5 Valuation of Firm - Other Valuation Basis
- 6.6 Contingent Claim Valuation

### 6.1 VALUATION MODELS - INTRODUCTION

Valuation of a company is associated with a lot of difficulties and insecurities. It is impossible to estimate the object value of a company only by counting, since the numbers are not the only factor to consider. To facilitate the business valuation process there are a number of helpful models. According to theory the business valuation procedure should consist of several phases to provide a reliable value. These phases are business analysis, accounting and financial analysis, operational and financial due diligence, impacts of changing business environment, forecasting and valuation itself. Forecasting is the most precarious part of the valuation process since it is based on assumption and discretion about a company's future economic performance. The insecurity connected with forecasting can be reduced to a certain extent by accurate analyzing of external and internal factors, which may affect the company's future development. The value of the company varies depending on which valuation model that has been applied and how input variables have been estimated.

The valuation models commonly described may be classified as follows:

#### (I) Asset-based approach

The asset-based approach has many other common names such as the asset accumulation method, the net asset value method, the adjusted book value method and the asset build-up method. The purpose of the model is to study and revalue the company's assets and liabilities obtaining the substance value which also is the equity. The substance value is thus estimated as assets minus liabilities. To be useful, the substance value must be positive, if liabilities are bigger than assets there is no use of the method.

The basic idea is that the company's value could be determined by looking at the Balance Sheet. Unfortunately, the values on the balance sheet cannot be used because the book value seldom is the same as the real value, except for the case of liabilities that is often accounted in real value. The problem is when following the principles of accounting, assets often are depreciated over their life expectancy and when the asset-based approach is applied the real value for these assets must be determined. In this case, the real value is equivalent to the fair market value that is value of the asset on a free market or present value of the future earnings from the asset or a group of assets.

Two methods are used here:

- (a) The Liquidation Value, which is the sum as estimated sale values of the assets owned by a company.
- (b) Replacement Cost: The current cost of replacing all the assets of a company at times for specific purposes professional valuers also consider depreciated replacement cost of the asset(s).

This approach is commonly used by property and investment companies, to cross check for asset based trading companies such as hotels and property developers, underperforming trading companies with strong asset base (market value vs. existing use), and to work out break – up valuations.



## (II) Income-based approach

The income approach is commonly called Discounted Cash Flow (DCF). It is accepted as an appropriate method by business appraisers. This approach constitutes estimation of the business value by calculating the present value of all the future benefit flows which the company are expected to generate.

Mathematically it can be expressed as the following formula:  $PV = \sum FV / (1 + i)^n$

Where,

PV = Present Value of FV = Future Value

i = discount rate reflecting the risks of the estimated future value

n = raised to the n<sup>th</sup> power, where n is the number of compounding periods Source:

As formula shows, according to the income-based approach to determine a business value the appraiser must always make an estimation of the elements below:-

- Estimation of business life expectancy;
- Estimation of future income flows that a business will generate during its life expectancy; and
- Estimation of discount rate in order to calculate the present value of the estimated income flows.

There are several models of income approach depending on which type of income flows that will be discounted. The common benefit flows that are usually used in the income-based approach are dividends, free cash flows and residual income. The dividends and cash flow are two measures which refer to direct payment flows from a company to shareholders and the residual income measure has focus on return which is derived from company's book value and based on accrual accounting. The differences among the models are in how the calculation is done and what factors about the company are highlighted in the process.

## (III) Market-based approach

The market approach determines company value by comparing one or more aspects of the subject company to the similar aspects of other companies which have an established market value.

### Different Valuation Models

Wide ranges of models are used in valuation ranging from the simple to the sophisticated. In general terms, there are three approaches to valuation.

- (1) Discounted cash flow valuation:** It relates to the value of an asset to the present value of expected future cash flows from that asset or group of assets.
- (2) Relative valuation:** It estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable such as earnings, cash flows, book value or sales. The profit multiples used are (a) Earnings before interest, tax, depreciation and amortisation (EBITDA), (b) Earning before interest and tax (EBIT), (c) Profits before tax (PBT) and (d) Profit after tax (PAT).
- (3) Contingent Claim valuation:** It uses option pricing models to measure the value of assets that have share option characteristics. Some of these assets are traded financial assets like warrants, and some of these options are not traded and are based on real assets. Projects, patents and oil reserves are examples. The latter are often called real options.

The outcomes from each of this approach may be different because these make different assumptions. In this module, different valuation approaches would be discussed and reason for differences in different models will be explored in this study note. Lesson on how to choose the right model to use for a specific task would be shared.

### Factors that affect formation of Valuation

#### Internal Factor

- (i) Rate of dividend declared



- (ii) Market / Current values of assets and liabilities
- (iii) Goodwill, product and corporate brand images,
- (iv) Market for the products and services
- (v) Value generation abilities of human resources and Industrial relations with employees
- (vi) Nature of plant and machinery and status or technology used,
- (vii) Expansion and diversification policies of the company
- (viii) Reputation of Management, and so on.

#### **External Factor**

- (i) Competition,
- (ii) Relations with Government and Regulatory Agencies and changes in related policies and regulations,
- (iii) Technological development,
- (iv) Impacts of changing policies of government regarding direct and indirect taxation,
- (v) Import Export policy and volatilities in foreign exchange rates and inputs prices,
- (vi) Stability of country's economy and rate of growth,
- (vii) Coupling effects from business environment changes in overseas countries through effects of globalisation,
- (viii) Stability of government in power and so on.

#### **Three Elements of Business Valuation**

Business valuation refers to the process and set of procedures used to determine the economic value of an owner's interest in a business.

The three elements of Business Valuation are:

##### **(1) Economic Conditions**

As we see in Portfolio Management Theory, wherein we adopt the Economy-Industry-Company (E-I-C) approach, in Business Valuation too, a study and understanding of the national, regional and local economic conditions existing at the time of valuation, as well as the conditions of the industry in which the subject business operates, is important. For instance, while valuing a company involved in sugar manufacture in India in January 2016 the present conditions and forecasts of Indian economy, industries and agriculture; prices of sugar in overseas market are to be understood before the prospects of Indian sugar industry and that of a particular company are evaluated.

##### **(2) Normalization of Financial Statements**

This is the second element that needs to be understood for the following purposes:

- (a) Comparability adjustments: to facilitate comparison with other organisations operating within the same industry.
- (b) Non-operating adjustments: Non-operating assets need to be excluded.
- (c) Non-recurring adjustments: Items of expenditure or income which are of the non-recurring type are to be excluded to provide comparison between various periods.
- (d) Discretionary adjustments: Wherever discretionary expenditure had been booked by a company, they are scrutinised to be adjusted to arrive at a fair market value.

##### **(3) Valuation Approach**

There are three common approaches to business valuation - Discounted Cash Flow Valuation, Relative



Valuation, and Contingent Claim Valuation. Within each of these approaches; there are various techniques for determining the fair market value of a business. Valuation models fall broadly into four variance based respectively on assets, earning, dividend and discounted cash flows. For all these the typically Capital Asset Pricing Model is used to calculate a discount rate. Each method has its advantages and disadvantages and are not appropriate in all circumstances. It is often not wise to depend on a single method. Calculating a range of value using different appropriate types of valuation can provide valuable benchmarks for the project or entity valuation being considered.

### **Distinction between Equity Value and Enterprise Value**

Equity and Enterprise Value: There is an important distinction between equity value and enterprise value.

The equity value of a company is the value of the shareholders' claims in the company. The value of a share is arrived at by dividing the value of the company's equity as accounted in the balance sheet by the total number of shares outstanding as on the date of valuation. In other words, it represents the all-inclusive value of the company, determined using any method, less all its liabilities. When a company is publicly traded, the value of the equity equals the market capitalization of the company, which may or may not represent at any point of time the fair value of the equity. It quite often it is observed that market has under-priced the equity of a listed entity because of many business ecosystem related reasons, market sentiments, or lack of information, etc., which may not affect a particular company.

The enterprise value of a company denotes the value of the entire company to all its claimholders. Enterprise value = Equity value + market value of all debts + minority interest + pension and other similar Employee's benefits related provisions + other claims.

### **Distinction between Fundamental Valuation and Relative Valuation**

Fundamental valuations are calculated based on a company's fundamental economic parameters relevant to the company and its future, are also referred to as 'standalone valuations'.

On the other hand, Relative valuations or relative multiples apply a relation of a specific financial or operational characteristic from a similar company or the industry to the company being valued. They express the value of a company as a multiple of a specific statistic like financial variables, e. g. Sales, EBIDTA, etc.

### **Fundamental basis for Valuations**

The different bases that can be used in valuations are:

1. Cash flows: the cash flow to equity shareholders, i.e., dividends or to both equity shareholders and lenders called free cash flow (FCF)
2. Returns: The difference between the company's capital and the cost of capital.
3. Operational Variables: Production capacity, subscriber base as in case of telecom companies, etc.

## **6.2 DISCOUNTED CASH FLOW VALUATION**

DCF method is an easy method of valuation. To understand and evaluate the other two methods of valuation it is important to understand the DCF method first. In this section, we will consider the basis of this approach.

### **Basis for Discounted Cash Flow Valuation**

This approach has its foundation in the present value rule, where the value of any asset is the present value of expected future cash flows that the asset generates. To use discounted cash flow valuation, one needs to estimate

- to estimate the life of the group of assets from which the income flow will be generated
- to estimate the cash flows during the life of the asset
- to estimate the discount rate to apply to these cash flows to get present value



$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

where,

n = Life of the asset

CF = Cash flow in period t

r = Discount rate reflecting the weighted average cost of capital employed added with the risk premium depending upon the riskiness of the estimated cash flows.

The cash flows will vary from asset to asset for example dividends for stocks, coupons (interest) and the face value for bonds and after-tax cash flows for a real project. The discount rate will be a function of the riskiness of the estimated cash flows. Discount rate will be high for riskier assets and low for safer assets. For example rate of discount on zero coupon bond is zero and for corporate bonds it is the interest rate that reflects the default risk.

In discounted cash flow valuation, the intrinsic value of an asset is calculated based on fundamentals. DCF technique perceives that markets are inefficient and make mistakes in assessing value. It also makes an assumption about how and when these inefficiencies will get corrected. Here the word asset represents collectively all the assets of the business or the company which is being valued.

### **Discounted Cash Flow Models – Classification and underlying approaches**

There are three distinct ways in which we can categorise discounted cash flow models. First, we differentiate between valuing a business as a going concern as opposed to a collection of assets. In the second, we draw a distinction between valuing the equity in a business and valuing the business itself. In the third, we lay out three different and equivalent ways of doing discounted cash flow valuation – the expected cash flow approach, a value based upon excess returns and adjusted present value.

#### **(a) Going Concern versus Asset Valuation**

The value of an asset in the discounted cash flow framework is the present value of the expected cash flows on that asset. Extending this proposition to valuing a business, it can be argued that the value of a business is the sum of the values of the individual assets owned by the business. While this may be technically right, there is a key difference between valuing a collection of assets and a business. A business or a company is an on-going entity with assets that it already owns and assets it expects to invest in the future along with all other resources required to operate the assets to generate earnings. Those are management and execution man power, and intangibles like brand and corporate, image, channel partners, etc.

A financial balance sheet provides a good framework to draw out the differences between valuing a business as a going concern and valuing it as a collection of assets. In a going concern valuation, we have to make our best judgments not only on existing investments but also on expected future investments and their profitability, besides maintenance investments to be made to carry on the existing business. While this may seem to be foolhardy, a large proportion of the market value of growth companies comes from their growth assets. In an asset-based valuation method, we focus primarily on the assets in place and estimate the value of each asset separately. Adding the asset values together yields the value of the business. For companies with lucrative growth opportunities, asset-based valuations will yield lower values than going concern valuations.

#### **(b) Equity Valuation versus Firm Valuation**

There are two ways in which we can approach discounted cash flow valuation. The first is to value the entire business, with both assets-in-place and growth assets; this is often termed firm or enterprise valuation.

The cash flows before debt payments and after reinvestment needs are called free cash flows to the firm, and the discount rate that reflects the composite cost of financing from all sources of capital is called the weighted average cost of capital.

The second way is to just value the equity stake in the business, and this is called equity valuation.



The cash flows after debt payments and reinvestment needs are called free cash flows to equity, and the discount rate that reflects just the cost of equity financing is the cost of equity.

### (c) Variations on DCF Models

The model that we have presented in this section, where expected cash flows are discounted back at a risk-adjusted discount rate, is the most commonly used discounted cash flow approach but there are two widely used variants. In the first, we separate the cash flows into excess return cash flows and normal return cash flows. Earning the risk-adjusted required return, which is otherwise, is called cost of capital or equity is considered a normal return cash flow but any cash flows above or below this number are categorised as excess returns. Excess returns can therefore be either positive or negative. With the excess return valuation framework, the value of a business can be written as the sum of two components:

**Value of business** = Capital invested in firm today + Present value of excess return cash flows from both existing and future projects

If we make the assumption that the accounting measure of capital invested (book value of capital) is a good measure of capital invested in assets today, this approach implies that firms that earn positive excess return cash flows will trade at market values higher than their book values and that the reverse will be true for firms that earn negative excess return cash flows.

In the second variation, called the adjusted present value (APV) approach, is separated the effects on value of debt financing from the value of the assets of a business. In general, using debt to fund a firm's operations creates tax benefits because interest expenses are tax deductible on the positive side and increases bankruptcy risk and expected bankruptcy costs on the negative side. In the APV approach, the value of a firm can be written as follows:

**Value of business** = Value of business with 100% equity financing + Present value of Expected Tax Benefits of Debt – Expected Bankruptcy Costs

In contrast to the conventional approach, where the effects of debt financing are captured in the discount rate, the APV approach attempts to estimate the expected money value of debt related benefits and costs separately from the value of the operating assets.

While proponents of each approach like to claim that their approach is the best and most precise, we will argue that the three approaches yield the same estimates of value, if consistent assumptions are considered for creating the valuation model.

### Inputs to Discounted Cash Flow Models

There are three inputs that are required to value any asset in this model - the expected cash flow, the timing of the cash flow and the discount rate that is appropriate given the riskiness of these cash flows.

#### (a) Discount Rates

In valuation, the valuer begins with the fundamental notion that the discount rate used on a cash flow should reflect its riskiness. In case of higher risk, cash flows to be discounted with higher discount rates. There are two ways of viewing risk. The first is purely in terms of the likelihood that an entity will default on a commitment to make a payment, such as interest or principal due, and this is called default risk. When looking at debt, the cost of debt is the rate that reflects this default risk.

The second way of viewing risk is in terms of the variation of actual returns around expected returns. The actual returns on a risky investment can be very different from expected returns. The greater the variation, the greater the risk. When looking at equity, the valuer tends to use measures of risk based upon return variance. There are some basic points on which these models agree. The first is that risk in an investment has to be perceived through the eyes of the marginal investor in that investment, and this marginal investor is assumed to be well diversified across multiple investments. Therefore, the risk in an investment that should determine discount rates is the non-diversifiable or market risk of that investment. The second is that the expected return on any investment can be obtained starting with the expected return on a riskless investment, and adding to it a premium to reflect the amount of market risk in that investment. This expected return yields the cost of equity.



The cost of capital can be obtained by taking an average of the cost of equity, estimated as above, and the after-tax cost of borrowing, based upon default risk, and weighting by the proportions used by each. One can argue whether the weights used, when valuing an on-going business, should be based upon the market values of debt and equity. While there are some analysts who use book value weights. Doing so they violate a basic principle of valuation. The principle directs that, one should be indifferent between buying and selling an asset.

### **(b) Expected Cash Flows**

In the strictest sense, the only cash flow an equity investor gets out of a publicly traded firm is the dividend models that use the dividends as cash flows are called dividend discount models. A broader definition of cash flows to equity would be the cash flows left over after the cash flow claims of non-equity investors in the firm have been met. Those are interest and principal payments to various types of lender, lease rent against financial and operating assets. Until recently preferred dividends on preference share capital used to be also deducted. But with the introduction of Ind AS in India as a measure toward convergence to International Financial Reporting Standards (IFRS), preference shares, other than with compulsory convertible clause, will also have to be considered as borrowed capital. After such deductions free cash flow will be determined after further deducting, after enough of reinvestments into the firm to sustain the projected growth in cash flows, by way of additional working capital margin and maintenance capital expenditure. This is the free cash flow to equity (FCFE), and models that use these cash flows are called FCFE discount models.

The cash flow to the firm is the cumulated cash flows to all claimholders in the firm. One way to obtain this cash flow is to add the free cash flows to equity to the cash flows to lenders (debt) and preferred stockholders. A far simpler way of obtaining the same number is to estimate the cash flows prior to debt and preferred dividend payments, by subtracting from the after-tax profit the net investment needs to sustain growth. This cash flow is called the free cash flow to the firm (FCFF) and the models that use these cash flows are called FCFF models.

### **(c) Expected Growth**

While estimating the expected growth in cash flows in the future, analysts confront with uncertainty most directly. There are three generic ways of estimating growth. One is to look at a company's past and use the historical growth rate posted by that company. The peril is that past growth may provide little indication of future growth. The second is to obtain estimates of growth from more informed sources. For some analysts, this translates into using the estimates provided by a company's management whereas for others it takes the form of using consensus estimates of growth made by others who follow the firm. The bias associated with both these sources should raise questions about the resulting valuations.

Taking inputs to estimate future growth from Due Diligence of immediate past few years' performance and PESTEL Analysis in the context of the business environment.

In this concept

P -Political

E -Economic

S - Societal

T - Technical

E - Environmental

L - Legal including regulatory

Findings from these analyses will not only help projecting growth rate in foreseeable future and in perpetuity but also help projecting cost of production, pricing of products and services and cost of capital.

### **Advantages and Disadvantages of Discounted Cash flow Valuation**

**Advantages:** As per one school of thoughts majority of corporate finance experts believe discounted cash flow valuation is the only way to approach valuation, but the benefits may be more nuanced that they are willing to admit. On the plus side, discounted cash flow valuation, done right, requires analysts to understand the businesses



that they are valuing and ask searching questions about the sustainability of cash flows and risk. Discounted cash flow valuation is tailor made for those who buy into the Warren Buffett adage that what we are buying are not stocks but the underlying businesses. In addition, discounted cash flow valuations are inherently contrarian in the sense that it forces analysts to look for the fundamentals that drive value rather than what market perceptions are. Consequently, if stock prices rise (fall) disproportionately relative to the underlying earnings and cash flows, discounted cash flows models are likely to find stocks to be overvalued (undervalued).

Discounted cash flow valuation is based upon expected future cash flows and discount rates. Given these informational requirements, this approach is easiest to use for assets and / or business entities.

- whose cash flows are currently positive and can be estimated with some reliability for future periods,
- and where a proxy for risk that can be used to obtain discount rates is available.

### **Limitations of DCF Valuation**

This technique requires lot of information. The inputs and information are difficult to estimate and also can be valuer. This technique cannot differentiate between over and undervalued stocks. It is difficult to apply this technique in the following scenarios:

- Negative earnings firms: For such firms, estimating future cash flows is difficult to do, since there is a strong probability of insolvency and failure. DCF does not work well since under this technique the firm is valued as a going concern which provides positive cash flows to its investors.
- Cyclical Firms: For such firms earnings follow cyclical trends. Discounting smoothes the cash flows.

It is very difficult to predict the timing and duration of the economic situation. The effect of cyclical situation on these firms is neither avoidable nor separable. Therefore, there are economic biases in valuations of these firms.

- Firms with un/under utilised assets: DCF valuation reflects the value of all assets that produce cash flows. If a firm has assets that are un/under utilised that do not produce any cash flows, the values of these assets will not be reflected in the value obtained from discounting expected future cash flows. But, the values of these assets can always be obtained externally, and added on to the value obtained from discounted cash flow valuation.
- Firms with patents or product options: Firms often have unutilized patents or license that do not produce any current cash flows and are not expected to produce cash flows in the near future, but, nevertheless, these are valuable and with changing business ecosystem those may be used to general income. If values of such patents are ignored then value obtained from discounting expected cash flows to the firm will understate the true value of the firm.
- Firms in the process of restructuring: Firms in the process of restructuring often sell, acquire other assets, and/ or change their capital structure dividend policy business model operating structure etc. Some of them also change their status from private to public. Each of these changes makes estimating of future cash flows more difficult and affects the riskiness of the firm. Using historical data for such firms may give a misleading picture of the firm's value. In case of business restructuring through acquisitions and if there is synergy then its value is to be estimated after considering the value addition to be generated from such synergy. This will require assumptions about the synergy and its effect on cash flows.
- Private Firms: The measurement of risk to be used in estimating discount rates is a challenge since securities in private firms are not traded, this is not possible. One solution is to look at the riskiness of comparable firms, which are publicly traded. The other is to relate the measure of risk to accounting variables, which are available for the private firm. But identifying a firm with comparable attributes is quite a difficult task.

### **Applicability:**

Since DCF valuation, done right, is based upon an asset's fundamentals, it is less exposed to market moods and perceptions. DCF valuation takes into account the underlying characteristics of the firm, and understands the business of firm. It clearly identifies the assumptions made while paying a given price for an asset. It works best for

investors who either have a long time horizon or have are potential acquirer of the whole firm. In long term period there is correction in market for price to revert to "true" value and when he is a potential acquirer he is capable of providing the catalyst needed to move price to value.

Steps in DCF Equity Valuation:

(1) Estimate the Free cash flow to equity:

(a) Forecast earnings for the future.

(b) Adjust earnings (net income) to get free cash flow to equity:

Free Cash Flow to Equity = Net Income - (Capital Expenditure – Depreciation) – Working capital Accruals + (New debt issued - Debt Repayment)

Following table shows how to calculate free cash flows:

Working Capital					
Year	0	1	2	....	Yn
Revenue					
Less: Costs of goods and / or services sold					
Less: Depreciation of tangible / intangible assets					Non-cash item
Add: Other Income					
Profit/ (Loss) from asset sales					
Taxable income					
Tax					
Net operating profit after tax (NOPAT)					Adjustment for non-cash item
Add: Depreciation					
Profit/ (Loss) from asset sales					
Operating cash flow and other income					
Change in working capital					
Capital Expenditure					Capital items
Salvage value of assets					
Free cash flow					

(c) Calculate the PV of equity cash flows by using cost of equity ( $K_e$ ) as discounting rate. Cost of equity can be calculated using CAPM approach.

(2) CAPM Approach:  $K_e = R_f + \beta(R_M - R_f)$

$K_e$  = Required rate of return

$R_f$  = Risk free rate

$\beta$  = Beta coefficient

$R_M$  = Expected return for common stocks in the market

$(R_M - R_f)$  = Equity risk premium (ERP)

H model as modification to the exciting mode

This model is based on the assumptions that:

(i) Equity growth rate starts at a high initial rate ( $g_o$ ) declines linearly over extra-ordinary growth period (which is assumed to last 2 H periods) to a stable growth rate ( $g_n$ ).



(ii) Dividend payout ratio is constant over time and is not affected by the shifting growth rates.

$$P_0 = \underbrace{DPS_0 (1 + g_n)}_{\substack{\text{Stable growth} \\ r - g_n}} + \underbrace{DPS \times H (g_a - g_n)}_{\substack{\text{Extra ordinary growth} \\ r - g_n}}$$

- Where
- $P_0$  = Value of firm now per share
  - $DPS_t$  = Dividend per share in year t
  - r = Required return to equity investor
  - $g_a$  = Growth rate initially
  - $g_n$  = Growth rate at the end of 2H years applied for ever after that.

**Limitations:**

- (i) Growth rate is assumed to follow a structure laid out in the model deviations from the structure can cause problem.
- (ii) Assumptions of payout ratio remain constant.

**Three Stage Discount Model**

This model assumes on initial period of stable high growth, second period of declining growth and a third period of stable low growth that lasts forever.

$$P_0 = \underbrace{\sum_{t=1}^{t=n_1} \frac{EPS_0 (1 + g_a)^t \times I_0}{(1+r)^t}}_{\text{High Growth}} + \underbrace{\sum_{t=n_1+1}^{t=n_2} \frac{DPS_t}{(1+r)^t}}_{\text{Transition}} + \underbrace{\frac{EPS_{n_2} (1 + g_n) \times I_n}{(r - g_n)(1+r)^n}}_{\text{Stable Growth}}$$

- $EPS_t$  : Earnings per share in year t
- $DPS_t$  : Dividends per share in year t
- $g_a$  : Growth rate in high-growth phase ( lasts  $n_1$  years)
- $g_n$  : Growth rate in stable growth phase
- $I_0$  : Payout ratio in high growth phase
- $I_n$  : Payout ratio in stable growth phase.

**6.3 RELATIVE VALUATION**

**Key Components of Relative Valuation**

In relative valuation, the value of an asset is derived from the pricing of 'comparable' assets, standardised using a common variable. Included in this description are two key components of relative valuation. The first is the notion of comparable or similar assets. From a valuation standpoint, this would imply assets with similar cash flows, risk and growth potential. In practice, it is usually taken to mean other companies that are in the same business as the



company being valued. The other is a standardized price. After all, the price per share of a company is in some sense arbitrary since it is a function of the number of shares outstanding; a two for one stock split would halve the price. Dividing the price or market value by some measure that is related to that value will yield a standardised price. When valuing stocks, this essentially translates into using multiples where we divide the market value by EBIDTA, book value or revenues to arrive at an estimate of standardised value. We can then compare these numbers across companies.

The simplest and most direct applications of relative valuations are with real assets where it is easy to find similar assets or even identical ones.

Harking back to the earlier discussion of discounted cash flow valuation, it has been argued that discounted cash flow valuation was a search albeit unfulfilled for intrinsic value. In relative valuation, the valuer will give up on estimating intrinsic value and essentially put trust in markets getting it right, at least on average.

### **Variations of Relative Valuation**

In relative valuation, the value of an asset is based upon how similar assets are priced. In practice, there are three variations of relative valuation, with the differences primarily in how one define comparable firms and control for differences across firms:

- (a) **Direct comparison:** In this approach, analysts try to find one or two companies that look almost exactly like the company they are trying to value and estimate the value based upon how these similar companies are priced. The key part in this analysis is identifying these similar companies and getting their market values.
- (b) **Peer Group Average:** In the second, analysts compare how their company is priced (using a multiple) with how the peer group is priced (using the average for that multiple). Thus, a stock is considered cheap if it trades at 12 times EBIDTA and the average price earnings ratio for the sector is 15. Implicit in this approach is the assumption that while companies may vary widely across a sector, the average for the sector is representative for a typical company.
- (c) **Peer group average adjusted for differences:** Recognising that there can be wide differences between the company being valued and other companies in the comparable firm group, analysts sometimes try to control for differences between companies. In many cases, the control is subjective. A company with higher expected growth than the industry will trade at a higher multiple of earnings than the industry average. But how much higher is left unspecified. In a few cases, analysts explicitly try to control for differences between companies by either adjusting the multiple being used or by using statistical techniques. As an example of the former, consider PEG ratios. These ratios are computed by dividing PE ratios by expected growth rates, thus controlling at least in theory for differences in growth and allowing analysts to compare companies with different growth rates.

### **Advantages and Limitations of Relative Valuation**

The allure of multiples is that they are simple and easy to relate to. They can be used to obtain estimates of value quickly for firms and assets, and are particularly useful when there are a large number of comparable firms being traded on financial markets, and the market is, on average, pricing these firms correctly. In fact, relative valuation is tailor made for analysts and portfolio managers who not only have to find undervalued equities in any market, no matter how overvalued, but also get judged on a relative basis. An analyst who picks stocks based on their PE ratios, relative to the sectors they operate in, will always find undervalued stocks in any market; if entire sectors are overvalued and his stocks decline, he will still look good on a relative basis since his stocks will decline less than comparable stocks assuming that the relative valuation is right.

By the same token, they are also easy to misuse and manipulate, especially when comparable firms are used. Given that no two firms are exactly similar in terms of risk and growth, the definition of 'comparable' firms is a subjective one. Consequently, a biased analyst can choose a group of comparable firms to confirm his or her biases about a firm's value. While this potential for bias exists with discounted cash flow valuation as well, the analyst in DCF valuation is forced to be much more explicit about the assumptions which determine the final value. With multiples, these assumptions are often left unstated.



The other problem with using multiples based upon comparable firms is that it builds in errors in the form of over valuation or under valuation that the market might be making in valuing these firms. If, for instance, we find a company to be undervalued because its equity share trades at 15 times of its earnings and comparable company's trade at 25 times earnings, we may still lose on the investment if the entire sector is overvalued. In relative valuation, all that we can claim is that a stock looks cheap or expensive relative to the group we compared it to, rather than make an absolute judgment about value. Ultimately, relative valuation judgments depend upon how well we have picked the comparable companies and how good a job the market has done in pricing them.

**Steps in Relative Valuation:**

**(1) Search and select the comparable companies:** The first part of the process is the selection of a group of comparable companies, that is, companies whose business operations are as similar as possible to those of the subject company. This requires a thorough understanding of the subject for example:

- How does it create value?
- What drives its financial performance?
- Who are its customers and suppliers?
- With whom and how does it compete?
- What risks does it face?

and so forth. Comparability is established by matching key business attributes of the subject with those of another group of firms. The similar step in the used car analogy is to match attributes such as make, model, year, engine size, mileage, options, and so on. List of salient characteristics could be prepared and then companies can be inspected one by one. A systematic selection procedure should be designed prior to the inspection to guard against biases.

**(2) Selection of Multiples:** The next step is to select certain multiples to be calculated based on market participants' views of the relevant metrics. The most commonly used multiples of enterprise value are value/revenue, value/EBIT, and value/EBITDA. Different multiples are used for enterprise value or equity value. For instance, the market-multiple approach is sometimes used to estimate a subject company's equity value rather than its enterprise value. In such instances the multiples computed from comparable companies are derived from stock prices or market capitalization rather than enterprise values. Sometimes some industry specific multiples also can be used that relate value to, say, sales per square foot or to subscriber base or patents, and so on if data is available.

**Note:** Enterprise Value = Equity Share Price in Market + All Loans – Cash and Cash Equivalent. However, there is a need for adjusting this value if there is in any critical finding from due diligence prompting for adjustment, e. g. riskiness in terms of achieving growth in future or major probability of any major contingent liability being payable.

**(3) Selection of comparables and size of sample:** Next step is to form of sample of comparables. The question is How big should be the size of a sample? As with most statistical exercises, the easy answer is that more is better as the estimates are more reliable in larger samples. Unfortunately, in a desire to create a large sample we may have to reduce the degree of comparability. A pragmatic response to this difficulty is to examine more than one set of comparables, ranging from a small set of closely matched companies to larger sets of loosely matched companies, and see what the effect is on indicated value. Selection of samples should not based on the multiples themselves or financial measures that directly affect the multiples. That is, we should not look at a set of comparables and decide to exclude companies with low EBIT multiples. This generates bias.

**(4) Computation of Multiples:** Computing multiples requires a calculation of enterprise value on the one hand and one or more operating metrics e.g EBIT, EBITDA etc. on the other. Enterprise value is generally computed as the market value of sum of the market values of debt and equity securities outstanding, including hybrid securities, which is sometimes referred to as "MVIC" (Market Value of Invested Capital). In practice, we sometimes assume that the market value of debt equals its book value. This may not always be an acceptable approximation. Therefore we may have to actually price the options or the conversion features of the securities to obtain



reliable estimates of MVIC. For obtaining operating metrics it will often be necessary to adjust or normalise financial or other data to preserve and enhance comparability within the sample.

For example, the choice of LIFO (last in, first out) versus FIFO (first in, first out) accounting for inventory affects a company's cost of goods sold, which in turns affects EBIT. The extent they affect sales, operating profit, or cash flow, should be eliminated before multiples are computed. Nonrecurring items might include results from discontinued operations, extraordinary gains or losses, should also be adjusted.

Multiples themselves may be computed based on historic data or forecasts. Commonly last twelve months data is considered in case of historic method. Multiples can also be computed based on forecasts of operating metrics that may be generated using the analyst's best judgment or expert opinions in trade publications or equity analyst reports.

After computation, it is be multiples have to be applied to the subject. The multiples will differ in the comparable companies within the sample. Therefore, simple means and medians of multiples can be used. Another alternative is to aggregate the MVICs and operating metrics for a sample of comparable companies and then compute a multiple based on the aggregates. This is in effect a value-weighted average of the sample. Whether this is appropriate depends on circumstances, but it is at least questionable in different sample size. Sometimes the minimum and maximum are used in conjunction with a mean or median to establish a range around a central point estimate.

**(5) Apply and conclude:** The concluded multiple is applied to the subject company by computing the product of the multiple and the indicated operating metric. The subject company's operating metric may have to be normalized for LIFO vs. FIFO; extraordinary nonrecurring items etc to ensure consistency with the sample of firms that generated the multiple. Further adjustments may be required after the multiple is applied.

**(a) Adjustment for excess cash:** If the subject has non operating assets such as excess cash, the amount of excess cash must be added to the value obtained from the multiple to arrive at enterprise value.

**(b) Adjustment for operating control:** The control premium should be included in the bidder's assessment of the subject enterprise value, in case the acquirer is taking over controlling shares and / or operational control of the target company. However, if the multiples are derived from observed stock prices for comparable companies, they probably lack any control premium since the shares being traded represent minority interests rather than controlling interests; On the other hand, if the multiples are derived from a sample of M&A transactions, and if those deals were for controlling interests, then a premium is already built into the concluded multiples. In general, whether an adjustment for control is indicated depends on what type of purpose of analysis and type of sample. How the adjustment should be made depends on the availability of reliable data on the incremental value of control.

**(c) Adjustment for illiquidity:** In general, an asset that is readily saleable is worth more than an otherwise identical asset that is not saleable. In case of valuation of a minority interest in a private company, or restricted shares of stock that may not be sold during a stipulated period, the concluded values derived from standard market multiples will need to be further adjusted (discounted) for illiquidity, also known as "lack of marketability." The Comparables are traded the subject is not. The estimation of the size of discount is subjective depending on the source, degree, and duration of the illiquidity.

Examples of adjustments to Comparables Data

- Inventory accounting (LIFO vs. FIFO)
- Extraordinary items (e.g., litigation settlements)
- Non-recurring items (e.g., discontinued operations, asset sales)
- Owner's compensation
- Capitalization of intangibles (from prior acquisitions)
- Non-operating assets (e.g., excess cash, idle land)
- Construction in progress etc.

**Variation on Relative Valuation**

In relative valuation, the value of an asset is based upon how similar assets are priced. In practice, there are three variations on relative valuation, with the differences primarily in how we define comparable firms and control for differences across firms:

- (a) Direct comparison:** In this approach, analysts try to find one or two companies that look almost exactly like the company they are trying to value and estimate the value based upon how these similar companies are priced. The key part in this analysis is identifying these similar companies and getting their market values.
- (b) Peer Group Average:** In the second, analysts compare how their company is priced using a multiple with how the peer group is priced using the average for that multiple. Thus, a stock is considered cheap if it trade at 12 times earnings and the average price earnings ratio for the sector is 15. Implicit in this approach is the assumption that while companies may vary widely across a sector, the average for the sector is representative for a typical company.
- (c) Peer group average adjusted for differences:** Recognising that there can be wide differences between the company being valued and other companies in the comparable firm group, analysts sometimes try to control for differences between companies. In many cases, the control is subjective: a company with higher expected growth than the industry will trade at a higher multiple of earnings than the industry average but how much higher is left unspecified. In a few cases, analysts explicitly try to control for differences between companies by either adjusting the multiple being used or by using statistical techniques. As an example of the former, consider PEG ratios. These ratios are computed by dividing PE ratios by expected growth rates, thus controlling at least in theory for differences in growth and allowing analysts to compare companies with different growth rates.

**Valuation Multiples**

A valuation multiple is the ratio of firm value or equity value to some aspect of the firm's economic activity, such as cash flow, sales, or EBITDA. The table below lists the most common multiples used to value firms, together with the terminology that is used to describe the multiple.

**Multiples Used in Finance**

Quantity	X	Multiple	Terminology	=	Value
Cash Flow	X	Firm Value / Cash Flow of Firm	"Cash flow multiple"	=	Value of Firm
EBITDA	X	Firm Value / EBITDA of Firm	"EBITDA multiple"	=	Value of Firm
Sales	X	Firm Value / Sales Value of Firm	"Sales multiple"	=	Value of Firm
Customers	X	Firm Value / Customers	"Customer multiple"	=	Value of Firm
Earnings	X	Price per Share / Earnings	"Price-earnings ratio"	=	Share Price

The technique for applying a valuation multiple is identical to that of applying a price-per-square-foot multiple to value real estate, or a price per pound to a purchase of fish. If you are studying a firm with a cash flow of ₹ 5 Crores and you believe it should be valued at a cash flow multiple of 10, you will determine that the firm is worth ₹50 Crores.

**Sources of Multiples:**

Multiples can be derived either by using fundamentals or by comparables. In discounted cash flow valuation, the value of a firm is determined by its expected cash flows. Other things remaining equal, higher cash flows, lower risk and higher growth should yield higher value. Thus, multiples can be derived from CF techniques and by comparing across firms or time, and make explicit or implicit assumptions about how firms are similar or vary on fundamentals. This approach requires the same information. Its primary advantage is to show the relationship between multiples and firm characteristics. For instance, what will happen to price-earnings ratios as growth rates decrease? What is the relationship between price-book value ratios and return on equity?



Under comparable method, a firm is valued as how similar firms are priced by the market, or in some cases, with how the firm was valued in prior periods. Thus, comparison can be cross sectional or long term time series. While doing cross sectional comparisons, finding exactly similar firms is difficult some adjustments need to be made to control for differences across firms on growth, risk and cash flow measures. Controlling can be either done by using industry averages or by using multivariate models which allows for controlling of variables. In time series comparisons assumptions have to be made that fundamentals of the firm have not changed. Comparing multiples across time can also be complicated by changes in the interest rates over time and the behaviour of the overall market. For instance, as interest rates fall below historical norms and the overall market increases, you would expect most companies to trade at much higher multiples of earnings and book value than they have historically.

### Description of Multiples:

(1) Earnings Multiples: This is the most common method of valuing multiples.

**(i) Price Earnings Ratio (P/E):** The price-earnings multiple (PE) is the most widely of all multiples. It is very simple to calculate. It is widely used in pricing of initial public offerings and making judgments on relative value. The price earnings ratio is the ratio of the market price per share to the earnings per share :

$$PE = \text{Market Price per share} / \text{Earnings per share}$$

To get to the heart of price earnings multiples, an equity DCF model can be used. Restated in terms of the PE ratio, we find that the PE ratio for a stable growth firm can be written in terms of three variables:

(a) The expected growth rate in earnings per share

(b) The riskiness of the equity, which determines the cost of equity and

(c) The efficiency with which the firm generates growth, which is measured by how much the firm can pay out or afford to pay out after reinvested to create the growth.

**(ii) Price to Earnings with no expected growth:**

$$P_0 = \frac{E_1}{k}$$

$$\frac{P_0}{E_1} = \frac{1}{k}$$

Where:

$E_1$  = expected earnings for next year

$E_1$  =  $D_1$  under no growth

$k$  = Required rate of return

$D_1$  = Dividend

#### Illustration 1.

$$E_0 = ₹ 2.50 \quad g = 0 \quad k = 12.5\%$$

$$P_0 = D/k = ₹ 2.50/0.125 = ₹ 20.00$$

$$P/E = 1/k = 1/0.125 = 8$$

**(iii) P/E Ratio with Constant Growth :**

$$P_0 = \frac{D_1}{k-g} = \frac{E_1(1-b)}{k-(b \times ROE)}$$

$$\frac{P_0}{E_1} = \frac{1-b}{k-(b \times ROE)}$$



Where:

- b = retention ratio
- ROE = Return on Equity
- b = 60%, ROE = 15%, (1 - b) = 40%
- $E_1 = ₹ 2.50 [1 + (0.6)(0.15)] = ₹ 2.73$
- $D_1 = ₹ 2.73(1 - 0.6) = ₹ 1.09$
- k = 12.5%,
- g = 9%
- $P_0 = 1.09 / (0.125 - 0.09) = ₹ 31.14$
- PE =  $31.14 / 2.73 = 11.4$  or  $PE = (1 - 0.60) / (0.125 - 0.09) = 11.4$

The PE ratio is an increasing function of the payout ratio and the growth rate, and a decreasing function of the riskiness of the firm. Other things held equal, higher growth firms will have higher PE ratios than lower growth firms. Higher risk firms will have lower PE ratios than lower risk firms. Firms with lower reinvestment needs will have higher PE ratios than firms with higher reinvestment rates.

**(iv) PE for a High Growth Firm:** The price-earnings ratio for a high growth firm can also be related to fundamentals. In the special case of the two-stage dividend discount model, this relationship can be made explicit fairly simply. When a firm is expected to be in high growth for the next n years and stable growth thereafter, the dividend discount model can be written as follows :

$$P_0 = \frac{EPS_0 \times \text{Payout ratio} \times (1+g) \times \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r-g} + \frac{EPS_0 + \text{Payout ratio} \times (1+g)^n (1+g_n)}{(r-g_n)(1+r)^n}$$

Where,

- EPS = Earnings per share in year 0 (current year)
- g = Growth rate
- Payout = Payout ratio

The value of a stock in a two-stage dividend discount model is the sum of two present values:

- The present value of dividends during the high growth phase - this is the first term in the equation above.
  - It is the present value of a growing annuity. There is no constraint on the growth rate. In fact, this equation will yield the present value of a growing annuity even if  $g > r...$
  - the denominator will become negative but so will the numerator)
- The present value of the terminal price... this is the second term in the equation. The PE ratio for
  - a high growth firm is a function of the same three variables that determine the PE ratio.
  - stable growth firm, though you have to estimate the parameters twice, once for the high growth phase and once for the stable growth phase.

**Illustration 2.**

Estimate the PE ratio for a firm which has the following characteristics:

	High Growth Phase	Stable Growth Phase
Expected Growth Rate	25%	8%
Payout- Ratio	20%	50%
Beta	1.00	1.00
Number of years	5 yrs	forever



Risk free rate = T. Bond Rate = 6%

Required rate of return = 6% + 1(5.5%) = 11.5%

$$P/E = \frac{0.2 \times (1.25) \times \left(1 - \frac{(1.25)^5}{(1.115)^5}\right)}{(0.115 - 0.25)} + \frac{0.5 \times (1.25)^5 \times (1.08)}{(0.115 - 0.08)(1.115)^5} = 28.75$$

For a firm with these characteristics, 28.75 times earnings is a fair price to pay. In fact, if valued this firm using a dividend discount model, would get the identical value per share.

### Illustration 3.

Estimating a Fundamental PE ratio for Infosys:

The following is an estimation of the appropriate PE ratio for Infosys in July 2000. The assumptions are summarized below:

	High Growth Phase	Stable Growth
Length	5 years	forever after year 5
Cost of Equity	10.85%	10.00%
Expected Growth Rate	13.63%	66.67%
Payout Ratio	36.00%	66.67%

The current payout ratio of 36% is used for the entire high growth period. After year 5, the payout ratio is estimated based upon the expected growth rate of 5% and a return on equity of 15% (based upon industry averages):

Stable period payout ratio = 1 - Growth rate / Return on equity = 1 - 5% / 15% = 66.67%.

The price-earnings ratio can be estimated based upon these inputs:

$$P/E = \frac{0.36 \times (1.1363) \times \left(1 - \frac{(1.1363)^5}{(1.1085)^5}\right)}{(0.1085 - 0.1363)} + \frac{0.67 \times (1.1363)^5 \times (1.05)}{(0.10 - 0.05)(1.1085)^5} = 17.79$$

Based upon its fundamentals, you would expect Infosys to be trading at 17.79 times earnings.

## 6.4 FREE CASH FLOW VALUATION

### Estimation of Free Cash Flow

Estimation of cash flows is an important step of a valuation process and the nature of cash flows that would be used in the calculation would depend on the perspective of the investor doing the analysis. Free cash flow concept focuses on the cash generated from operations in excess of that needed for reinvestment. Analysts frequently value firms based on the present value of expected future free cash flow. If a firm is not expected to generate free cash flow in the future, it is unlikely to be valuable.

Free cash flow valuation defines the value of the firm to be the present value of its expected future cash flows discounted at the company's cost of capital. Free cash flow available to the firm (FCFF) represents cash flow available to both debt and equity holders. Free cash flow to equity (FCFE) is what remains after debt holders have received their contractually obligated payments namely interest.



A company generates revenue by selling its products and services, while incurring expenses— like salaries, cost of goods sold (COGS), selling and general administrative expenses (SGA), research and development (R&D). To produce revenue a firm not only incurs operating expenses, but it also must invest money in real estate, buildings and equipment, and in incremental working capital to support growth and sustain its business activities. Also, the company must pay income taxes on its earnings. The amount of cash that is left over after the payment of these investments and taxes is known as Free Cash Flow to the Firm (FCFF).

This cash flow represents the return to all providers of capital, whether debt or equity. It can be used to pay off debt, repurchase shares, pay dividends or be retained for future growth opportunities. It is the hard cash that is available to pay the company's various claim holders, especially the shareholders.

FCFF = Net Operating Profit - Taxes - Net Investment - Net Change in Working Capital or

FCFF = Net Income + Interest (1-T) - Net Investment - Net Change in Working Capital

A positive value would indicate that the firm has cash left after expenses. A negative value, on the other hand, would indicate that the firm has not generated enough revenue to cover its costs and investment activities.

FCFF can be calculated from the statement of cash flows as follows:

FCFF=Cash Flow from operations + After-tax interest expense - Capital expenditures

### Free Cash Flows to Equity (FCFE) Model

Free Cash Flow to Equity (FCFE) is a measure of how much cash can be paid to the equity shareholders of the company after all expenses, reinvestment and debt repayment. Free cash flow to equity (FCFE) represents the cash flow a company generates after necessary expenses and expenditures and after satisfying the claims of debt holders. It can be calculated from Free Cash Flow to the Firm (FCFF) as follows:

FCFE = FCFF - After-tax interest expense + Net borrowing

If the company borrows more in a year than it repays it will have additional funds that could be distributed to shareholders, which is why net borrowing is added to FCFF in order to determine FCFE.

Once the free cash flows are estimated from the right perspective, the value of the firm is the sum of the present values of the free cash flows for a "planning period" plus the present value of the cash flows beyond the planning horizon (i.e., the terminal value), i.e.,

$$= \sum_{t=1}^T \frac{FCF_t}{(1+k)^t} + \frac{FCF_{T+1}}{k-g} \times \frac{1}{(1+k)^T}$$

Where,

g = growth

t = time

k = cost of equity

If free cash flow is positive then the company has done a good job of managing its cash. If free cash flow is negative then the company may have to look for other sources of funding such as issuing additional shares or debt financing. If a company has a negative free cash flow and has to issue more equity shares, this will dilute the profits per share. If the company chooses to seek debt financing, there will be additional interest expense as a result and the net income of the company will suffer. Free cash flow is one indicator of the ability of a company to return profits to shareholders through debt reduction, increasing dividends, or stock buybacks. All of these scenarios result in an increased shareholder yield and a better return on your investment.

To find the value of a firm, debt holders and/or contributors of debt and equity capital, would discount FCFF by weighted average cost of capital (WACC). Similarly, the equity shareholders would discount FCFE by cost of equity.

There are two major approaches to determine cost of equity. An equilibrium model - either CAPM or Arbitrage Pricing Theory (APT) and the Government security (bond) yield plus risk premium method.



The FCFE is the residual cash flows left after meeting interest and principal payments providing for capital expenditures to both – sustain existing operating company and add new assets for future growth– fund required to finance incremental working capital.

FCFE = Net Income + Depreciation – Capital spending –  $\Delta$  Working capital – Principal repayments + New Debt Issues.

In a special case where capital expenditures and working capital are expected to be financed at the target debt equity ratio and principal repayments are made from new debt issues.

FCFE = Net Income - (1 - d) (Capital Exp. – Depreciation) + (1 - d) ( $\Delta$  Working capital).

#### Dividends different from FCFE

The FCFE is a measure of what a firm can afford to payout as dividends, which is again dependent upon cash flow management needs arising out of the following

- Desire for stability,
- Future investment needs for sustenance and growth related capital expenditure and working capital,
- Tax factors,
- Signalling prerogatives like increase in dividends is viewed as positive signals and decreases as negative signal.

#### FCFE Models:

(I) The stable-growth FCFE Model:

The value of equity, under the stable-growth model, is a function of expected FCFE in the next period, the stable growth rate, and the required rate of return.

$$P_0 = \frac{FCFE_1}{r - g_n}$$

$P_0$  = Value of stock today

FCFE = Expected FCFE next year

$r$  = Cost of equity of the firm

$g_n$  = Growth rate in FCFE for the firm forever.

#### Illustration 4.

Earnings per share: ₹ 3.15

Capital Expenditure per share: ₹3.15

Depreciation per share: ₹2.78

Change in working capital per share: ₹0.50

Debt financing ratio : 25%

Earnings, Capital expenditure, Depreciation, Working Capital are all expected to grow at 6% per year. The beta for stock is 0.90. Treasury bond rate is 7.5%. A premium of 5.50% is used for market.

Calculate value of stock.

#### Solution:

Estimating value

Long term bond rate 7.5%

Cost of equity = 7.5% + (0.90 × 5.50%) = 12.45%

Expected growth rate 6%

Base year FCFE = Earning per share – (Capital Exp. – Dep.)(1 – Debt Ratio) – Change in working capital (1 – Debt Ratio)  
 = 3.15 – (3.15 – 2.78) (1 – 0.25) – 0.50 (1 – 0.25) = 2.49



Value per share =  $2.49 \times 1.06 / (0.1245 - 0.06) = ₹41$ .

**Illustration 5.**

Assume that the following details are given for a company:

Sales - ₹1,00,000; Costs - ₹75,000; Depreciation - ₹20,000; Tax - 35%; Change in Net Working Capital - ₹1,000; Change in Capital Spending - ₹10,000

The Free Cash Flow to Firm (FCFF) for the given data can be calculated as follows:

Sales - Costs - Depreciation	₹5,000
Less: Tax	₹1,750
PAT	₹3,250
Add: Depreciation	₹20,000
Less: Change in Net Working Capital	₹1,000
Less: Change in Capital Spending	₹10,000
<b>Free Cash Flow to Firm (FCFF)</b>	<b>₹12,250</b>

**Illustration 6.**

If in the above example if interest of ₹1,000 is given and the company resorts to net borrowing of ₹5,000 in the year, we can find FCFE as follows:

We first find Free Cash Flow to Firm (FCFF) for the given data:

Sales - Costs - Depreciation - Interest	₹4,000
Less: Tax (using same rate as in the previous problem)	₹1,400
PAT	₹2,600
Add: After tax interest i.e. $1,000 (1 - 0.35)$	₹650
<b>Net Operating Profit after Tax</b>	<b>₹3,250</b>
Add: Depreciation	₹20,000
Less: Change in Net Working Capital	₹1,000
Less: Change in Capital Spending	₹10,000
<b>Free Cash Flow to Firm (FCFF)</b>	<b>₹12,250</b>
Less: After tax Interest Expense i.e. $I \times (1 - T)$	₹650
Add: Net Borrowing	₹5,000
<b>Free Cash Flow to Equity (FCFE)</b>	<b>₹16,600</b>

**(II) FCFE model – two stage and three stage FCFE model****(a) Two stage FCFE model :**

The value of any stock is the present value of the FCFE per year for the extra ordinary growth period plus the present value of the terminal price at the end of the period.

$$\begin{aligned} \text{Value} &= \text{PV of FCFE} + \text{PV of Terminal price} \\ &= \sum_{t=1}^{t=n} \text{FCFE}_t (1+r)^{-t} + P_n (1+r)^{-n} \end{aligned}$$

Where

$\text{FCFE}_t$  = FCFE in year t

$P_n$  = Price at the end of extra ordinary growth period

r = Required rate of return to equity investors in high growth period calculated using CAPM

The terminal price is generally calculated using the infinite growth rate model

$$P_n = \text{FCFE}_{n+1} (r_n - g_n)$$

$g_n$  = Growth rate after the terminal year forever

$r_n$  = Required rate of return to equity investors in stable-growth period.

### (b) Three stage FCFE model - E model

E-model is designed to value firms that are expected to go through three stages of growth: an initial phase of high growth rates, a transition period where growth rate declines and a steady state where growth is stable.

$$P_0 = \sum_{t=1}^{t=n_1} \frac{\text{FCFE}_t}{(1+r)^t} + \sum_{t=n_1+1}^{t=n_2} \frac{\text{FCFE}_t}{(1+r)^t} + \frac{P_{n_2}}{(1+r)^{n_2}}$$

Where

$P_0$  = Value of stock today

$\text{FCFE}_t$  = FCFE in year t

t = Cost of equity

$P_{n_2}$  = Terminal price at the end of transition period

$$= \frac{\text{FCFE}_{2+1}}{(r - g_n)}$$

$n_1$  = End of the initial high growth period

$n_2$  = End of transition period

### Situations when FCFE models and dividend discount valuation models provide similar as well as dissimilar results

FCFE model is alternative to dividend discounting model. But at times both provide similar results: When result obtained from FCFE and Dividend discount model may be same:

- (i) Where dividends are equal to FCFE.
- (ii) Where FCFE is greater than dividends but excess cash (FCFE- dividends) is invested in projects with NPV = 0 (Investments are fairly priced)

When results from FCFE and Dividend discounting models are different:

- (i) When FCFE is greater than dividends and excess cash earns below market interest rates or is invested in negative NPV – value projects, the value from FCFE will be greater than the value from discount model.
- (ii) When dividends are greater than FCFE, the firm will have to issue either new stock or new debt to pay their dividends- with attendant costs.
- (iii) Paying too much of dividend can lead to capital rationing constraints when good projects are rejected, resulting in loss of wealth.

### Conclusion:

The dividend model uses a strict definition of cash flows to equity, i.e. expected dividends on stock, while FCFE model uses an expensive definition of cash flows to equity as the residual cash flows after meeting all financial obligations and investment needs.

When the firms have dividends that are different from FCFE, the values from two models will be different. In valuing firms for takeover or where there is reasonable chance of changing corporate control, the value from the FCFE provides the better value.



### The Discounted Cash Flow Analysis

Discounted cash flow valuation is based upon the notion that the value of an asset or group of assets, e. g., an operating division or a company, is the present value of the expected operating cash flows from that asset, discounted at a rate considering weighted average cost of capital (WACC) plus a factor to take care of the riskiness of those cash flows. The nature of the cash flows will depend upon the asset, the dividends for an equity share, coupons and redemption value for bonds and the post-tax cash flows for a project. The approach is based on time value concept where the value of any asset is the present value of its expected future cash flows. An acquirer would need to follow the steps given below and first find the intrinsic value of share. As we illustrate the method let us find the intrinsic value of popular auto ancillary company Bharat Forge Ltd.

#### Step I

##### Estimate free cash flows for the explicit forecast period

The free cash flows represent the cash flow available to all the suppliers of the capital to the firm. These include equity holders, the preference investors and the providers of debt to the firm.

Free Cash Flow = Gross Cash Flow of the firm - Tax - Investments - Change in NWC + Depreciation + Non-Cash Charges

Note that financing is not incorporated in the cash flows. Suitable adjustments for the specific financing have to be made in the discount rate.

#### Step II

##### Estimate a suitable Discount Rate for the Acquisition

The second step involves computation of the cost of capital to the firm. The cost of capital is the rate to be used for discounting the free cash flows to their present values. The cost of capital is to be computed as the weighted average of the costs of all sources of capital, which are based on the market value of each of the components of the capital.

$$K_o = K_e \left( \frac{S}{V} \right) + K_p \left( \frac{P}{V} \right) + K_d (1-T) \left( \frac{B}{V} \right)$$

Where V is the total market value of firm, S, P and B indicate the market values of Equity, preference share and Debt respectively.  $K_o$ ,  $K_e$ ,  $K_p$  and  $K_d$  respectively are the weighted average cost of capital, cost of equity capital, cost of preference capital and cost of debt and t is the tax rate applicable to the firm. If the acquirer who is valuing the firm intends to change the capital structure of the target company, then suitable adjustments for the discount rate must be made.

For this Bharat Forge example, the available information is that  $K_e$  as 12.5%,  $K_d$  as 8% and T – tax rate as 33.6%. Moreover we know that D/E is 1/9 i.e.  $W_d = 1/10 = 0.10$  and  $W_e = 9/10 = 0.90$ .

Therefore WACC =  $0.9 \times 0.125 + 0.1 \times 0.08 \times (1 - 0.336) = 11.8\%$  approx. This would be the discount rate that would be used to find PV of free cash flow.

#### Step III

##### Calculate the Present Value of Cash Flows for the explicit forecast period

One of the premises of this approach is that the firm is a going concern. The implication of this assumption is that the cash flows in perpetuity need to be discounted to value the firm. This is however, impossible in practice. Hence, the cash flows are explicitly computed for a finite period of time known as explicit forecast period and the continuing value of the firm at the end of such period is computed known as Terminal Value. The forecast period is set in such a way that the company reaches a stable phase / steady state at the end of forecast period and the growth rate remains constant in perpetuity.

For the Bharat Forge, we have 10 year forecasts, and therefore we find the total PV summing the 10 individual year's PV (See Table 1) to get ₹23910 mln.



### Step IV

#### Estimate the Terminal Value

The terminal value is the present value of the cash flows occurring after the forecast period.

$TV = \frac{[CF_t(1+g)]}{k-g}$  where  $CF_t$  is the Cash flow in the last year,  $g$  is the constant growth rate and  $k$  is the discount rate.

For the Bharat Forge example we have, FCF applicable for the terminal year as ₹6.762 mln. Substituting in the above formula we get,

$$\left[ PV \text{ of TV as } \frac{[6726 \times (1.02)]}{0.118 - 0.02} \times \frac{1}{(1 + 0.118)^{10}} \right] = ₹25879 \text{ mln. [We have assumed } g = 2\%]$$

### Step V

#### Determination of the Value of the firm

Add PV of the free cash flows (as arrived at in Step III) and the Terminal Value (as arrived at in Step IV). For Bharat Forge we get ₹49789 mln.

### Step VI

#### Subtract the Value of the debt

Subtract the Value of the debt and preference share capital and other obligations assumed by the acquirer to arrive at the value of equity.

The debt of Bharat Forge is given as ₹3236 mln. This value need to be subtracted to find the value of equity. Therefore we have, Value of Equity = ₹(49789-3236) = ₹46553 mln. We also have the information that number of O/s shares = 37.7 mln. **Therefore, intrinsic value of 1 equity share of Bharat Forge = 46553/37.7 = ₹1235 approx.**

It should be noted that the final price paid by the acquirer might be much higher than the estimate arrived at by the DCF method. The target company's value can be thought of as

Value of Buyer = Value of Seller + Value added by the Buyer by +Benefits from Synergies + Strategic Considerations + Change in the value to a buyer if the target firm is acquired by the competitor + Control Premium if applicable. However, final payment will always depend on negotiation skills of both the parties.

**Note** = Negotiation is a method by which people settle differences. It is a process by which compromise or agreement is reached while avoiding argument and dispute.

## 6.5 VALUATION OF FIRM - OTHER VALUATION BASIS

### Enterprise Valuation:

Valuation of an enterprise includes takes of all equity, preference shareholders and debt holders. The value of the firm is obtained by discounting expected cash flows to the firm, i.e., the residual cash flows after meeting all operating expenses, reinvestment needs and taxes, but prior to any payments to either debt or equity holders, at their respective cost of equity culminating to weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{CF \text{ to Firm}}{(1 + WACC)^t}$$

Where,



CF to Firm = Expected Cash flows to Firm in period  $t$

And WACC = Weighted average cost of capital

### Valuation of firm in pieces (Adjusted Present value):

Valuation is done in pieces beginning with its operations and adding the effects on value of debt and other non-equity claims. The value of the firm can also be obtained by valuing each claim on the firm separately. In this approach, first equity is valued assuming that it was financed only with equity. Then the value taken away by debt is considered by considering the present value of the tax benefits that flow from debt and the expected bankruptcy costs.

**Value of firm** = Value of all-equity financed firm + PV of tax benefits + Expected Bankruptcy Costs Piece or Adjusted PV approach allows different cash flows to the firm to be discounted at different rates, given their riskiness. Following example shows the equivalence of equity and firm valuation.

### Illustration 7.

Effects of mismatching cash flows and discount rates

Year	Cash flow to Equity	Interest (1 - t)	Cash flow to Firm
1	50	40	90
2	60	40	100
3	68	40	108
4	76.2	40	116.2
5	83.49	40	123.49
Terminal Value	1603.008		2363.008

Assuming the cost of equity is 13.625% and the firm can borrow long term at 10%. (The tax rate for the firm is 30%) The current market value of equity is 1,073 and the value of debt outstanding is 800.

The cost of equity is given as an input and is 13.625%, and the after-tax cost of debt is 5%. Cost of Debt = Pre-tax rate (1 - tax rate) = 10% (1 - 0.3) = 7%

Given the market values of equity and debt, the cost of capital can be estimated.

WACC = Cost of Equity (Equity / (Debt + Equity)) + Cost of Debt (Debt / (Debt + Equity))

= 13.625% (1073/1873) + 7% (800/1873) = 10.79%

#### Method 1: Discount CF to Equity at Cost of Equity to get value of equity

We discount cash flows to equity at the cost of equity:

PV of Equity =  $50/1.13625 + 60/1.13625^2 + 68/1.13625^3 + 76.2/1.13625^4 + (83.49+1603)/1.13625^5$  = 1073

#### Method 2: Discount CF to Firm at Cost of Capital to get value of firm

PV of Firm =  $90/1.0994 + 100/1.0994^2 + 108/1.0994^3 + 116.2/1.0994^4 + (123.49+2363)/1.0994^5$  = 1873

PV of Equity = PV of Firm - Market Value of Debt = 1873 - 800 = 1073

The value of equity is 1073 under both approaches.

#### Error 1: Discount Cash Flows to Equity at Cost of Capital to Get Too High a Value for Equity

PV of equity =  $50/1.0994 + 60/1.0994^2 + 68/1.0994^3 + 76.2/1.0994^4 + (83.49 + 1,603)/1.0994^5$  = 1,248

#### Error 2: Discount Cash Flows to Firm at Cost of Equity to Get Too Low a Value for the Firm

PV of firm =  $90/1.13625 + 100/1.13625^2 + 108/1.13625^3 + 116.2/1.13625^4 + (123.49+2,363)/1.13625^5$  = 1,613

PV of equity = PV of firm - Market value of debt = 1,612.86 - 800 = 813

**Note:**

- (1) The common mistake that is made is that the cash flows to equity are discounted at cost of capital (WACC) which gives very high value of equity and when cash flows to firm are discounted at cost of equity the firm is understated. In our example the value of equity increases by 175 over its true value (1073). When the cash flows to the firm are erroneously discounted at the cost of equity, the value of the firm is understated by 260. This is predominantly because cost of equity is higher than cost of borrowed funds.
- (2) Cash flows for equity are after interest and cash flows for the firm are before. If the cash flows that are discounted are before interest expenses and principal payments, they are usually cash flows to the firm.

**Cash Value Added (CVA)**

Cash value added (CVA) is the excess of cash generated over and above the requirement of cash. It is a cash flow based measure of value that includes only the cash items.

**Cash Value Added is given by:****Cash value added (CVA) = Operating Cash Flow (OCF) – Operating Cash Flow Demand (OFCD)**

The operating cash flow is computed for the essential strategic investment and excludes non-strategic investment. Operating cash flow is computed by adding earnings before interest, taxes, depreciation and amortization (EBITDA) and the increase in working capital, and subtracting from that non-strategic investment.

**Operating Cash Flow (OCF) = EBITDA + Increase in Working Capital – Non-strategic Investment**

It is clear that investment in working capital is regarded as essential and strategic, if the same is planned and not due to market forces like increase in receivables due to non-payment by customer.

From OCF is subtracted the operating cash flow demand (OFCD) representing the opportunity cost of capital demanded by the investors for the strategic investment. It measures the requirement of investors not in percentage terms but in actual cash flow terms. The difference of OCF and OFCD is the cash value added.

Not being a market-based determinant it can be computed at strategic business unit level. The emphasis is on cash and not on accounting earnings such as EBIT or net profit of the strategic unit being evaluated.

**Cash Flow Return on Investment (CFROI)**

Developed by Holt Value Associates, cash flow return on investment (CFROI) is a cash flow based corporate performance measure. Boston Consulting Group (BCG) uses it as performance measure and defines it as ratio of sustainable cash flow in a year to the cash invested on the assets of the firm.

$$\text{Cash Flow Return on Investment (CFROI)} = \frac{\text{Sustainable Cash Flow}}{\text{Cash Invested}}$$

Sustainable cash flow is the cash flow adjusted for economic depreciation. Economic depreciation is the annual amount of charge (or sinking fund) on the cash flows of the firm that is required for replacing the asset after its useful life is over and with discount factor of WACC of the firm. For Example, if an asset available with the firm is valued at ₹5,00,000 but after 10 years of its useful life the replacement can be done only at ₹7,00,000 the economic depreciation would be based on replacement cost of ₹7 lakh instead of ₹5 lakh. And if the WACC is 12 % the amount each year must be based on such that the present value at 12 % for 10 years equals ₹7,00,000.

**Relative Value of Growth**

The firm's management often faces the dilemma as to how to provide increased value to the shareholders. Two common strategies available to them are increase the revenue by increased marketing and sale promotion effort, and to increase the productivity by undertaking cost cutting exercises wherever possible. Undoubtedly, both are desirable and increase value to the shareholders. Given the constraint of time with the top management it is hard to imagine if management can be focus on both the strategies of value addition simultaneously and with equal vigor.



Relative value of growth (RVG) is one parameter that helps resolve this dilemma.

Nathaniel Mass (2005) defined RVG as:

$$\text{Relative Value of Growth (RVG)} = \frac{\text{Value of 1\% Growth (VG)}}{\text{Value of 1\% improvement in Margin (VM)}}$$

Where,

Value of 1% Growth (VG) = Value of the Firm with 1% Extra Revenue – Current Value of the Firm

$$= \frac{\text{Current Cash Flow}}{\text{WACC} - (g + 1\%)} - \text{Current Value of the Firm}$$

Value of improvement in Margin by 1% (VM)

$$= \frac{\text{Post – Tax Increase in Cash Flow}}{\text{WACC} - g}$$

$$= \frac{\text{Current Cash Flow} \times 1\% \times (1 - T)}{\text{WACC} - g}$$

Here g = Expected rate of growth

Relative value of growth compares what is achievable by an increase in revenue as compared to increase in profitability. The higher the value of RVG the more desirable it is. It compares the contribution of increase in revenue to that of strategy of cost cutting. With an RVG greater than one, the increase in the value would be higher if the firm focuses on increased revenue than if the focus is on cost cutting to improve margins. It is a measure of how increased revenue, which implies increased market share, impact shareholders' value creation. Growth in revenue outweighs cost cutting measures. If RVG is less than one, cost cutting is more effective in value creation than the increase in revenue. Such a situation would signify the maturity of the market where only way to improve value is cost cutting.

Understanding the RVG would help strike a good balance between marketing and production activities. It is useful for making investment decisions, establishing long term focus and formulation of corporate strategy. The limitation of RVG includes its inability to value intangibles besides being a relative measure ignoring the increase in value in absolute terms.

### **Economic Margin**

Economic margin, as a measure of corporate performance, was developed by Daniel J Obrycki and Rafael Resendes (1996). It focuses on economic profit. The approach makes adjustments for differences in capital structure, age and life of the assets, mix of the assets, and investment needed to generate earnings.

Economic margin framework is not only a performance metric but also encompasses valuation based on four main value drives – profitability, competition, growth, and cost of capital.

It is measured as follows:

$$\text{Economic Margin: } \frac{\text{Operating Cash Flow} - \text{Capital Charge}}{\text{Invested Capital}}$$

Where,

Operating Cash Flow = Net Income + Depreciation & Amortization + After-tax Interest + R&D Expenses ±  
Non-recurring Expenses/Income

Invested capital = Total Assets + Accumulated Depreciation + Gross Plant Inflation adjustment + Capitalized R&D  
– Non-debt Current Liabilities

The basic difference and premise of economic margin based valuation is that it emphasizes that firms with high excess returns are expected to attract greater competition leading to a shorter competitive advantage period, thus discarding the perpetual cash flow computed to arrive at the terminal value. It states that competition would compete away excess returns.

It is used for finding competition-adjusted performance. The numerator of economic margin like EVA (discussed later) based on economic profit. Unlike EVA, economic margin adds depreciation to the EBIT. Like CFROI the economic margin based on gross assets and helps avoid growth disincentive and not on net assets. However, unlike CFROI the cash flows are unlevered.

### Economic Value Added (EVA) – an aid to Valuation

It is a performance metric that calculates the creation of shareholder value. It distinguishes itself from traditional financial performance metrics such as net profit and EPS. EVA is the calculation of what profits remain after the cost of company's capital—both debt and equity—are deducted from operating profit.

The value of a firm is the sum of the capital invested and the present value of the economic value added. The present value of the economic value added by an asset over its life is the net present value of that asset. The value of a firm can be written as the sum of three components, the capital invested in assets in place, the present value of the economic value added by these assets, and the expected present value of the economic value that will be added by future investments. It can be calculated as:

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t, \text{Assets in place}}}{(1+WACC)^t} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t, \text{Future Project}}}{(1+WACC)^t}$$

Where:

Economic Value Added for all years = Net Operating Profit after Taxes – WACC × Capital Employed

Or, (Return on Capital Invested – WACC) × Capital Invested

Terminal EVA = EVA / (WACC – Net sales growth rate).

WACC = Cost of capital means the “fair rate of return to invested capital”, which goes to all claimholders. It is computed by multiplying Capital invested with WACC.

Return on Capital = Operating Income (1 – tax rate) / Capital Invested

NOPAT = Net Operating Profit After Tax

NOPLAT = Net Operating Profit Less Adjusted Taxes.

It means total operating profit for a firm with adjustments made for taxes. It is used in variant of the FCF and used in mergers of acquisitions.

NOPLAT is very similar to NOPAT, except its (net income + after tax interest expenses + Deferred taxes)

Capital Invested for all years = Total equity + Interest bearing liabilities + Convertibles - Total interest bearing financial assets.

Capital Invested for terminal year = (NOPLAT – Gross capital expenditure – Change in working capital + Increase in non-interest bearing liabilities – Total depreciation) / (Net sales growth × NOPLAT).

**Illustration 8.**

Consider a firm that has assets in place in which it has capital invested of ₹100 crores. Assume the following further facts about the firm:

1. The after-tax operating income on assets in place is ₹15 crores. This return on capital of 15% is expected to be sustained in the future, and the company has a cost of capital of 10%.
2. At the beginning of each of the next 5 years, the firm is expected to make investments of ₹10 crores each. These investments are also expected to earn 15% as a return on capital, and the cost of capital is expected to remain 10%.
3. After year 5, the company will continue to make investments and earnings will grow 5% a year, but the new investments will have a return on capital of only 10%, which is also the cost of capital.
4. All assets and investments are expected to have infinite lives. Thus, the assets in place and the investments made in the first five years will make 15% a year in perpetuity, with no growth.

This firm can be valued using an economic value added approach as follows:

Capital Invested in Assets in Place		₹100 crores
+ EVA from Assets in Place	$\frac{(0.15 - 0.10)(100)}{0.10}$	₹50 crore
+ PV of EVA from New Investments in Year 1	$\frac{(0.15 - 0.10)(10)}{(0.10)}$	₹5 crore
+ PV of EVA from New Investments in Year 2	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^1}$	₹4.55 crore
+ PV of EVA from New Investments in Year 3	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^2}$	₹4.13 crore
+ PV of EVA from New Investments in Year 4	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^3}$	₹3.76 crore
+ PV of EVA from New Investments in Year 5	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^4}$	₹3.42 crore
Value of Firm		₹170.85 crore

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{\infty} \frac{\text{EVA}_{t, \text{Assets in place}}}{(1 + \text{WACC})^t} + \sum_{t=1}^{\infty} \frac{\text{EVA}_{t, \text{Future Project}}}{(1 + \text{WACC})^t}$$

Thus, ₹170.85 crores = ₹100 crores + ₹50 crores + ₹20.85 crores

### Limitations of EVA Method of Firm Valuation

- (1) Needs calculation of invested capital for every year which depends on valuation issues.
- (2) Economic profits as excess returns are fairly subjective, depending on the valuation of invested capital.
- (3) Economic profit framework may provide data inducing illusory accuracy of the quantified business plan.

### Income/ Earnings Capitalisation Approach:

There are two main income approaches of valuation. The first, the discounted future income method, involves forecasting a company's "income" streams (e.g., earnings or cash flow) on a year-by-year basis, and then converting these results into their present worth today based on the investor's required annual rate of return for taking the associated risk. The second, the capitalisation of earnings method, looks at the actual past results of the company as an indicator of its expected future results. There are a variety of potential "income streams" that might be used to determine value in the discounted future income method and capitalisation method such as a company's net profit (after-tax), pre-tax profit, cash flow, dividends and so forth. It then converts these earnings into an estimate of value using a capitalization rate.

- (1) Discounted future income method:** Value of a business is the present value of all of its anticipated future income streams. This method looks to the future by making annual forecasts of a company's earnings and cash flows and then uses present value techniques to convert these estimates into a value of the business today. In this method higher discount rate is used for higher uncertainty. It is assumed that growth rate will be constant after a period of 5-7 years since it is difficult to reliably predict beyond five or seven years in a forecast. The term "income" is used generically. It is calculated as:

$$\sum_{t=1}^n \frac{\text{Income}}{(1 + \text{WACC})^t}$$

- (2) Earnings Capitalisation Method:** The capitalization method simply says that value is a function of the elements of a company's income, the risk associated with that income (reflected in the discount rate), and the income's expected rate of future annual growth.

$$\text{Firm Value} = \frac{\text{Income Stream for the Coming Year}}{(D - g)}$$

Where, D is the discount rate which is WACC and g is the growth rate.

## 6.6 CONTINGENT CLAIM VALUATION

In valuation, the value of a firm is the present value of the expected cash flows from the assets of the firm. The net present value of a project does not capture the values of the options to delay, expand or abandon a project. When comparing across investments, the traditional approach of picking the investment with the highest return or net present value may short-change investments that offer a firm more flexibility in operations and investing. A financing model that focuses on minimising the current cost of capital does not consider the value of financial flexibility that comes from having excess debt capacity. In a similar vein, firms that hold back on returning cash to their stockholders and accumulate large cash balances might also be guided by the desire for financing flexibility. The value of equity, obtained from a discounted cash flow valuation model, does not measure the option to control, and if necessary, liquidate the firm that equity investors possess, and it ignores other options that might be owned by the firm, including patents, licenses and rights to natural reserves. In light of these options that seem to be everywhere, these options should be considered when analyzing corporate decisions. We should try to quantitatively estimate the value of these options, and build them into the decision process.

The value of an asset may not be greater than the present value of expected cash flows if the cash flows are contingent on the occurrence or non-occurrence of an event. As a simple example, consider an undeveloped oil reserve belonging to Exxon, the renowned crude oil exploring company. It can be valued based upon



expectations of oil prices in the future, but this estimate would miss the non-exclusive facts that the oil company will develop this reserve if oil prices go up and will not if oil prices decline or the oil company will develop this reserve if development costs go down because of technological improvement and will not if development costs remain high. Such undeveloped reserves are real options and should be valued as such, rather than with traditional discounted cash flow models.

**Contingent Claim Valuations (CCV)** is a revolutionary development in valuation techniques, to recognise the value of assets whose cash flows are contingent on a future event occurring. Typical examples would be the development of a pharmaceutical drug, an unknown oil field, or the development of a new product, innovation or service, with huge risk and uncertainty.

Earnings Valuations have some difficulty dealing with these firms having unused assets, or where the value of the assets cannot be easily linked to future cash flows.

CCV techniques sometimes use option valuation theory to value the underlying options present in many of these assets. Discounted cash flows techniques tend to understate the value of these assets, or punish them with higher discounting rates (higher WACC).

**Real Options Valuations** tend to value these underlying options as a set of managerial rights to wait, grow, expand, use flexible operating processes or even abandon a project or the use of the asset even after the investment has been made. This technique removes a huge dysfunction that currently exists, between project investment decision making, and managerial flexibility.

**Valuation of intangibles and Brands** which employ methodologies to value intangible assets that are identifiable, separable and capable of systematic valuation. Brand valuations are an example. There are three main approaches to value intangibles namely:

- (1) Cost
- (2) Market Value
- (3) Economic Value

**Key benefits of carrying out earnings based valuation and/or contingent valuations are:**

- (1) They allow firms that are going concerns to value their ability to generate free cash flows in the near and far term;
- (2) They make an estimate of the WACC and the ability of these future free cash flows to create wealth;
- (3) They estimate the terminal value of the company and therefore capture the effect of the company's intangible assets like branding, intellectual capital etc;
- (4) They permit the owners an intelligent and economically way of transiting from the business; and/or
- (5) Provide for effective succession planning.

**Valuation of Warrants**

A warrant is an option issued by a company to buy a stated number of shares of stock at a specified price. Warrants are generally distributed with debt, or preferred stock, to induce investors to buy those securities at lower cost. A detachable warrant is one that can be detached and traded separately from the underlying security. Most warrants are detachable.

A convertible security is a debenture or preferred stock that can be converted into common stock at the owner's discretion. A warrant, on the other hand, is similar to a long-term right, in that it is merely an option to purchase common stock at a stated price. When a convertible is exercised, it is exchanged directly for common stock; however, with a warrant, both money and the warrant are exchanged for the common stock.

The minimum price of a warrant is equal to zero until the price of the stock rises above the warrant's exercise price. After that, the warrant's minimum price takes on positive values. The degree to which the warrant price rises with increases in the common stock price depends upon the exercise ratio. In addition, investors are willing to pay a



premium for warrants because only a small loss is possible, in that the warrant price is less than that of the common stock and has large return possibilities.

Several factors affect the size of the warrant premium including:

- (1) The stock price/exercise price-ratio. As the ratio of the stock price to the exercise price climbs, the warrant premium falls, because the leverage ability of the warrant declines.
- (2) The time left to the warrant expiration date. As the expiration date approaches the size of the warrant premium shrinks.
- (3) Investors' expectations concerning the capital gains potential of the stock. If investors feel favourably about the stock, the warrant premium is larger.
- (4) The degree of price volatility on the underlying common stock. The more volatile the common stock, the higher the warrant premium.

### Illustration 9.

Shyam Ltd. has announced issue of warrants on 1:1 basis for its equity share holders. The current price of the stock ₹10 and warrants are convertible at an exercise price of ₹11.71 per share. Warrants are detachable and are trading at ₹3. What is the minimum price of the warrant? What is the warrant premium? Now had the current price been ₹16.375, what is the minimum price and warrant premium? (Consider warrants are tradable at ₹9.75)

Minimum Price = (Market Price of Common Stock – Exercise Price) × Exchange Ratio = (₹10.00 – 11.71) × 1.0 = ₹1.71

Thus, the minimum price on this warrant is considered to be zero, because things simply do not sell for negative prices.

Warrant premium = Market price of warrant - Minimum price of warrant = ₹3 - 0 = ₹3

Minimum price = (Market price of common stock - Exercise price) × (Exercise ratio)  
 = (₹16.375 - 11.71) × 1.0  
 = ₹4.665

Warrant premium = Market price of warrant - Minimum price of warrant = ₹9.75 - 4.665 = ₹5.085

### Valuation of Preference Shares

Preferred stock is an element of shareholder equity that has characteristics of both equity and debt. A preferred share carries additional rights above and beyond those conferred by common stock. Preferred shareholders may have an advantage over common stock shareholders in dissolution, bankruptcy or liquidation, for instance. Preferred shares also generally have a dividend requirement, which makes them appear similar to debt. The dividend structure usually has rights attached to it, such as whether the dividends are cumulative or whether the shares participate in enterprise earnings. The dividend rate may or may not be fixed or tied to some type of index that controls the movement of the rate, either up or down.

Since preference shares generally pay a constant dividend over its life time the value of a share of preferred stock is derived from the following formula:

Value of preferred share = Dividend / Required rate of return

The process of determining the value of preferred stock is not entirely different from common stock, except the risk is assessed based on the individual characteristics of the preferred shares and their impact on the income or cash flow.

### Characteristics of Preferred Stock

When comparing characteristics of preferred shares to characteristics of similar securities look at the following:

An important characteristic of preferred shares is its dividend. The variations could be of the following types:



- Whether the dividends accrue if they are not paid on time,
- Whether they cumulative or non-cumulative preference shares.
- Whether the preference shares holders have the right
  - to participate in earnings or value over and above the stated rate decided
- Whether the preferred shares are participating vs. non-participating.

Another characteristic is a preferred share would generally entail a distribution upon liquidation before the equity shareholders. If the preferred shares have a fixed term, and if they can be bought back by the company at a specified price, time or interval, decides whether they are Redeemable or Irredeemable ones. At times preferred shares come with voting rights. At some other times facility of put options are granted where, the preferred holder make the company repurchase the shares for a fixed price (usually par value). Also there are preference shares that are converted for common stock, or into some other stock or debt instrument, which are known by convertible preference shares or non-convertible shares. However, most of these varieties are not seen to be used in India. Remember, each specific characteristic affects value based on the advantage or disadvantage associated with it. The table below highlights them:

Characteristic	Increases value	Decreases value
Convertible vs. non-convertible	Convertible	Non-convertible
Cumulative or non-cumulative	Cumulative	Non-cumulative
Participating vs. non-participating	Participating	Non-participating
Put option	Yes	No
Redeemable vs. nonredeemable	Call price high	Call price low
Voting vs. nonvoting	Voting	Nonvoting

Of all types are preference shares, it is the convertible preference share which are quite popular with equity investors. These are preferred issues that the holders can exchange for a predetermined number of the company's common stock. This exchange can occur at any time the investor chooses regardless of the current market price of the common stock, depending upon the terms of the issue. It is a one way deal so one cannot convert the common stock back to preferred stock.

Following formulae on convertible preference shares are used to find the conversion value, conversion premium etc. These are similar to the ones we learnt in the chapter of Bond Markets.

$$\text{Conversion Ratio} = \frac{\text{Par value of convertible security}}{\text{conversion price}}$$

$$\text{Conversion value} = (\text{Conversion ratio}) \times (\text{Market value per share of the common stock})$$

$$\text{Straight value of preferred stock} = \text{Dividend} / \text{Expected Return}$$

$$\text{Conversion Premium (in absolute terms)} = \left( \begin{array}{c} \text{Market price of} \\ \text{the Convertible} \\ \text{preferred stock} \end{array} \right) - \left( \begin{array}{c} \text{Higher of the security} \\ \text{value and conversion} \\ \text{value} \end{array} \right)$$

**Illustration 10.**

Amit Ltd. is issuing 5% ₹25 par preference shares that would be convertible after three years to equity shares at ₹27. If the current market price of equity shares is ₹13.25, what is the conversion value and conversion premium? The convertibles are trading at ₹17.75 in the market? Assume expected return as 8%.

**Solution:**

$$\text{Conversion ratio} = \frac{\text{Par value of conversion security}}{\text{conversion price}} = 25/27 = 0.9259$$

$$\begin{aligned} \text{Conversion value} &= (\text{Conversion ratio}) \times (\text{Market value per share of the common stock}) \\ &= (0.9259) \times (\text{₹}13.25) = \text{₹}12.27 \end{aligned}$$

Now let us find the value as straight preferred stock =  $1.25/8 = \text{₹}15.63$

$$\begin{aligned} \text{Conversion Premium (in absolute terms)} &= \left( \text{Market price of the Convertible preferred stock} \right) - \left( \text{Higher of the security value and conversion value} \right) \\ &= \text{₹}17.75 - \text{₹}15.63 = \text{₹}2.12. \end{aligned}$$

**Illustration 11.**

ABC Ltd Company currently sells for ₹32.50 per share. In an attempt to determine if ABC Ltd is fairly priced, an analyst has assembled the following information.

- The before-tax required rates of return on ABC Ltd debt, preferred stock, and common stock are 7.0 percent, 6.8 percent, and 11.0 percent, respectively.
- The company's target capital structure is 30 percent debt, 20 percent preferred stock, and 50 percent common stock.
- The market value of the company's debt is ₹145 million and its preferred stock is valued at ₹65 million.
- ABC Ltd's FCFF for the year just ended is ₹28 million. FCFF is expected to grow at a constant rate of 4 percent for the foreseeable future.
- The tax rate is 35 percent.
- ABC Ltd has 8 million outstanding common shares.

What is ABC Ltd's estimated value per share? Is ABC Ltd's stock under priced?

**Solution:**

The weighted-average cost of capital for ABC Ltd is

$$\text{WACC} = 0.30(7.0\%) (1 - 0.35) + 0.20(6.8\%) + 0.50(11.0\%) = 8.225\%$$

The firm value is

$$\text{Firm value} = \text{FCFF}_0 (1 + g) / (\text{WACC} - g)$$

$$\text{Firm value} = 28(1.04) / (0.08225 - 0.04) = 29.12/0.04225 = \text{₹}689.23 \text{ million}$$

The value of equity is the firm value minus the value of debt minus the value of preferred stock:

Equity =  $689.23 - 145 - 65 = \text{₹}479.23$  million. Dividing this by the number of shares gives the estimated value per share of  $\text{₹}479.23 \text{ million}/8 \text{ million shares} = \text{₹}59.90$ . The estimated value for the stock is greater than the market price of ₹32.50, so the stock appears to be undervalued.

**Illustration 12.**

Sandip Corporation is considering for going public but is unsure of a fair offering price for the company. Before hiring an investment banker to assist in making the public offering, managers at Sandip have decided to make their own estimate of the firm's common stock value. The firm's CFO has gathered data for performing the valuation using the free cash flow valuation model. The firm's weighted average cost of capital is 12 percent, and it has ₹ 14,00,000 of debt at market value and ₹5,00,000 of preferred stock at its assumed market value. The estimated free cash flows over the next five years, 2009 through 2013, are given below. Beyond 2013 to infinity, the firm expects its free cash flow to grow by 4 percent annually.

Year	Free Cash Flow
2012	₹ 2,50,000
2013	₹ 2,90,000
2014	₹ 3,20,000
2015	₹ 3,60,000
2016	₹ 4,00,000

- Estimate the value of Sandip Corporation's entire company by using the free cash flow approach.
- Using (a), along with the data provided above, to find Sandip Corporation's equity share value.
- If the firm plans to issue 2,00,000 shares of equity, what is its estimated value per shares ?

**Solution:**

- (a) The total value of the firm equals

$$\frac{2,50,000}{1.12} + \frac{2,90,000}{1.12^2} + \frac{3,20,000}{1.12^3} + \frac{3,60,000}{1.12^4} + \frac{1}{1.12^4} \times \frac{4,00,000}{0.12 - 0.04} = 40,88,547$$

- (b) Of this amount, ₹1.4 million is debt and ₹0.5 million is preferred stock, so the equity value is ₹21,88,547.
- (c) With 2,00,000 shares, the price per share would be ₹10.94.

**Illustration: 13**

True Value Ltd. (TVL) is planning to raise funds through issue of common stock for the first time. However, the management of the company is not sure about the value of the company and, therefore, they attempted to study similar companies in the same line which are comparable to True value in most of the aspects.

From the following information, you are required to compute the value of TVL using the comparable firms approach.

(₹ in crore)

Company	True value Ltd. (₹)	Jewel-value Ltd. (₹)	Real value Ltd. (₹)	Unique value Ltd. (₹)
Sales	250	190	210	270
Profit after tax	40	30	44	50
Book value	100	96	110	128
Market value		230	290	440

TVL feels that 50% weightage should be given to earnings in the valuation process; sales and book value may be given equal weightages.

**Solution:**

The valuation multiples of the comparable firms are as follows:

Particular	Jewel-value Ltd.	Real value Ltd.	Unique value Ltd.	Average
Prices/Sales ratio*	1.21	1.38	1.63	1.41
Price/Earnings ratio**	7.67	6.59	8.80	7.69
Price/Book value ratio***	2.40	2.64	3.44	2.83

Applying the multiples calculated as above, the value of TVL can be calculated as follows:

Particular	Multiple Average	Parameter (₹ cr.)	Value (₹ cr.)
Prices/Sales	1.41	250	352.50
Price/Earnings	7.69	40	307.60
Price/Book value	2.83	100	283.00

By applying the weightage to the P/S ratio, P/E ratio and P/BV ratio we get:

$[(352.50 \times 1) + (307.60 \times 2) + (283.00 \times 1)] / (1 + 2 + 1) = 312.675$ , i.e. ₹312.675 crores is the value.

**Alternative:**

₹  $(352.50 \times 0.25 + 307.60 \times 0.50 + 283.00 \times 0.25) = ₹ 312.675$  crore.

**Working Notes:**

$$\text{*Price/Sales Ratio} = \frac{\text{Market Value}}{\text{Sales}}$$

$$\text{**Price/Earnings Ratio} = \frac{\text{Market Value}}{\text{Profit after tax}}$$

$$\text{***Price/Book value ratio} = \frac{\text{Market Value}}{\text{Book Value}}$$

**Illustration: 14**

ABC Ltd. requires an initial investment of ₹12 lakh for its new store for which ₹4 lakh would come from borrowing at an interest rate of 8%. The interest is paid for 5 years and the entire principal with interest is repaid at the end of the sixth year. The interest expenses are tax deductible at a rate of 36%, but the principal payments are not. The cash flows to the firm are expected to be ₹80,000 initially. These cash flows are expected to grow at a rate of 30% for the first 4 years and at 75% from the fifth year. Estimate the free cash flow to equity.

**Solution:**

Free cash flow to equity = (Net operating income - Interest) + Depreciation and amortization - Capital expenditure - Change in working capital - Principal repayments + Proceeds from new debt issues.

or

FCFE = FCFF + Borrowing - Interest  $(1 - t)$  - Principal repaid

Year	FCFF	Borrowing	Interest $\times (1 - t)$	Principal repaid	FCFE
0	(12,00,000)	4,00,000			(8,00,000)
1	80,000		20,480		59,520



2	1,04,000		20,480		83,520
3	1,35,200		20,480		1,14,720
4	1,75,760		20,480		1,55,280
5	3,07,580		20,480		2,87,100
6	5,38,265		20,480	4,00,000	1,17,785

**Illustration: 15**

Alpha India Ltd. is trying to buy Beta India Ltd. Beta India Ltd., is a small biotechnology firm that develops products that are licensed to major pharmaceutical firms. The development costs are expected to generate negative cash flows of ₹10 lakh during the first year of the forecast period. Licensing fee is expected to generate positive cash flows of ₹5, 10, 15 and 20 lakh during 2-5 years respectively. Due to the emergence of competitive products cash flows are expected to grow annually at a modest 5% after the fifth year. The discount rate for the first five years is estimated to be 15% and then drop to 8% beyond the fifth year. Calculate the value of the firm.

**Solution:**

Year	Cash Flows	Discount rate @15%	Present value
1	(10)	1.15	(8.69)
2	5	1.323	3.779
3	10	1.521	6.575
4	15	1.749	8.576
5	20	2.011	9.945

Total sum of present value = 20.185

$$\text{Terminal Value}_t = \frac{\text{Cash Flow}_{t+1}}{r - g_{\text{stable}}}$$

$$\begin{aligned} \text{Cash Flow}_{t+1} &= \text{Cash flow}_t (1 + g) \\ &= 20(1+0.05) = 21 \text{ lakh} \end{aligned}$$

$$\begin{aligned} \text{Terminal Value} &= 21 / (0.08 - 0.05) \\ &= ₹700 \text{ lakh.} \end{aligned}$$

$$\text{Present value of terminal value} = 700 / 2.011 = 348.08$$

$$\text{Value of the firm} = ₹20.185 + ₹348.08 = ₹368.265 \text{ lakh}$$

**Illustration 16.**

From the given financial statement of ABC Ltd find the following free cash flows viz. Free Cash Flow to Firm (FCFF) and Free Cash Flow to Equity (FCFE).

Balance Sheet of ABC Ltd	(₹ in Millions)	
	31.3.2015	31.3.2016
Asset:		
Current Assets		
Cash	210	248



Account Receivable	474	513
Inventory	520	564
Total Current Assets	1204	1325
Gross Fixed Assets	2501	2850
Accumulated Depreciation	(604)	(784)
Net Fixed Assets	1897	2066
Total Assets	3101	3391
Equity & Liabilities:		
Current Liabilities		
Accounts Payable	295	317
Notes Payable	300	310
Accrued Taxes and expenses	76	99
Total Current Liabilities	671	726
Long Term Debt	1010	1050
Share Capital	50	50
Additional paid in Capital	300	300
Retained Earnings	1070	1265
Total Shareholders' Equity	1420	1615
Total Liabilities	3101	3391

#### Statement of Income — ABC Ltd (₹ Million) — 31.3.2016

Total revenues	2215
Operating Costs and Expenses	1430
EBITDA	785
Depreciation	180
EBIT	605
Interest Expense	130
PBT	475
Tax (@40%)	190
Net Income	285
Dividends	90
Transfer to Retained Earnings	195

#### Statement of Cash Flows — ABC Ltd (₹ Million) — 31.3.2016

<b>Operating Activities</b>	
Net Income	285
Adjustments	
Depreciation	180
Income taxes Paid	(190)
Change in Working Capital	



Account Receivable	(39)
Inventories	(44)
Accounts Payable	22
Accrued taxes & expenses	23
Cash provided by Operating Activities	427
Investing Activities	
Purchases of fixed assets	349
Cash used for Investing Activities	349
Financing Activities	
Notes Payable	(10)
Long Term Debt	(40)
Dividends	90
Cash used for Financing Activities	40
Cash and Equivalents Increase	38
Cash - beginning of the year	210
Cash - end of the year	248
Additional disclosures	
Interest Paid	130

**Solution:**

Free cash flow to the firm is given by the formula:

$$\text{FCFF} = \text{NI} + \text{Non Cash Charges} + \text{Interest} (1-T) - \text{Net Investment} - \text{Net Change in Working Capital}$$

$$\text{FCFF} = 285 + 180 + 130(1 - 0.40) - 349 - (39 + 44 - 22 - 23)$$

\*Net Investment in 2016 = Change in Gross Fixed Assets = (2850 - 2501) = 349  
FCFF = 285 + 180 + 78 - 349 - 38 = ₹156 million

Free cash flow to equity is given by:

$$\text{FCFE} = \text{FCFF} - \text{Interest} (1 - T) + \text{Net borrowing}$$

And we know that:

$$\text{FCFF} = \text{NI} + \text{Non Cash Charges} + \text{Interest} (1-T) - \text{Net Investment} - \text{Net Change in Working Capital}$$

Therefore:

$$\text{FCFE} = \text{NI} + \text{Non Cash Charges} - \text{Net Investment} - \text{Net Change in Working Capital} + \text{Net Borrowing}$$

$$\text{FCFE} = 285 + 180 - 349 - (39 + 44 - 22 - 23) + (10 + 40)$$

$$\text{FCFE} = 285 + 180 - 349 - 38 + 50 = ₹128 \text{ million}$$

Or directly from FCFF as follows:

$$\text{FCFE} = \text{FCFF} - \text{Interest} (1 - \text{Tax rate}) + \text{Net borrowing}$$

$$\text{FCFE} = 156 - 130(1 - 0.40) + (10 + 40)$$

$$\text{FCFE} = 156 - 78 + 50 = ₹128 \text{ million}$$

**Illustration 17.**

ABC Ltd has FCFF of ₹170 Crores and FCFE of ₹130 Crores. ABC Ltd's WACC is 13% and its cost of equity is 15%. FCFF is expected to grow forever at 7% and FCFE is expected to grow forever at 7.5%. ABC Ltd has debt outstanding at ₹1500 Crores. Find the value of ABC Ltd using FCFF approach and FCFE approach.

**Solution:**

FCFF Approach: (discount rate = WACC)

The firm value is the present value of FCFF discounted at the weighted-average cost of capital (WACC):

$$= FCFF_1 / (k-g) = 170 \times 1.07 / (0.13 - 0.07) = ₹3031.67 \text{ Crores}$$

The market value of equity is the value of the firm minus the value of debt:

$$\text{Equity} = 3031.67 - 1500 = ₹1531.67 \text{ Crores}$$

FCFE Approach: (discount rate = Cost of Equity)

Using the FCFE valuation approach, the present value of FCFE, discounted at Cost of equity

$$= FCFE_1 / (k-g) = 130 \times 1.075 / (0.15 - 0.075) = ₹1863.33 \text{ Crores}$$

**Illustration 18.**

Given below is the Balance Sheet of Khan Ltd. as on 31.3.2016:

Equity and Liability	₹ (in Lakh)	Assets	₹ (in Lakh)
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
Equity Share Capital of ₹ 10 each	100	(i) Tangible Assets:	
(b) Reserve & Surplus		— Land and Building	40
— General Reserve	40	— Plant and Machinery	80
(2) Current Liabilities:		(b) Non-Current Investments	10
(a) Trade Payables		(2) Current Assets:	
— Sundry Creditors	30	(a) Inventories	20
		(b) Trade Receivables	
		— Sundry Debtors	15
		(c) Cash & Cash Equivalents	5
Total	170	Total	170

You are required to work out the value of the Company's, shares on the basis of Net Assets method and Profit-earning capacity (Capitalisation) method and arrive at the fair price of the shares, by considering the following information:

- (i) Profit for the current year ₹64 lakhs includes ₹4 lakhs extraordinary income and ₹1 lakh income from investments of surplus funds; such surplus funds are unlikely to recur.
- (ii) In subsequent years, additional advertisement expenses of ₹5 lakhs are expected to be incurred each year.
- (iii) Market values of Land and Building & Plant and Machinery have been ascertained at ₹96 lakhs and ₹100 lakhs respectively. This will entail additional depreciation of ₹6 lakhs each year.
- (iv) Effective Income-tax rate is 30%.
- (v) The capitalization rate applicable to similar business is 16%.

**Solution:**

Net Assets Method:

Assets	₹ (in Lakh)
Land and Building	96
Plant and Machinery	100
Investments	10
Stocks	20
Debtors	15
Cash at Bank	5
Total Assets	246
Less: Creditors	30
Net Assets	216

**Value per Share**

Number of shares = 100 lakhs / 10 = 10 lakhs

Value per share = Net Assets / No. of shares = ₹216 lakhs / 10 lakhs = ₹21.60

**Profit Earning Capacity Method:**

	₹ (in Lakh)
Profit before tax	64
Less: Extraordinary income	4
Less: Investment income not likely to recur	1
Less: Additional expenses for forthcoming years - Advertisement	5
Less: Depreciation	6
Expected Earnings Before Taxes	48
Less: Income taxes @30%	14.4
Future Maintainable Profits	33.6

$$\text{Value of Business} = \frac{\text{Future Maintainable Profit}}{\text{Capitalization Factor}} = \frac{33.6}{0.16} = ₹210 \text{ lakhs}$$

Subtracting external liabilities we get Net Value of Business. Value of share would be Net Value of Business divided by number of shares = ( ₹210 lakhs - ₹30 lakhs) / 10 lakhs = ₹18.00.

	₹
Fair Price of share	
Value as per Net Assets Method	21.6
Value as per Profit earning capacity (Capitalization) method	18.0

Fair Price = Average of the two = ₹19.80 per Share

**Illustration 19.**

A company manufacturing, needle roller bearings, is financed by debt and equity to the extent of 3:7, with total debts of ₹10.82 million. The company's debt is valued at 8%. The beta of the company's equity is known to be 1.5. The company generates a free cash flow ₹2 million with the known growth projection of 5% to perpetuity. If it is known that the market risk premium is 6% and the risk free rate is 5%, what is the value of each equity share for the 1 million shareholders of the company? Assume that the company is in the 40% tax bracket.

**Solution:**

It is given that:

$$FCF_1 = 2.00(1.05) = ₹2.1 \text{ million}; g = 5\%;$$

$$\beta = 1.5; R_F = 5\%; (R_M - R_F) = 6\%; = RP_M$$

$$W_d = 30\%; T = 40\%; K_d = 8\%$$

$$K_e = R_F + RP_M(\beta) = 5\% + 6\%(1.5) = 14\%,$$

$$\begin{aligned} WACC &= W_d K_d (1-T) + W_e K_e \\ &= 0.30(8\%)(0.60) + 0.70(14\%) \\ &= 11.24\% \end{aligned}$$

$$\text{Value of firm} = \frac{FCF(1+g)}{WACC - g} = \frac{2.1}{0.1124 - 0.05} = ₹33.65 \text{ million}$$

$$\text{Value of Equity Shares} = V_{\text{firm}} - V_{\text{debt}} = 33.65 - 10.82 = ₹22.83 \text{ million}$$

$$\text{Price} = 22.83 \text{ million} / 1 \text{ million shares} = ₹22.83 / \text{share}$$

**Illustration 20.**

If in the above problem, the following different situations are observed:

Free Cash Flows given for: Year 1: ₹2.5 million; Year 2: ₹2.9 million, Year 3: ₹3.4 million; Year 4 onwards: Growth of 5%

Tax shields are available each year on interest of ₹1.50 million for years 1 to 3. With all other information remaining the same, find the value per equity share?

**Solution:**

$$FCF_1 = ₹2.5 \text{ million}, FCF_2 = ₹2.9 \text{ million and } FCF_3 = ₹3.4 \text{ million};$$

$$g = 5\%;$$

$$\beta = 1.5; R_F = 5\%; RP_M = 6\%;$$

$$W_d = 30\%; T = 40\%; K_d = 8\%$$

WACC was calculated as 11.24%.

The terminal value after year 3 can be calculated as

$$\begin{aligned} &= FCF_3(1+g) / (WACC - g) \\ &= 3.4(1.05)/(0.1124-0.05) \\ &= ₹57.21 \text{ million} \end{aligned}$$

Tax shields in years 1 through 3 are:

$$TS1 = TS2 = TS3 = \text{Interest} \times T$$

$$= 1,500,000 \times 0.40 = 6,00,000$$

Free Cash Flows for years 1 to 3 and terminal value for year 4-end: (FCF = FCF<sub>1</sub> + TS1 and so on)

Year 1	Year 2	Year 3	Year 4-end
3.1 million	3.5 million	4.0 million	57.21 million



Since the interest tax shields have been taken into account, the cash flows would have to be discounted with WACC where we do not apply tax for debt parties,

$$\text{i.e., } K = W_d K_d + W_e K_e = 0.30(8\%) + 0.70(14\%) = 12.20\%$$

The present value of the FCFs, the tax shields, and the terminal value gives us the value of the firm:

$$V_{\text{Firm}} = \frac{3.1}{1.122} + \frac{3.5}{(1.122)^2} + \frac{4.0}{(1.122)^3} + \frac{57.21}{(1.122)^4} = ₹ 48.88 \text{ million}$$

$$\text{Equity value} = V_{\text{Firm}} - V_{\text{debt}}$$

$$= 48.88 \text{ million} - 10.82 \text{ million}$$

$$= 38.06 \text{ million}$$

or ₹ 38.06 per share since there are 1 million shares outstanding.

### Illustration 21.

The free cash flow of S Ltd is projected to grow at a compound annual average rate of 35% for the next 5 years. Growth is then expected to slow down to a normal 5% annual growth rate. The current year's cash flow of S Ltd is ₹4 lakh. S Ltd's cost of capital during the high growth period is 18% and 12% beyond the fifth year, as growth stabilizes. Calculate the value of the S Ltd.

### Solution:

Present Value of Cash Flows during the Forecast Period

$$PV_{1-5} = \{[FCFE_0 \times (1 + g_t)^t] / (1 + WACC)^t\}$$

$$= [(4 \times 1.35) / 1.18] + [4 \times (1.35)^2 / (1.18)^2] + [4 \times (1.35)^3 / (1.18)^3] + [4 \times (1.35)^4 / (1.18)^4] + [4 \times (1.35)^5 / (1.18)^5]$$

$$= 5.4 / 1.18 + 7.29 / (1.18)^2 + 9.84 / (1.18)^3 + 13.29 / (1.18)^4 + 17.93 / (1.18)^5$$

$$= 4.58 + 5.24 + 5.99 + 6.85 + 7.84$$

$$= ₹30.50 \text{ lakh}$$

Calculation of Terminal Value

$$\text{Where } P_n = FCFE_n \times (1 + g) / (k_e - g)$$

$$= (17.93 \times 1.05) / 0.12 - 0.05$$

$$= 18.83 / 0.07$$

$$= ₹269 \text{ lakh}$$

$$\text{PV of Terminal Price} = 269 / (1.18)^5 = 117.58$$

$$P_{0'} FCFE = PV_{1-5} + PV_T$$

$$= 30.50 + 117.58 = ₹148.08 \text{ lakh.}$$

### Illustration 22.

A task has been assigned to a research analyst in a mutual fund to find out at what price the fund should subscribe to an IPO issue (through Book Building) of a transformer company X Ltd. The following details of the company from 31.3.13 Annual Report are available:

Particulars	31.03.13
Revenues	248.79
Operating expenses	214.41
EBIDTA	34.38
Other Income	3.84
Interest expense	1.00
Preliminary Expenses W/O	0.00
Depreciation	1.92
Profit before taxes	35.30
Income taxes	12.35
Tax at the rate of	35%
Net profit	22.95

To calculate future cash flows, the following projections for the financial year ended 31.3.2014 till 31.3.2018 is available:

Amount in lakhs

	FY14	FY15	FY16	FY17	FY18
Revenue growth	55%	50%	28%	20%	14%
Operating exp/ Income	87%	87%	87%	88%	88%
Other Income	2.50	2.20	2.50	2.50	2.50
Interest expense	2.00	3.00	3.00	3.00	3.00
Preliminary Expenses W/O	0.00	0.00	0.00	0.00	0.00
Depreciation	2.60	3.50	4.10	3.90	3.70
Capital spending	2.00	5.00	5.00	2.00	2.00
Incremental Working capital	2.00	5.00	5.00	2.00	2.00

It is given that revenues would grow at 0% after the explicit forecast period. X Ltd. total assets of ₹219.98 lakhs are financed with equity of ₹208.66 lakhs and balance debts sourced at 8% p.a. Assume risk free rate of 7.5%, risk premium of 7.5% and beta of stock as 1.07. The firm falls in the 35% tax bracket. The company including the shares floated in this issue would have issued a total of 1.02 lakhs shares. Find out the intrinsic value of share using Discounted Cash Flow Analysis. If the price band announced by X Ltd. stands at ₹345 - ₹365, should this fund subscribe to this book built issue and at which end of the price band?

**Solution:**

Calculation of Cost of Equity =  $R + \beta(R_m - R_f) = 7.5 + 1.07 \times 7.5 = 15.53\%$

Cost of Debt = 8%

WACC =  $(208.66/219.98) \times 0.1553 + (11.32/219.98) \times 0.08 \times (1-0.35) = 15\%$

Discount rate = 15%

Calculation of Future Free Cash Flows for the Explicit Period of 5 Years:

Particulars	31.03.14E	31.03.15E	31.03.16E	31.03.17E	31.03.18E
Revenues	385.63	578.45	740.41	888.49	1012.88
Operating expenses	335.50	503.25	644.16	781.87	891.33
EBIDTA	50.13	75.20	96.25	106.62	121.55
Other Income	2.50	2.20	2.50	2.50	2.50



Interest expense	2.00	3.00	3.00	3.00	3.00
Preliminary Expenses W/O	0.00	0.00	0.00	0.00	0.00
Depreciation	2.60	3.50	4.10	3.90	3.70
Profit before taxes	48.03	70.90	91.65	102.22	117.35
Income taxes	16.81	24.81	32.08	35.78	41.07
Net Profit	31.22	46.08	59.57	66.45	76.28
Add Depreciation	2.60	3.50	4.10	3.90	3.70
Less capital spending	2.00	5.00	5.00	2.00	2.00
Less Incremental working capital	2.00	5.00	5.00	2.00	2.00
Free cash flow to the firm	29.82	39.58	53.67	66.35	75.98

Calculation of Value of Firm:

[Amount in lakhs]

Year	Cash flows	Disc. Factor @ 15%	PV of cash flows
2013-14	29.82	0.870	25.93
2014-15	39.58	0.756	29.93
2015-16	53.67	0.658	35.29
2016-17	66.35	0.572	37.95
2017-18	75.98	0.497	37.76
Terminal Value* (g=0%)	506.50	0.497	251.73
Value of Firm			418.59
Value of Debt			11.32
Equity Value			407.27
Equity shares outstanding			1.02
Share price in ₹			399.28

$$* \frac{75.98(1+0\%)}{(15\% - 0\%)}$$

Since the intrinsic value of share is ₹399 approximately and the price band is from ₹345 to ₹365, there is a scope for appreciation. Hence the fund can subscribe to these shares at the upper band of ₹365.

**Illustration 23.**

An unlisted company RS Ltd., manufacturing electrical equipments is currently in the expansion mode and is expected to be a good investment keeping in mind the expected sales and profits over the next 5 years. The projection statement of free cash flows is given below for the period 2009-2013. The shares are likely to be listed after an initial public offer (IPO) shortly.

(₹ Crores)

Particulars	31.03.12	31.03.13	31.03.14	31.03.15	31.03.16
Income	99.58	121.48	151.91	189.76	231.40
Expenditure	87.63	106.30	132.16	164.14	199.00
Operating profit (PBDIT)	11.95	15.18	19.75	25.62	32.40
-Depreciation	3.23	9.29	9.63	9.63	9.31



-Interest	0.85	0.67	0.39	0.12	0.00
PBT	7.87	5.22	9.73	15.87	23.08
-Provisions for taxation	2.59	1.72	3.21	5.23	7.61
Net profit	5.28	3.50	6.52	10.64	15.47
Add: Depreciation	3.23	9.29	9.63	9.63	9.31
Less: capital spending	14.58	30.30	1.71	0.00	0.00
Less: Incremental working capital	17.09	22.59	12.59	12.00	12.00
Free cash flow to the firm	-23.16	-40.10	1.85	8.27	12.78

This is a company with similar risk characteristics that of RS Ltd. which is listed and whose average beta is 0.85. The risk free rate and the market risk premium are 7% and the company is funded with 93% equity and 7% debt, whose cost is 9.25%. A 5% growth is projected beyond 5 years till perpetuity. The firm falls in the 33% tax bracket. The total of 1.06 Crores shares would be outstanding. Find out the intrinsic value of share using Discounted Cash Flow Analysis.

**Solution:**

Calculation of Cost of Equity =  $R_f + \beta(R_m - R_f) = 7 + 0.85 \times 7 = 12.95\%$

Cost of Debt = 9.25%

WACC =  $0.93 \times 0.1295 + 0.07 \times 0.0925 \times (1-0.33) = 12.48\%$

Discount rate = 12.48%

Calculation of Value of Firm:

[ ₹ in Crores]

Year	Cash flows	Disc. Factor @ 12.48%	PV of Cash flows
2011-12	-23.16	0.889	-20.59
2012-13	-40.10	0.790	-31.68
2013-14	1.85	0.703	1.30
2014-15	8.27	0.625	5.17
2015-16	12.78	0.555	7.09
Terminal Value* (g = 5%)	179.40	0.555	99.57
Total PV			60.86
No. of shares outstanding in Crs			1.06
Fair Value of Share in ₹			57.41

$$* \frac{12.78(1+5\%)}{(12.48\% - 5\%)}$$

The intrinsic value of share is ₹57 approximately.

**Valuation of Business****Illustration 24.**

P Ltd is considering buying the business of Q Ltd the final accounts of which for the last 3 years were as follows:

Profit and Loss Accounts for the 3 years ended 31st Dec. (Figures in ₹)

Particulars	2014	2015	2016
Sales	2,00,000	1,90,000	2,24,000
Material Consumed	1,00,000	95,000	1,12,000
Business Expenses	80,000	80,000	82,000
Depreciation	12,000	13,000	14,000
Net Profit	8,000	2,000	16,000

Balance Sheet as at 31st Dec.

(Figures in ₹)

Particulars	2013	2014	2015	2016
Fixed Assets (at Cost)	1,00,000	1,20,000	1,40,000	1,80,000
Less: Depreciation	70,000	82,000	95,000	1,09,000
	30,000	38,000	45,000	71,000
Stock in Trade	16,000	17,000	18,500	21,000
Sundry Debtors	21,000	24,000	26,000	28,000
Cash in hand and Bank	32,000	11,000	28,000	13,200
Prepaid Expenses	1,000	500	2,000	1,000
Total Assets	1,00,000	90,500	1,19,500	1,34,200
Equity Capital	50,000	50,000	70,000	70,000
Share premium	--	--	5,000	5,000
General Reserve	16,000	24,000	26,000	42,000
Debentures	20,000	--	--	--
Sundry Creditors	11,000	13,000	14,000	14,000
Accrued Expenses	3,000	3,500	4,500	3,200
Total Liabilities	1,00,000	90,500	1,19,500	1,34,200

P Ltd wishes the offer to be based upon trading cash flows rather than book profits. Trading Cash Flow means Cash received from Debtors less Cash Paid to Creditors and for Business Expenses excluding Depreciation, together with an allowance for average annual expenditure on Fixed Assets of ₹15,000 per year.

The actual expenditure on Fixed Assets is to be ignored, as is any cash receipt or payment out on the issue or redemption of Shares or Debentures.

P Ltd wishes the Trading Cash Flow to be calculated for each of the years 2014, 2015 and 2016 and for these to be combined using weights of 25% for 2014, 35% for 2015 and 40% for 2016 to give an Average Annual Trading Cash Flow.

P Ltd considers that the Average Annual Cash Flow should show a return of 10% on its investment.



You are required to calculate:

- Trading Cash Flow for each of the years 2014, 2015 & 2016,
- Weighted Average Annual Trading Cash Flow, and
- Price which P Ltd should offer for the business.

**Solution:**

Particulars	2014	2015	2016
Net Profit as per Profit & Loss A/c	8,000	2,000	16,000
Add: Depreciation	12,000	13,000	14,000
Operating Cash Flows before Working Capital Changes	20,000	15,000	30,000
Adjustment for Working Capital Changes			
(a) Change in Stock	(1,000)	(1,500)	(2,500)
(b) Change in Debtors	(3,000)	(2,000)	(2,000)
(c) Prepaid Expenses	500	(1,500)	1,000
(d) Sundry Creditors	2,000	1,000	--
(e) Accrued Expenses	500	1,000	(1,300)
Cash Generated from Operations	19,000	12,000	25,200
Less: Allowance for Expenditure on Fixed Assets	(15,000)	(15,000)	(15,000)
Trading Cash Flow	4,000	(3,000)	10,200
Weights	25%	35%	40%
Weighted Trading Cash Flow	1,000	(1,050)	4,080
Weighted Average Cash Flow	4,030		
Capitalization Rate	10%		
Value of Business	40,300		

**Illustration 25.**

Shah Ltd had earned a PAT of ₹48 Lakhs for the year just ended. It wants you to ascertain the value of its business, based on the following information.

- Tax Rate for the year just ended was 36%. Future Tax rate is estimated at 34%.
- The Company's Equity Shares are quoted at ₹120 at the Balance Sheet date. The Company had an Equity Capital of ₹100 Lakhs, divided into Shares of ₹50 each.
- Profits for the year have been calculated after considering the following in the P & L Account:-
  - Subsidy ₹2 Lakhs received from Government towards fulfillment of certain social obligations. The Government has withdrawn this subsidy and hence, this amount will not be received in future.
  - Interest ₹8 Lakhs on Term Loan. The final instalment of this Term Loan was fully settled in the last year.
  - Managerial Remuneration ₹15 Lakhs. The Shareholders have approved an increase of ₹6 Lakhs in the overall Managerial Remuneration, from the next year onwards.
  - Loss on sale of Fixed Assets and Investments amounting to ₹8 Lakhs. (Ignore Tax Effect thereon)

**Solution:****1. Computation of Future Maintainable Profits**

Particulars	₹ Lakhs
Profit after Tax for the year just ended	48,00,000
<b>Add:</b> Tax Expense (Tax is 36%, So PAT = 64%, Hence, Tax = 48,00,000 × 36/64)	27,00,000
<b>Profit before Tax for the year just ended</b>	<b>75,00,000</b>
<b>Add/ (Less):</b> Adjustments in respect of Non-Recurring items	
Subsidy Income not received in future	(2,00,000)
Interest on Term Loan not payable in future, hence saved	8,00,000
Additional Managerial Remuneration	(6,00,000)
Loss on Sale of Fixed Assets and Investments (non-recurring)	8,00,000
<b>Future Maintainable Profits before Tax</b>	<b>83,00,000</b>
<b>Less:</b> Tax Expense at 34%	28,22,000
<b>Future Maintainable Profits after Tax Equity Earnings</b>	<b>54,78,000</b>

**2. Computation of Capitalization Rate and Value of Business**

Particulars	₹ Lakhs
(a) Profit after Tax for the year just ended	₹48 Lakhs
(b) Number of Equity Shares (₹100 Lakhs ÷ ₹50 per Share)	2 Lakhs
(c) Earnings Per Share (EPS) = PAT ÷ Number of Equity Shares	₹24
(d) Market Price per Share on Balance Sheet Date	₹120
(e) Price Earnings Ratio = MPS ÷ EPS	5
(f) Capitalization Rate = 1 ÷ PE Ratio	20%
<b>(g) Value of Business = Future Maintainable Profits ÷ Capitalization Rate = ₹54.78 Lakhs ÷ 20%</b>	<b>₹273.90 Lakhs</b>

**Illustration 26.**

Shiva Ltd. gives the following information-

- Profits After Tax for the period = ₹100 Lakhs; Expected Compound Growth Rate = 8% p.a
- Cash Flows After Taxes for the period = ₹125 Lakhs; Expected Compound Growth Rate = 7% p.a.
- Current Market Price per Equity Share = ₹900; Equity Share Capital = ₹1,00,00,000 into Shares of ₹100 each.

Compute the value of Shiva Ltd by projecting its PAT /CFAT for an eight year period. Use 10% Discount Rate for your calculations. Also calculate the value of the business by capitalizing the current PAT/ CFAT.

**Solution:****1. Discounted Value of Future PAT and CFAT**

(₹ Lakhs)

Year	PVIF at 10%	PAT	Discounted PAT	CFAT	Discounted CFAT
1	0.9091	100.00 + 8% = 108.00	98.18	125.00 + 7% = 133.75	121.59
2	0.8264	108.00 + 8% = 116.64	96.39	133.75 + 7% = 143.11	118.27
3	0.7513	116.64 + 8% = 125.97	94.64	143.11 + 7% = 153.13	115.04
4	0.6830	125.97 + 8% = 136.05	92.92	153.13 + 7% = 163.85	111.91
5	0.6209	136.05 + 8% = 146.93	91.23	163.85 + 7% = 175.32	108.86

6	0.5645	$146.93 + 8\% = 158.69$	89.58	$175.32 + 7\% = 187.59$	105.90
7	0.5132	$158.69 + 8\% = 171.38$	87.95	$187.59 + 7\% = 200.72$	103.01
8	0.4665	$171.38 + 8\% = 185.09$	86.34	$200.72 + 7\% = 214.78$	100.19
<b>Total</b>		<b>Value of Business</b>	<b>737.23</b>		<b>884.77</b>

**2. Capitalization of current PAT /CFAT**

(₹ Lakhs)

	Particulars	PAT	CFAT
(a)	PAT/CFAT for the period	₹100.00 Lakhs	₹125.00 Lakhs
(b)	Earnings per Share = PAT ÷ Number of Equity Shares	₹100 per share	₹100 per share
(c)	Market Price per share	₹900 per share	₹900 per share
(d)	P/E Ratio = MPS ÷ EPS	9	9
(e)	Capitalization Rate = $1 \div$ PE Ratio	11.11%	11.11%
(f)	Value of Business = PAT or CFAT ÷ Capitalization Rate	₹900.09 Lakhs	₹1,125.11 Lakhs

**3. Summary of Value of Business under different methods**

	Particulars	₹ Lakhs
(a)	Discounted Value of future PAT of 8 years	₹737.23 Lakhs
(b)	Discounted Value of future CFAT of 8 years	₹884.77 Lakhs
(c)	Capitalization of current PAT at 11.11%	₹900.09 Lakhs
(d)	Capitalization of current CFAT at 11.11%	₹1,125.11 Lakhs
(e)	Simple Average of all of the above = $(a+b+c+d) \div 4$	₹911.80 Lakhs

**Illustration 27.**

Kolkata Ltd and Mumbai Ltd have agreed that Kolkata Ltd will take over the business of Mumbai Ltd with effect from 31st December 2013. It is agreed that:

- 10,00,000 shareholders of Mumbai Ltd will receive Shares of Kolkata Ltd. The Swap ratio is determined on the basis of 26 week average market prices of Shares of both the Companies. Average Prices have been worked out at ₹50 and ₹25 for the shares of Kolkata Ltd and Mumbai Ltd respectively.
- In addition to (1) above, the shareholders of Mumbai Ltd will be paid in cash based on the projected synergy that will arise on the absorption of the business of Mumbai Ltd by Kolkata Ltd. 50% of the projected benefits will be paid to the share holders of Mumbai Ltd.

The following projections have been agreed upon by the management of both the Companies.

Year	2014	2015	2016	2017	2018
Benefit (in ₹ Lakhs)	50	75	90	100	105

The benefit is estimated to grow at the rate of 2% from 2018 onwards. It has been further agreed that a discount rate of 20% should be used to calculate the cash that the holders of each share of Mumbai Ltd will receive.

- Calculate the cash that holder of each share of Mumbai Ltd will receive.
- Calculate the total purchase consideration.

(Discounting Rate 20%: 1 year-0.833, 2 year – 0.694, 3 year – 0.579, 4 year – 0.482, 5 year -0.402, 6 year - 0.335)

**Solution:****1. Present Value of Synergy Benefits**

Year	Computation	PV= ₹ Lakhs
2014	$50 \times 0.833$	41.65
2015	$75 \times 0.694$	52.05
2016	$90 \times 0.579$	52.11
2017	$100 \times 0.482$	48.20
2018	$105 \times 0.402$	42.21
2019 onwards (Terminal value Note)	$(105 \times 102\% \div 18\%) \times 0.402$	239.19
<b>Total</b>		<b>475.41</b>

50% on the Synergy Benefits =  $475.41 \times 50\%$  = ₹237.705 Lakhs

Cash for every share held in Mumbai Ltd =  $237.705 \div 10$  = ₹23.77

**Note:** For every increasing cash flow at constant growth rate i.e. Perpetual Cash Flows is as under –

**2. Total Purchase Consideration for the business**

(a) Equity share $(25/50 \times 10,00,000 \times ₹50)$	₹250.00 Lakhs
(b) Cash = 50% of Synergy Benefits	₹237.70 Lakhs
<b>Total</b>	<b>₹487.70 Lakhs</b>

**Illustration 28.**

XY Ltd. which is specialised in manufacturing garments is planning for expansion to handle a new contract which it expects to obtain. An investment bank has approached the company and asked whether the Co. had considered Venture Capital Financing. In 2011, the company borrowed ₹100 lakhs on which interest is paid at 10% p.a. The company shares are unquoted and it has decided to take your advice in regard to the calculation of value of the company that could be used in negotiations using the following available information.

Year 2015		Year 2016	
Turnover (₹ Lakhs)	Probability	Turnover (₹ Lakhs)	Probability
2,000	0.6	2,500	0.7
		3,000	0.3
1,500	0.3	2,000	0.5
		1,800	0.5
1,200	0.1	1,500	0.6
		1,200	0.4

Company's forecast turnover for the year 31st March 2015 is ₹2,000 lakhs which is mainly dependent on the ability to obtain the new contract the chance of which is 60%, turnover for the following year is dependent to some extent on the outcome of the year to 31st March 2015.

Following are the estimated turnovers and probabilities:

Operating costs inclusive of depreciation are expected to be 40% and 35% of the turnover respectively for the years 31st March 2015 and 2016. Tax is to be paid at 30%. It is assumed that profits after interest and taxes are free cash flows. Growth in earnings is expected to be 40% for the years 2017, 2018 and 2019 which will fall to 10% each year after that. Industry average cost of equity (net of tax) is 15%.

**Solution:**

We need to find the value of the company today, for which we need to find the future cash flows and discount them at the expected rate of return (given as 15%). In the given problem since it is given that profit after interest and taxes can be taken as cash flows, we find the same for the year ending 2015 onwards as below:

Expected turnover for the year 2015 =  $0.6 \times 1200 + 0.3 \times 1500 + 0.1 \times 1200 = ₹1770$  lakhs Joint probability for the turnover in year 2016 would be as follows:

Year 2016 - Turnover	2500	3000	2000	1800	1500	1200
Joint Probability	0.42	0.18	0.15	0.15	0.06	0.04
Expected Turnover -2016 (Weighted average)	₹2,298 lakhs					

**Cash flow table:**

Particular	2015	2016	2017	2018	2019	2020 to end
Turnover	1,770	2,298				
Operational Costs	708	804				
Interest	10	10				
Profit Before Tax	1,052	1,484				
Tax	316	445				
Cash Flows = PAT with the given growth rate	736	1,039	1,455	2,037	2,852	62,744
PV factor @15%	0.870	0.756	0.658	0.572	0.497	0.497
PV@15%	640	785	957	1165	1417	31181*

Constant growth from 2020:

Value =  $D/k = (2852 \times 1.1 / (0.15 - 0.10)) \times 0.497 = ₹31181$  lakhs

Total value of company = Sum of last row = ₹36145 lakhs

**Illustration 29.**

You are the director of Ram Company. One of the projects you are considering is the acquisition of Shyam Company. Shyam, the owner of Shyam Company, is willing to consider selling his company to Ram Company, only if he is offered and all-cash purchase price of ₹5 million. The project estimates that the purchase of Shyam Company will generate the following profit after-tax cash flow:

Year	Cash Flow (₹)
1	1,000,000
2	1,500,000
3	2,000,000
4	2,500,000
5	3,000,000

If you decide to go ahead with this acquisition, it will be funded with Ram's standard mix of debt and equity, at the firm's weighted average (after-tax) cost of capital of 9 percent. Ram's tax rate is 30 percent. Should you recommend acquiring Shyam Company to your CEO?

**Solution:**

Year	Cash Flow (₹)	PV Factor @ 9%	PV of cash flow
1	1,000,000	0.917	9,17,431
2	1,500,000	0.842	12,62,520
3	2,000,000	0.772	15,44,367
4	2,500,000	0.708	17,71,063
5	3,000,000	0.650	19,49,794
Total value of the project			74,45,175

Since the value of Shyam Company, is ₹74, 45,175 a figure greater than minimum desired amount of ₹50 lakhs to be paid to Shyam Company, Ram Company can consider buying Shyam Company.

**Illustration 30.**

Idea Ltd was incorporated on 1st April, 2016 for the purpose of acquiring P Ltd, Q Ltd and R Ltd. The summarised Balance Sheets of the Companies as at 31st March 2016 are given below (₹ 000's)-

Liabilities	P Ltd	Q Ltd	R Ltd	Assets	P Ltd	Q Ltd	R Ltd
Equity Shares (₹10)	20,00,000	25,00,000	12,50,000	Fixed Assets - Goodwill	--	3,00,000	--
Reserves & Surplus	7,50,000	5,50,000	3,00,000	Land & Buildings	5,00,000	4,00,000	3,00,000
10% Term Loan	3,50,000	2,00,000	2,00,000	Plant & Equipment	20,00,000	16,00,000	12,00,000
Current Liabilities	7,00,000	4,50,000	4,75,000	Other Fixed Assets	3,00,000	8,00,000	2,25,000
				Current Assets - Stocks	4,00,000	2,50,000	2,00,000
				Debtors	5,00,000	3,00,000	2,50,000
				Cash & Bank	1,00,000	50,000	50,000
Total	38,00,000	37,00,000	22,25,000	Total	38,00,000	37,00,000	22,25,000

Other relevant particulars –

1. Average Annual Profits before interest: P Ltd - ₹4, 50,000; Q Ltd - ₹6, 00,000; and R Ltd - ₹2,50,000
2. Tangible Fixed Assets have been valued by professionals at 31st March 2016 as-

Particulars	P Ltd	Q Ltd	R Ltd
Land & Buildings	₹ 8,00,000	₹ 9,00,000	₹5,00,000
Plant & Equipments	₹16,00,000	₹14,00,000	₹12,00,000
Other Fixed Assets	₹1,75,000	₹ 9,00,000	₹3,25,000

3. The Directors of Idea Ltd in their negotiations agreed to the following-

- (a) The recorded value of Goodwill is to be ignored;
- (b) Professional valuations are to be accepted in respect of Fixed Assets.
- (c) Current Assets are to be accepted at their reported amounts.
- (d) Valuation Adjustments are to be made by individual Companies before completion of acquisition.
- (e) Idea Ltd will issue 12% debentures at par in amount equal to the Net Assets of each acquired Company.
- (f) Idea Ltd will issue Equity Shares of ₹10 each at par for the capitalized value of the Average Profits of each acquired company in excess of Net Assets (The capitalization rate is 10%)
  - Calculate amounts of Debentures and Equity Shares to be issued by Idea Ltd to Shareholders of P Ltd, Q Ltd, and R Ltd.

- Calculate the effect of the scheme on Q Ltd' profitability, if Idea Ltd earns a Net Profit of ₹25,00,000 before interest for the year ended 31st March 2016.

**Solution:****1. Computation of Average Adjusted Profits**

Particulars	P Ltd	Q Ltd	R Ltd
Average PBIT	₹4,50,000	₹6,00,000	₹2,50,000
Less: Term Loan Interest (10% on Loan Amount)	₹35,000	₹20,000	₹20,000
Profit After Tax (ignoring taxation)	₹4,15,000	₹5,80,000	₹2,30,000

**2. Computation of Net Assets (₹)**

Particulars	P Ltd	Q Ltd	R Ltd
Land & Building	8,00,000	9,00,000	5,00,000
Plant & Equipments	16,00,000	14,00,000	12,00,000
Other Fixed Assets	1,75,000	9,00,000	3,25,000
Stock	4,00,000	2,50,000	2,00,000
Debtors	5,00,000	3,00,000	2,50,000
Cash	1,00,000	50,000	50,000
<b>Total Assets</b>	<b>35,75,000</b>	<b>38,00,000</b>	<b>25,25,000</b>
Less: Outside Liabilities:			
Term Loans	(3,50,000)	(2,00,000)	(2,00,000)
Current Liabilities	(7,00,000)	(4,50,000)	(4,75,000)
<b>Net Assets</b>	<b>25,25,000</b>	<b>31,50,000</b>	<b>18,50,000</b>

**3. Computation of Consideration Payable by Idea Ltd**

Particulars	P Ltd	Q Ltd	R Ltd	Total
Consideration in 12% Debentures				
= Net Assets ( Consideration in Debentures) (A)	25,25,000	31,50,000	18,50,000	75,25,000
Consideration in Shares				
= Capitalised Value Less Net Assets				
Average Profit as per WN 1 above	4,15,000	5,80,000	2,30,000	
Capitalised value at 10%	41,50,000	58,00,000	23,00,000	
Less: Net Assets as per WN 2 above	25,25,000	31,50,000	18,50,000	
Consideration in Shares (B)	16,25,000	26,50,000	4,50,000	47,25,000
Total Consideration (A+B)	41,50,000	58,00,000	23,00,000	1,22,50,000

**4. Effect of the scheme in Q Ltd****(a) Profit Receivable by Shareholders of Q Ltd:**

Particulars	₹
Profit Before Interest and Tax of Idea Ltd (given)	25,00,000
Less: Interest Expense	
Interest on Term Loans [10% × (₹3,50,000 + ₹2,00,000 + ₹2,00,000)]	(75,000)
Interest on Debentures [12% × ₹75,25,000]	(9,03,000)



Profit After Tax of Idea Ltd	15,22,000
Profit accruing to shareholders of Q Ltd [ $₹15,22,000 \times 26,50,000 \div 47,25,000$ ]	8,53,608

**(b) Additional Income received by Q Ltd:**

Particulars	₹
From Equity Share Capital [from (a) above]	8,53,608
From 12% Debentures [ $₹31,50,000 \times 12\%$ ]	3,78,000
Total Income received from Idea Ltd	12,31,608
Less: Profit After Tax of Q Ltd before takeover	5,80,000
Increase in the earnings of Q Ltd on takeover by Idea Ltd	6,51,608

**Illustration 31.**

X Ltd and Y Ltd, two private Companies, decide to amalgamate their business into a new Holding Company Z Ltd., which was incorporated on 1st Nov 2015 with an Authorized Capital of ₹40,00,000 in Equity Share of ₹10 each. The new Company plans to commence operation on 1st Jan 2016.

From the information given below, and assuming that all transactions are completed by 30th June 2016, you are required to –

- Show the computation of the number of shares to be issued to the former shareholders of X Ltd & Y Ltd.
- Calculate the Cash Flow available to Z Ltd, based on the information available to you.

Information:

- Z Ltd will acquire the whole of Equity Share Capital of X Ltd and Y Ltd by issuing its own shares fully paid.
- The number of shares to be issued is to be calculated by multiplying the future annual maintainable profits available to the Equity Shareholders in each of the two Companies by the agreed Price Earning Ratios.
- The following information is relevant.

Particulars	X Ltd	Y Ltd
Equity Shares of ₹10 each fully paid	10,00,000	4,00,000
8% Cumulative Preference Shares	--	1,00,000
10% Debentures	2,00,000	--
Future annual maintainable pre-tax profits (before interest/ dividends)	2,30,000	1,12,000
Price Earning Ratio	10 times	8 times

- Shares in the Holding Company are to be issued to the shareholders in Subsidiary Companies at a premium of 20% and thereafter these shares will be marketed on the Stock Exchange.
- It is expected that the Group Profits of the new Company in 2016 will be at least ₹4,50,000 but that will be required as additional Working Capital to facilitate expansion. Accordingly, it is planned to make a further issue of 37,500 Equity shares to the public for Cash at a premium of 30% on 1st May 2016. The new shares will not rank for interest / dividend to be paid on 30th June 2016.
- Out of the proceeds of the Public Issue, Z Ltd will advance ₹2,50,000 to X Ltd and ₹2,00,000 to Y Ltd on 1st May 2016 for Working Capital. These advances will carry interest @ 15% p.a to be paid monthly.
- Preliminary Expenses are estimated at ₹8,000 and Administrative Expenses for the half-year ended 30th June 2016 at ₹16,000 but this expenditure will be covered by temporary overdraft facility. It is estimated that Bank Overdraft cost will be ₹1,600 in the first six months.

(viii) A provision for ₹7,500 should be made for Directors Fee for the half year.

(ix) On 30th June 2016, it is planned to pay interim dividend as: Per share X Ltd – 5% , Y Ltd - 4.40%, Z Ltd - 4%

(x) Income tax 50%. (Say)

**Solution:**

**1. Computation of number of Shares to be issued**

Particulars	X Ltd	Y Ltd
Future Maintainable EBIT	2,30,000	1,12,000
Less: Debenture Interest	(20,000)	--
Profit Before Tax	2,10,000	1,12,000
Less: Income Tax at 50%	(1,05,000)	(56,000)
Profit After Tax	1,05,000	56,000
Less: Preference Dividend	--	(8,000)
Profit to Equity Shareholders	1,05,000	48,000
PE Ratio	10	8
Capitalized Earnings = $\left[ \frac{\text{Profit to Equity shareholders}}{\frac{1}{\text{PE ratio}}} \right]$	10,50,000	3,84,000
$\therefore K_e = \frac{1}{\text{PE ratio}}$		
Number of Shares to be exchanged in Z Ltd at ₹12 per share (including premium of ₹2 each)	87,500	32,000

**2. Computation of Total Purchase Consideration**

Particulars	₹
Issued Share Capital [87,500 + 32,000 = 1,19,500 Shares of ₹10]	11,95,000
Securities Premium 1,19,500 × ₹2 per Share	2,39,000
Total Purchase Consideration	14,34,000

**3. Cash Flow Analysis**

Receipts	₹	Payments	₹
To Proceeds of Public Issue	3,75,000	By Payments:	
37,500 shares at ₹10 each		Preliminary Expenses	8,000
Share Premium at 30%	1,12,500	Administration Expenses	16,000
To Interest received on Advances:		Advance to X Ltd	2,50,000
From X Ltd (2,50,000 × 15% × 2/12)	6,250	Advance to Y Ltd	2,00,000
From Y Ltd (2,00,000 × 15% × 2/12)	5,000	Bank Interest	1,600
To Dividends Received:		By Dividends Payable:	
From X Ltd (10,00,000 × 5%)	50,000	₹11,95,000 × 4%	47,800
From Y Ltd (4,00,000 × 4.40%)	17,600	By Balance c/d (balancing figure)	42,950
Total	5,66,350	Total	5,66,350



**Illustration 32.**

Tridev Ltd is in the business of making sports equipment. The Company operates from Thailand. To globalise its operations Tridev has identified Try Toys Ltd, an Indian Company, as a potential takeover candidate. After due diligence of Try Toys Ltd, the following information is available :-

(a) Cash Flow Forecasts (₹ in Crores)

Year	10	9	8	7	6	5	4	3	2	1
Try Toys Ltd	24	21	15	16	15	12	10	8	6	3
Tridev Ltd	108	70	55	60	52	44	32	30	20	16

(b) The Net Worth of Try Toys Ltd (in Lakh ₹) after considering certain adjustments suggested by the due diligence team reads as under —

Tangible	750	
Inventories	145	
Receivables	75	970
Less: Creditors	165	
Bank Loans	250	(415)
Represented by Equity Shares of ₹1000 each		555

Talks for the takeover have crystallized on the following –

- (i) Tridev Ltd will not be able to use Machinery worth ₹75 Lakhs which will be disposed off by them subsequent to take over. The expected realization will be ₹50 Lakhs.
- (ii) The inventories and receivables are agreed for takeover at values of ₹100 and ₹50 Lakhs respectively, which is the price they will realize on disposal.
- (iii) The liabilities of Try Toys Ltd will be discharged in full on take over along with an employee settlement of ₹90 Lakhs for the employees who are not interested in continuing under the new management.
- (iv) Tridev Ltd will invest a sum of ₹150 Lakhs for upgrading the Plant of Try Toys Ltd on takeover. A further sum of ₹50 Lakhs will also be incurred in the second year to revamp the machine shop floor of Try Toys Ltd.
- (v) The anticipated cash flow (in ₹ Crore) post takeover are as follows-

Year	1	2	3	4	5	6	7	8	9	10
Cash Flows	18	24	36	44	60	80	96	100	140	200

You are required to advise the management the maximum price which they can pay per share of Try Toys Ltd., if a discount factor of 15% is considered appropriate.

**Solution:**

**1. Computation of Operational Synergy expected to arise out of merger (₹ Lakhs):**

Year	1	2	3	4	5	6	7	8	9	10
Cash Flow after merger	1,800	2,400	3,600	4,400	6,000	8,000	9,600	10,000	14,000	20,000
Cash Flow without merger	1,600	2,000	3,000	3,200	4,400	5,200	6,000	5,500	7,000	10,800
<b>Synergy Effect</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>1,200</b>	<b>1,600</b>	<b>2,800</b>	<b>3,600</b>	<b>4,500</b>	<b>7,000</b>	<b>9,200</b>

## 2. Valuation of Try Toys Ltd (₹ Lakhs) :

Year	Discount Factor	Without considering merger		Considering Merger	
		Cash Flows	Discounted Cash Flow	Cash Flows	Discounted Cash Flow
1	0.870	300	261.00	200	174.00
2	0.756	600	453.60	400	302.40
3	0.657	800	525.60	600	394.20
4	0.572	1,000	572.00	1,200	686.40
5	0.497	1,200	596.40	1,600	795.20
6	0.432	1,500	648.00	2,800	1,209.60
7	0.376	1,600	601.60	3,600	1,353.60
8	0.327	1,500	490.50	4,500	1,471.50
9	0.284	2,100	596.40	7,000	1,988.00
10	0.247	2,400	592.80	9,200	2,272.40
			5337.90		10,647.30
Total (Round off)			5338.00		10,647.00

## 3. Computation of Maximum Value to be quoted

Particulars	₹ Lakhs	
Value as per discounted Cash Flow from Operations		10,647
<b>Add: Cash to be collected immediately by disposal of assets:</b>		
Sundry Fixed Assets	50	
Inventories and receivables	150	200
<b>Less: Sundry Creditors</b>	165	
Retrenchment Compensation	90	
Bank loan	250	
Investment to be made on takeover	150	
Present value of investment at the end of year 2 (₹50 lakhs × 0.756)	38	693
<b>Maximum Amount to be quoted</b>		10,154
Difference in Valuation had there been no merger = (10,647–5,338) = ₹ 5,309 Lakhs		

### Illustration 33.

The Directors of a Public Limited Company are considering the acquisition of the entire Share Capital of an existing Company Subhash Ltd engaged in a line of business suited to them. The Directors feel that acquisition of Subhash Ltd will not create any further risk to their business interest. The following is the Balance Sheet of Subhash Ltd as at 31.3.2016 –

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
4,000 Equity Share Capital of ₹100 each	4,00,000	(i) Tangible Assets: (Cost Less Depreciation)	6,00,000
(b) Reserve & Surplus		(2) Current Assets:	
— General Reserve	3,00,000	(a) Inventories (Stock & WIP)	2,00,000



(2) Current Liabilities:		(b) Trade Receivables	
(a) Short Term Borrowings		– Sundry Debtors	3,40,000
— Bank O/D	2,40,000	(c) Cash & Cash Equivalents	1,00,000
(b) Trade Payables			
— Sundry Creditors	3,00,000		
Total	12,40,000	Total	12,40,000

Subhash Ltd's financial records for the past five years were as under — (₹)

Particulars	2015-16	2014-15	2013-14	2012-13	2011-12
Profits before Extra – Ordinary Items	80,000	74,000	70,000	60,000	62,000
Adj: Extra Ordinary Item	3,500	4,000	(6,000)	(8,000)	1,000
Profit after Extra – Ordinary Items	83,500	78,000	64,000	52,000	61,000
Less: Dividends	48,000	40,000	40,000	32,000	32,000
Net balance	35,500	38,000	24,000	20,000	29,000

The following additional information is available:

- (i) There were no change in the Issued Share Capital of Subhash Ltd during this period.  
(ii) The estimated values of Subhash Ltd's assets on 31.3.2016 are – (₹)

Particulars	Replacement Cost	Realizable Value
Fixed Assets	8,00,000	5,40,000
Stock and WIP	3,00,000	3,20,000

- (iii) It is anticipated that 1% of the may prove difficult to be realised.  
(iv) The cost of capital of Chandra Ltd is 10%.  
(v) The current Return on Investment of Public Limited Co. is 10% Quoted Companies with business activities and activities as Subhash Ltd have a PE ratio approximating to 8, although these companies tend to be larger than Subhash.

**Required:** Estimate the value of the total Equity Capital of Subhash Ltd as on 31.3.2016 using each of the following bases – (a) Balance Sheet Value (b) Replacement Cost; (c) Realizable Value; (d) Gordon's Dividend Growth Model and (e) PE Ratio Model.

**Solution:**

**Valuation of Equity Capital of Subhash Ltd under various methods**

- Balance Sheet Value** = Capital ₹4,00,000 + Reserves ₹3,00,000 = ₹7,00,000
- Replacement Value** = Capital + Reserves + Appreciation in Fixed Assets and Stock  
= 4,00,000 + 3,00,000 + (8,00,000 – 6,00,000) + (3,00,000 - 2,00,000) = ₹10,00,000
- Realizable value** = Capital + Reserves + Change in Fixed Assets, Stock and Debtors

Particulars	₹
Capital	4,00,000
Reserve	3,00,000
Appreciation in Stock (3,20,000 – 2,00,000)	1,20,000
Less: Reduction in Fixed Assets (6,00,000 – 5,40,000)	(60,000)
Less: Reduction Debtors (3,40,000 × 1%)	(3,400)
Total Value	7,56,600



**Note:** It is assumed that the estimated Bad Debts are not relevant to Balance Sheet Value and Replacement Value.

4. **Gordon's Dividend Growth Model** is given by the rule:  $P = [E \times (1-b)] \div [(k-br)]$ , where

P = Price Per Share; E = Earnings Per Share; b = retention Ratio; k = Cost of Capital; br = g = Growth rate and r = Rate of Return on Investment. The calculation is made as under –

**Step 1:** Average Profit Retained and Profit earned:

Profit Retained: 35,500 + 38,000 + 24,000 + 20,000 + 29,000 = ₹1,46,500

Profit Earned: 83,500 + 78,000 + 64,000 + 52,000 + 61,000 = ₹3,38,500

**Step 2:** Calculation of b = ₹1,46,500 ÷ 3,38,500 = 0.433 (approx)

**Step 3:** Calculation of r = year ended 31.3.2016

Where, Avg. Investment = (Capital + Reserve – ½ of Profit Retained)

$$\text{Or, } r = \frac{\text{Profit before extra ordinary items}}{\text{Capital + Reserve} - \frac{1}{2} \text{ of Profit Retained}} \times 100$$

$$\begin{aligned} \therefore r &= \frac{80,000}{4,00,000 + 3,00,000 - \frac{1}{2} \times 35,500} \\ &= \frac{80,000}{6,82,250} \times 100 = 11.73\% \end{aligned}$$

**Step 4:** Calculation of b × r = g = Return × Retention Ratio

$$= 11.73\% \times 0.433$$

$$= 5.08\%$$

**Step 5:** Avg Profit = ₹(3,38,500 ÷ 5) = ₹67,700

$$\begin{aligned} \text{Step 6: Market Value} &= \frac{E(1-b)}{K_e - b.r} = \frac{67,700(1-0.433)}{0.10 - 0.0508} \\ &= \frac{38,385.90}{0.0492} = ₹ 7,80,201.22 \end{aligned}$$

**Step 7:** P/E Ratio Model: Comparable companies have P/E Ratio of 8, but Subhash Ltd is much smaller.

If P/E Ratio is taken at 6, the valuation will be 80,000 × 6 = ₹4,80,000

If P/E Ratio is taken at 8, maximum possible value will be (₹80,000 × 8) = ₹6,40,000



**Short Question and Answer:**

**(a) State whether the following statements are true or false:**

- (i) According to basic valuation model, the value of a financial asset is present value of its expected future cash flows.
- (ii) Expected future yield is very low for a Stock with very high P/E ratio.
- (iii) Relative valuation is much more likely to reflect market perceptions and mood than DCF valuation.
- (iv) Industrial groups are inherently less conservative than investors in allocating resources.
- (v) The CAPM assumes perfect market competition.
- (vi) Under discounted cash flow model of asset valuation, estimated cash flows during life of the asset are not required.
- (vii) If expected rate of return is more than required rate, stock should be sold.
- (viii) Intrinsic value of a share decreases after a bonus issue.
- (ix) As per Capital Asset Pricing Model (CAPM), the only relevant risk to price a security is Systematic Risk and not both Systematic as well as Unsystematic Risk.
- (x) Under Asset based valuation approach individual assets are valued and aggregated in the process of finding the enterprise value.

**Answer:**

- (i) True
- (ii) False
- (iii) True
- (iv) False
- (v) True
- (vi) False.
- (vii) False
- (viii) True
- (ix) True
- (x) True

**(b) Fill in the blanks by using the words / phrases given in the brackets:**

- (i) In DCF valuation, the value of an asset is present value of \_\_\_\_\_ cash flows on the asset, (actual/expected)
- (ii) A ratio that presents willingness of the stock market to pay for one rupee of earning per share is called \_\_\_\_\_. (Price to Earnings Ratio/Earnings to Price Ratio/price to Net Profit Ratio)
- (iii) CAPM helps in determining \_\_\_\_\_ of return. (actual rate/required rate)
- (iv) If capitalization rate is reduced by growth rate, the Cash Flows should also be reduced by \_\_\_\_\_. (capital expenditure/dividend payment)
- (v) For firms with negative FCFE and positive FCFF the present value of \_\_\_\_\_ is the suitable model of valuation of equity. (FCFE/FCFF).



- (vi) The required rate of return may also be called \_\_\_\_\_ of capital. (cost / opportunity cost)
- (vii) The CAPM model assumes \_\_\_\_\_ market competition, (perfect / imperfect)
- (viii) DCF analysis requires the revenue and expenses of..... (past/future)
- (ix) Under DCF valuation technique, higher rates of discount will be used for .....project. (safe / risky)

**Answer:**

- (i) expected
- (ii) Price to Earnings Ratio
- (iii) Required rate
- (iv) Capital expenditure
- (v) FCFF
- (vi) Opportunity cost
- (vii) Perfect
- (viii) Future
- (ix) Risky

**(c) In each of the questions given below one out of the four options is correct. Indicate the correct answer:**

- (i) If a company has a P/E ratio of 20 and a ROE (Return on Equity) of 15% then the Market to Book Value Ratio is-
- (A) 3 times
- (B) 3%
- (C) Cannot be calculated from the given information
- (D) None of the above
- (ii) If an all equity firm has Cash from Operating Activities amounting to ₹60 lakhs, Depreciation ₹30 lakhs, increase in non-cash working capital ₹25 lakhs and Capital expenditure ₹20 lakhs, its Free Cash Flows to Equity amounts to (in ₹lakhs)
- (A) 90 lakhs
- (B) 45 lakhs
- (C) 40 lakhs
- (D) 65 lakhs
- (iii) Assume that in a Stock Market, the CAPM is working. A company has presently beta of 0.84 and its going to finance its new project through debt. This would increase its Debt/Equity Ratio to 1.56 from the existing 1.26. Due to increased Debt/Equity Ratio, the Company's beta would
- (A) Increase
- (B) Decrease
- (C) Remain unchanged
- (D) Nothing can be concluded



- (iv) Which one is the advantage of DCF valuation
- (A) It is not based upon an asset's fundamentals
  - (B) It is not the right way to think about what an investor would get when buying an asset
  - (C) It forces an investor to think about the underlying features of the firm and understand its business
  - (D) All of these
- (v) Estimated fair value of an asset is based on the ..... value of operating cash flows.
- (A) current
  - (B) discounted
  - (C) future
  - (D) none of these
- (vi) X Ltd's share beta factor is 1.40. The risk free rate of interest on government securities is 9%. The expected rate of return on the company equity shares is 16%. The cost of equity capital based on CAPM is-
- (A) 15.8%
  - (B) 16%
  - (C) 18.8%
  - (D) 9%

**Answer:**

- (i) (A) 3 times
- (ii) (C) 40 lakhs [60 - 20 = 40] [Dep. and WC change already adjusted in Cash Flows and no adjustment for cost of Debt Capital, the firm being all equity.]
- (iii) (C) Remain unchanged (Because as per CAPM, the company specific risk has no impact on the systematic risk).
- (iv) (C) It forces an investor to think about the underlying features of the firm and understand its business,
- (v) (B) discounted  
In Discounted Cash Flow (DCF) valuation, the value of an asset is the present value of the expected cash flows on the asset.
- (vi) (C) 18.8%

# Study Note - 7

## VALUATION OF ASSETS AND LIABILITIES



### This Study Note includes

- 7.1 Valuation of Inventories
- 7.2 Valuation of Investments - Bonds and Shares
- 7.3 Valuation of Intangibles - Copyrights, Goodwill and Brands
- 7.4 Valuation of Human Resources
- 7.5 Value Added, Economic Value Added, Market Value Added
- 7.6 Valuation of Liabilities

### 7.1 VALUATION OF INVENTORIES

#### Valuation of Inventory – Important for different types of merchandising and manufacturing companies

An inventory valuation allows a company to provide a monetary value for items that make up their inventory. Inventories are usually the one of the top three current assets of manufacturing and / or trading business, and proper measurement of them is necessary to assure accurate financial statements. If inventory is not properly measured, expenses and revenues cannot be properly matched, funds deployed in working capital as well as its cycle and costs cannot be properly measured and a company could make poor business decisions.

The inventory valuation involves two major aspects:

- The costs of the purchased and / or fully and partly manufactured / processed inventory have to be determined and
- Such costs are retained in the inventory accounts of the company until the product is sold.

A single company may conduct merchandising, service, and / or manufacturing activities. For convenience, we shall assume that each company described here conducts only one type of business. If a company does conduct more than one type of activities, it will use the accounting method appropriate for each type.

Retail stores, wholesalers, distributors, and similar companies that sell tangible goods are merchandising companies. A merchandising company substantially sells goods in the same physical form as that in which it acquires them. Its cost of sales is therefore the acquisition cost of the goods that are sold. On the balance sheet, a current asset, Merchandise Inventory, shows the cost of goods that have been acquired but not yet sold as of the balance sheet date.

A manufacturing company converts raw materials and purchased parts into finished goods. Its cost of sales includes the conversion costs as well as the raw material and parts costs of the goods that it sells. A manufacturing company has three types of inventory accounts: Materials, Work in Process, and Finished Goods.

Since both merchandising and manufacturing companies sell tangible goods, their income statements sometimes use the term cost of goods sold rather than cost of sales. We shall use the two terms interchangeably for merchandising and manufacturing companies, but use only cost of sales for service organisations.

Service organisations furnish intangible services rather than tangible goods. They include hotels, telecom services, beauty parlours and other personal services organisations, hospitals and other health care organisations, educational organisations, banks and other financial institutions, and governmental units. Service organizations may have materials inventories-for example, the pipes and fittings of a plumbing company. Professional service firms, such as law, consulting, accounting, and architectural firms, may have intangible inventories consisting of costs that have been incurred on behalf of clients but that have not yet been billed to clients. These inventories,



often called jobs in progress or unbilled costs, correspond to work in process inventories in a manufacturing company. Service organisations do not have finished goods inventories.

### **Costs of Inventories**

#### **Cost of inventory can be classified as**

- (a) Costs of purchase,
- (b) Costs of conversion, and
- (c) "Other costs" incurred in bringing the inventories to their present location and condition.

#### **(a) Costs of Purchase**

The costs of purchase includes

- Purchase price, inclusive of government levies,
- Import duties and import related expenses if procured from overseas sources,
- All logistics costs, including warehousing and stock keeping expenses,
- Handling costs directly pertaining to the acquisition of the goods

#### **(b) Costs of Conversion of Inventory**

Cost of conversion of inventory includes costs directly attributable to the units of production, for example, direct labour. The conversion costs could also include variable and fixed manufacturing overhead incurred in converting raw materials into finished goods. Fixed overhead costs remain constant irrespective of the units of production. Variable costs are those costs that vary directly with the volume of production. Allocation of overhead to the cost of conversion is based on the "normal capacity" of the facility or in proportion to actual quantity manufactured vs. quantity in stock, as is appropriate. Normal capacity is the production that is normally achieved on average over a number of periods.

#### **(c) Other Costs in Valuing Inventories**

Valuing inventories include those costs that are incurred in bringing inventories to their present location and condition in other cost. For example cost for designing a product on the basis of specific customer needs or transport costs to an interim position for certain logistics activity prior to acceptance and actual passing of property to the goods to the customer.

Costs that are excluded from inventory valuation

Certain costs are excluded in valuing inventory are:

- (a) Abnormal amounts of wasted materials, labour, or other production costs
- (b) Storage costs unless they are essential to the production process
- (c) Administrative overheads that do not contribute to bringing inventories to their present location and condition
- (d) Selling costs.

#### **List of disclosure requirements in the Balance Sheet (BS) / Statement of Financial Position (SOFP)**

The financial statements should disclose

- Accounting policies adopted for measuring inventories and the cost flow assumption (i.e., cost formula) used,
- Total carrying amount as well as amounts classified as appropriate to the entity,
- Carrying amount of any inventories carried at fair value less costs to sell,



- Amount of inventory recognised as expense during the period,
- Amount of any write-down of inventories recognised as an expense in the period,
- Amount of any reversal of a write-down to net realizable value and the circumstances that led to such reversal,
- Circumstances requiring a reversal of the write-down, and
- Carrying amounts of inventories pledged as security for liabilities.

### TECHNIQUES OF MEASUREMENT OF COSTS (To be deleted FIFO/LIFO)

Several acceptable methods of handling those are

- Specific identification,
- Average cost,
- Weighted average cost – Moving weighted average or period end weighted average
- First-in, first-out (FIFO), and
- Last-in, first-out (LIFO).

We shall explain these methods with an example from a merchandising company, but the same principles apply to a manufacturing company. In our illustration, we assume the following for a year:

	Units	Unit Cost (₹)	Total Cost (₹)
Inventory, January 1	100	8	800
Purchased June 1	60	9	540
Purchased October 1	80	10	800
Goods available for sale	240	8.917	2140
Goods sold during the year	150	?	?
Ending inventory	?	?	?

#### Specific Identification

Specific identification method is common practice with certain big-ticket items such as automobiles and with unique items such as paintings, expensive jewellery, custom-made furniture; and bar codes and scanners is making it feasible with lower cost items. In many cases, however, when a substantial number of physically similar items are sold, this method can be unsatisfactory because the cost of goods sold depends on what specific items happen to be sold.

#### Illustration 1.

In the above Example, 150 units were sold. If the merchant selected the 100 units with a unit cost of ₹8 and 50 of the units having a unit cost of ₹9, the cost of goods sold would be

$(100 \times ₹8) + (50 \times ₹9) = ₹1,250$ . If the 150 units with the highest cost were selected, the cost of goods sold would be  $(80 \times ₹10) + (60 \times ₹9) + (10 \times ₹8) = ₹1,420$ .

#### Average cost

The average cost method, the average cost of the goods available for sale is calculated, and the units in both cost of goods sold and ending inventory are costed at this average cost. In the periodic inventory method, this average is computed for the whole period. It is a weighted average. Each unit cost is weighted by the number of units with that cost. In the perpetual inventory method, a new average unit cost is sometimes calculated after each purchase. In either case, the average cost is representative of the cost of all of the items that were available for sale during the period.



**Weighted Average Cost** is a method of calculating Ending Inventory cost. It is also known as WAVCOs.

It takes Cost of Goods Available for Sale and divides it by the number of units available for sale (number of goods from Beginning Inventory + Purchases/production). This gives a Weighted Average Cost per Unit. A physical count is then performed on the ending inventory to determine the number of goods left. Finally, this quantity is multiplied by Weighted Average Cost per Unit to give an estimate of ending inventory cost. The cost of goods sold valuation is the amount of goods sold times the Weighted Average Cost per Unit. The sum of these two amounts (less a rounding error) equals the total actual cost of all purchases and beginning inventory.

**Moving-Average (Unit) Cost** is a method of calculating Ending Inventory cost.

Assume that both Beginning Inventory and beginning inventory cost are known. From them the Cost per Unit of Beginning Inventory can be calculated. During the year, multiple purchases are made. Each time, purchase costs are added to beginning inventory cost to get Cost of Current Inventory. Similarly, the number of units bought is added to beginning inventory to get Current Goods Available for Sale. After each purchase, Cost of Current Inventory is divided by Current Goods Available for Sale to get Current Cost per Unit on Goods.

Also during the year, multiple sales happen. The Current Goods Available for Sale is deducted by the amount of goods sold, and the Cost of Current Inventory is deducted by the amount of goods sold times the latest (before this sale) Current Cost per Unit on Goods. This deducted amount is added to Cost of Goods Sold.

At the end of the year, the last Cost per Unit on Goods, along with a physical count, is used to determine ending inventory cost.

#### Illustration 2.

Assuming the periodic inventory method, the 240 units available for sale have a total cost of ₹ 2, 140; hence, the average cost is ₹ 2,140 / 240 = ₹8.917. The calculations cost of goods sold and ending inventory are as follows:

	Units	Units (₹)	Cost Total (₹)
Cost of Goods sold	150	8.917	1338
Ending Inventory	90	8.917	802
	240		2140

#### First-in, First-Out (FIFO)

The FIFO method assumes that the oldest goods, in terms of date of receipt and entry to stock are first issued to production or sold first and that the most recently purchased goods are in the ending inventory. In the illustration, for the 150 units sold, it is assumed that the 100 units in beginning inventory were sold first and that the other 50 units sold were from the purchase made on June 1.

	Units	Units Cost (₹)	Cost Total (₹)
Cost of Goods Sold:			
From beginning inventory	100	8	800
From purchase of June	50	9	450
Cost of Goods Sold	150		1250
Ending Inventory:			
From Purchase of June 1	10	9	90
From purchase of October 1	80	10	800
Ending Inventory	90		890



For the moment, it is sufficient to note that with FIFO (1) cost of goods sold is likely to approximate the physical flow of the goods because most companies sell their oldest merchandise first and (2) the ending inventory approximates the current cost of the goods, since it is costed at the amounts of most recent purchases.

### Last-In, First Out

The LIFO method is the reverse of FIFO. Cost of goods issued to production or sold is based on the cost of the most recent purchases, and ending inventory is costed at the cost of the oldest units available.

	Units	Units Cost (₹)	Cost Total (₹)
Cost of Goods Sold:			
From purchase of October 1	80	10	800
From Purchase of June 1	60	9	540
From beginning inventory	10	8	80
Cost of Goods Sold	150		1420
Ending Inventory:			
From beginning inventory	90	8	720

LIFO (1) cost of goods sold does not reflect the usual physical flow of merchandise and (2) the ending inventory may be costed at amounts prevailing several months or years ago, which in an era of repaid inflation are far below current costs.

(Note that LIFO is not permitted under international accounting standards.)

### Changes in Inventory

In a year when the physical size of the inventory increases above the amount on hand at the beginning of the year, with LIFO the inventory account is increased by the additional quantity valued at the costs existing during that year. During a period of growth, the inventory account will therefore consist of a number of layers, a new layer being added each year. If subsequently the physical inventory should decrease in size, these layers are, in effect, stripped off, taking the most recently added layer first in accordance with the basic LIFO rule. This process can have a peculiar effect on the income statement. If inventory is decreased to the extent that several LIFO layers are stripped off, then inventory items will be moving into cost of goods sold at costs established several years previously. If there has been constant inflation during the interim, such a decrease in inventory can result in a significant increase in reported income. Some people assert that in a recession, some companies deliberately eat into their LIFO inventories in order to increase reported income in a lean year. Careful readers of financial statements are not fooled by this practice, since the profit effect of reducing LIFO inventories must be disclosed in the notes to the financial statements.

### LIFO Reserve

Companies that use LIFO for determining their balance sheet valuation of inventory nevertheless keep their detailed inventory records on a FIFO or average cost basis. The inventory amounts on these other bases usually will be higher than the LIFO valuation shown on the balance sheet. At the end of each accounting period, the difference between the LIFO valuation and the FIFO or average cost valuation is determined. (This is a complex calculation that is covered in advanced accounting texts.) This difference is sometimes called the LIFO reserve. The terminology is unfortunate because "reserve" suggests something set aside or saved for some special future purpose. The LIFO reserve is nothing more than the mathematical difference between two inventory amounts, one based on LIFO and the other one based on a different method of valuing inventory. LIFO companies disclose their LIFO reserve in the notes for their financial statement.



### Income Tax Considerations

FIFO, average cost, and LIFO are all permitted for inventory, valuation as well as income computation. Once a method is chosen, a company cannot change it without seeking permission from the Internal Revenue Service (IRS). If a company chooses the LIFO method for tax purposes, it must also use LIFO in its published financial statements. This LIFO conformity rule is the only significant instance in which the IRS requires use of the same accounting method for income tax and "book" (financial reporting) purposes.

In periods of inflation, LIFO results in lower income than FIFO or average costs, and thus results in lower income taxes. If the physical size of inventory remains constant or grows, LIFO reduces taxable income indefinitely. Only if LIFO layers are stripped off in future years might taxable income under LIFO exceed taxable income under FIFO; and even in that case, LIFO will have postponed some income tax payments. These tax advantages of LIFO in periods of rising prices can improve a company's cash flow and therefore lead many companies to select the LIFO method regardless of the conceptual pros and cons of the various alternatives.

### Illustration 3.

ABC Stores is a departmental store, which sell goods on retail basis. It makes a gross profit of 20% on net sales. The following figures for the year-end are available:

Opening Stock	₹ 50,000
Purchases	₹ 3,60,000
Purchase Returns	₹ 10,000
Freight Inwards	₹ 10,000
Gross Sales	₹ 4,50,000
Sales Returns	₹ 11,250
Carriage Outwards	₹ 5,000

Calculate the estimated cost of the inventory on the closing date.

### Solution:

Calculation of Cost for closing stock

Particulars	₹
Opening Stock	50,000
Purchases less returns (360000-10000)	3,50,000
Freight Inwards	10,000
	4,10,000
Less: net sales (450000-11250)	4,38,750
	(28,750)
Add: gross profits (438750x 20%)	87,750
Closing stock	59,000

### Illustration 4.

Oil Company is a bulk distributor of high octane petrol. A periodic inventory of petrol on hand is taken when the books are closed at the end of each month. The following summary of information is available for the month of June, 2016.

Sales	₹ 9,45,000
General Administrative cost	₹ 25,000
Opening stock 100000 litres @ ₹ 3per litre	₹ 3,00,000



Purchases (including freight):

June 1-2,00,000 litres @ ₹ 2.85 per litre

June 30-1,00,000 litre @ ₹ 3.03 per litre

Closing stock on June 30-1,30,000 litres

Compute the following data by FIFO, Weighted average and LIFO methods of inventory costing on June 30.

**Solution:**

Statement showing value of closing stock or inventory on 30th June, 2016 under FIFO, weighted and LIFO methods of pricing of issues [quantity of closing stock (100000 + 30000) litres.]

Particulars	FIFO	Weighted Average	LIFO
(1) First-in-First out Method:*			
100000litres @ ₹3.03 per litres	3,03,000		
30000 litres @ ₹2.85 per litres	85,500		
(2) Weighted Average Method:**			
100000 litres @ ₹3.03 per litres		3,03,000	
30000 litres @ ₹2.90 per litres		87,000	
(3) Last-in First out Method:***			
100000 litres @ ₹3.00 per litres			3,00,000
30000 litres @ ₹2.85 per litres			85,500
Value of Closing Stock	3,88,500	3,90,000	3,85,500

\* Under FIFO method old lots are exhausted and new lots are kept in hand on 30.6.2016.

\*\* Under Weighted Average method, the Weighted Average rate is to be calculated or follows:

$$100000 \text{ Litres} \times ₹3 + 200000 \text{ litres} \times ₹2.85 = ₹2.90 \text{ (100000+200000) litres}$$

\*\*\* Under LIFO method, new lots are exhausted except purchased on 30.06.16 and old lots are kept in hand on 30.06.16

**Illustration 5.**

Closing Stock Valuation of Budgeted Raw Material Purchases

Quarter	1st	2nd	3rd	4th
Working Days	65	60	55	60
Production (units per working day)	100	110	120	105
Raw Material Purchase (% by weight of annual total)	30%	50%	20%	
Budgeted purchase price (₹ Per kg.)	1.00	1.05	1.125	

Quantity of raw material per unit of production: 2kg

Budgeted opening stock of raw material: 4000kg (cost ₹4000)

Budgeted closing stock of raw material: 2000kg

Issues are priced on FIFO basis.

Calculate the following budgeted figures:

Quarterly and annual purchases of raw material, by weight and value.

Closing quarterly stock by weighted and value.


**Solution:**

Quarter	Day		Consumption						
			Production per day qty. of RM per unit of production						Kg.
1st	65	x	100	x			2		13000
2nd	60	x	110	x			2		13200
3rd	55	x	120	x			2		13200
4th	60	x	105	x			2		12600
Total consumption for the year									52000

We know that:

Consumption = opening stock + purchases - closing stock

Purchases = consumption + closing stock - opening stock

= 52000 = 2000 - 4000 or, 50000Kg.

**(a) Purchases:**

Quarter	Kg.	Purchase Price	Value (₹)
1	50000 × 30% i.e. 15000	1.00	15000
2	50000 × 50% i.e. 25000	1.05	26250
3	50000 × 20% i.e. 10000	1.125	11250
			52500

**(b) Closing quarterly Stock by weighted and value:**

1st Quarter	(FIFO method)	Quantity Kg.	Rate (₹)	value (₹)
	Opening Stock	4000	1	4000
	Purchase	15000	1	15000
	total	19000		19000
less:	consumption	13000	1	13000
	closing stock	6000	1	6000
2nd quarter	opening stock	6000	1	6000
	purchase	25000	1.05	26250
	total	31000		32250
less:	consumption	13200		13560*
	closing stock	17800		18690
	*6000 @ ₹1.00 =	6000		
	7200 @ ₹1.05 =	7560		
	13200	13560		
3rd quarter	opening stock	17800	1.05	18690
	purchase	10000	1.125	11250
	total	27800		29940
less:	consumption	13200	1.05	13860
	closing stock	14600		16080



4th quarter	opening stock	14600		16080
	purchase	nil		nil
	total	14600		14600
less:	consumption	12600		13830*
	closing stock	2000		2250
	* 4600 (i.e 17800-13200) @ ₹1.05	4830		
	8000 @ ₹ 1.125	9000		
	12600	13830		

**Illustration 6.**

The XYZ Machineries Ltd. requests you to ascertain the amount at which the inventory should be included in the financial statement for the year 2015-16. The value of inventory as shown in the books is ₹12, 50,000.

To determine the net realisable value of the inventory (on a test check basis), you had selected several items whose book value was ₹ 3, 50,000. You ascertain that except for items (a) to (b) mentioned below, the cost was in excess of the realisable value by ₹ 29,532.

The following items require special treatment.

- One machine (cost ₹ 1, 30,000) can now fetch ₹ 1, 15,000. It was priced at ₹ 70,000 and was written down to the same figure at the end of 2015-16.
- A pump (cost ₹ 50,000) was expected to realise ₹ 35,000. A special commission would have to be paid to the broker.
- 6 units of product No. 15,710 were in stock valued each at ₹ 5,520; the selling price was ₹ 4,500 per unit; selling expenses are 10% of the selling price.

Taking into consideration only the above mentioned items requiring special treatment, compute the value of their inventory as at 31st March, 2016 you would consider reasonable.

**Solution:**

Book value of selected items is given. From the given information, realisable value of remaining selected items will have to be found. Then the value of inventory (net realisable value) for all the items to be included in the financial statements of the company for the year 2015-16 is to be determined.

Working showing Realisable Value of Selected Items

Book value of selected items		₹ 350000
Less: Book value of items (a) to (c)		
(a) One machine	₹ 70000	
(b) One pump	₹ 50000	
(c) 6 units of product No. 15,710@ ₹ 5,520	33120	153120
Remaining book value		196880

It is given in the question that except for the items (a) to (b) the cost was in excess of realisable value by ₹ 29,532. In order to find out the realisable value of remaining items, this amount should be deducted from the book value of selected items.

The realisable value of remaining selected items will be: ₹ 1,96,880 - ₹29,532 = ₹ 1,67,348. Percentage of the cost in excess of realisable value to the book value of selected items =  $(29,532/1,96,880) \times 100 = 15\%$

Working showing the Inventory Valuation (on Net Realisable Value Basis) (as on 31-03-2016)



	₹	₹
Value of all the items as shown in the books		1250000
Less: Book value of special items		350000
Book value of the remaining items		900000
Less: Cost of excess of realisable value by 15% i.e. (9,00,000 x 15%)		135000
		765000
Add: Realisable value of remaining selected items		167348
		932348
Add: Realisable value of selected items:		
One machine	₹115000	
One pump (₹ 35,000 less 15% brokerage)	29750	
6 units of product No. 15,710 (6 x 4,500 less 10% selling expenses)	24300	169050
Value of all items of inventory (as on 31-3-16)		1101398

## 7.2 VALUATION OF INVESTMENTS - BONDS AND SHARES

### Enterprisers hold investments

Enterprises hold investments for diverse reasons. For some enterprises, investment activity is a significant element of operations and assessment of the performance of the enterprise may largely, or solely, depend on the reported results of this activity. Some hold investments as a store of surplus funds and some hold trade investments in order to cement a trading relationship or establish a trading advantage.

Enterprises, for which investment activity is a significant element of operations, such as insurance companies and some banks, are often subject to regulatory control. The Preface to Financial Reporting Standards provides that Financial Reporting Standards do not override local regulations governing the issue of financial statements.

Some investments are represented by certificates or similar documents; others are not. Then nature of an investment may be that of a debt, other than a short or long-term trade debt, representing a monetary amount owing to the holder and usually bearing interest; alternatively it may be a stake in an enterprise's results, such as an equity share. Most investments represent financial rights, but some are tangible — such as certain investments in land or buildings and direct investments in gold, diamonds or other marketable commodities.

For some investments, like listed debentures of companies, an active market exists from which a market value can be established. For such investments, market value is an indicator of fair value. For other investments, an active market does not exist and other means are used to determine fair value.

### Classification of Investments

An enterprise that distinguishes between current and long-term assets in its financial statements should present current investments as current assets and long-term investments as non-current assets.

Enterprises that do not distinguish between current and non-current investments in their balance sheets should nevertheless make a distinction for measurement purposes and determine the carrying amount for investments.

Current investments are included in current assets. The fact that a marketable investment has been retained for a considerable period does not necessarily preclude its classification as current. The declared intention and purpose of holding the investment is important as per Ind AS 32 – Financial Instruments.

Investments held primarily to protect, facilitate or further existing business or trading relations, often called trade investments, are not made with the intention that they will be available as additional cash resources and are thus classified as long-term. Other investments, such as investment properties, are intended to be held for a number of years to generate income and capital gain. They are therefore classified as long-term assets even though they may be marketable.



Some enterprises choose not to distinguish between current and long-term assets, and others may be required by regulations to adopt a balance sheet format that makes no distinction. Many such enterprises operate in the financial field, such as banks and insurance companies. Large Corporates also park their temporary surplus cash in liquid financial instruments for easy encashment if needed. Although such enterprises do not intend to realise their assets in current operations, they usually regard many of their investments as being available for the purposes of their current operations as liquid assets if required to manage mismatches in cash flows.

However, such enterprises may have investments properly regarded as long-term assets, for example a bank may hold shares in a leasing company or a corporate holding equity shares in one of its operating subsidiaries which are intended to be held till the subsidiary in existence or till not divested or demerged.

Many such enterprises, therefore, analyse their investments and attribute carrying amounts to them according to whether their characteristics are those of current investments or non-current investments.

### **Cost of investments**

The cost of an investment includes acquisition charges such as brokerages, fees, duties and bank fees. If an investment is acquired, or partly acquired, by the issue of shares or other securities, the acquisition cost is the fair value of the securities issued and not their nominal or par value. If an investment is acquired in exchange, or part exchange, for another asset, the acquisition cost of the investment is determined by reference to the fair value of the asset given up. It may be appropriate to consider the fair value of the investment acquired if it is more clearly evident.

Interest, royalties, dividends and rentals receivable in connection with an investment are generally regarded as income, being the return on the investment. However, in some circumstances, such inflows represent a recovery of cost and do not form part of income. For example, when unpaid interest has accrued before the acquisition of an interest-bearing investment and is therefore included in the price paid for the investment, the subsequent receipt of interest is allocated between pre-acquisition and post-acquisition periods; the pre-acquisition portion is deducted from cost. When dividends on equity securities are declared from pre-acquisition profits a similar treatment applies. If it is difficult to make such an allocation except on an arbitrary basis, the cost of an investment is normally reduced by dividends receivable only if they clearly represent a recovery of part of cost.

The difference between the acquisition cost and redemption value of an investment in debt securities (the discount or premium on acquisition) is usually amortised by the investor over the period from acquisition to its maturity so that a constant yield is earned on the investment. The amortised discount or premium is credited or charged to income as though it were interest and added to or subtracted from the carrying amount of the security. The resulting carrying amount is then regarded as cost.

### **Carrying amounts of Investments**

Investments classified as current assets should be carried in the balance sheet at either:

- (a) market value; or
- (b) the lower of cost and market value.

If current investments are carried at the lower of cost and market value, the carrying amount should be determined either on an aggregate portfolio basis, in total or by category of investment, or on an individual investment basis.

Opinions differ on the appropriate carrying amount for current investments. Some maintain that, for financial statements prepared under the historical cost convention, the general rule of lower of cost and net realisable value is applicable to investments; and since most current investments are marketable, the carrying amount is the lower of cost and market value. Supporters of this method of determining carrying amount claim that it provides a prudent balance sheet amount and does not result in recognising unrealised gains in income.

Others argue that, since current investments are a readily realisable store of wealth, or a cash substitute, it is appropriate to value them at fair value, usually market value. The enterprise is not concerned with the cost of such items but with the cash it could raise by disposing of them. Investments are distinguished from inventories because they can generally be sold without effort, whereas it would normally be inappropriate to recognise profit



on sale of inventories before the sale was assured. Each investment is dispensable by the business - for example an equity investment could be sold and the proceeds re-invested in a bank deposit account without detriment to the business - and therefore it is appropriate to report it at market value. Supporters of market value also argue that reporting investments at historical cost allows management to recognise income at its discretion, since selected investments can be sold and immediately repurchased and the resulting profit reported in income, although such transactions have not changed the enterprise's economic position.

#### **Valuation of Investments on the basis of their classification**

Investments classified as long-term assets should be carried in the balance sheet at either:

- (a) cost;
- (b) revalued amounts; or
- (c) in the case of marketable equity securities, the lower of cost and market value determined on a portfolio basis.

If revalued amounts are used, a policy for the frequency of revaluations should be adopted and an entire category of long-term investments should be revalued at the same time. The carrying amount of all long-term investments should be reduced to recognise a decline other than temporary in the value of the investments, such reduction being determined and made for each investment individually.

Non-current investments with the intention for holding till maturity are usually carried at cost. However, when there is a decline, other than temporary, in the value, the carrying amount is reduced to recognise the decline. Indicators of the value of an investment may be obtained by reference to its fair value, the investee's assets and results and the expected cash flows from the investment. Risk and the type and extent of the investor's stake in the investee are also taken into account. Restrictions on distributions by the investee or on disposal by the investor may affect the value attributed to the investment.

Reductions for other than a temporary decline in the carrying amounts of long-term investments are charged in the income statement unless they offset a previous revaluation.

Reductions in carrying amount may be reversed when there is a rise in the value of the investment, or if the reasons for the reduction no longer exist. However, in some countries reductions in the carrying amount are not reversed.

**Note:** Fair Value is defined as a sale price agreed to by a willing buyer and seller, assuming both parties enters the transaction freely.

#### **Recognise carrying amount in relation to disposals of Investments**

On disposal of an investment the difference between net disposal proceeds and the carrying amount should be recognised as income or expense. If the investment was a current asset carried on a portfolio basis at the lower of cost and market value, the profit or loss on sale should be based on cost. If the investment was previously revalued, or was carried at market value and an increase in carrying amount transferred to revaluation surplus, the enterprise should adopt a policy either of crediting the amount of any remaining related revaluation surplus to income or of transferring it to retained earnings. This policy should be applied consistently in accordance with Financial Reporting Standard.

Any reduction to market value of current investments carried at the lower of cost and market value on a portfolio basis is made against the cost of the portfolio in aggregate; individual investments continue to be recorded at cost. Accordingly the profit or loss on sale of an individual investment is based on cost; however the aggregate reduction to market value of the portfolio needs to be assessed.

When disposing of part of an enterprise's holding of a particular investment, a carrying amount must be allocated to the part sold. This carrying amount is usually determined from the average carrying amount of the total holding of the investment.

#### **Reclassification of Investments**

For long-term investments re-classified as current investments, transfers should be made at:

- the lower of cost and carrying amount, if current investments are carried at the lower of cost and market value. If the investment was previously revalued, any remaining related revaluation surplus should be reversed on the transfer; and
- carrying amount if current investments are carried at market value. If changes in market value of current investments are included in income any remaining related revaluation surplus should be transferred to income.

Investments re-classified from current to long-term should each be transferred at the lower of cost and market value or at market value if they were previously stated at that value.

If current investments are carried at the lower of cost and market value, any reductions to market value and any reversals of such reductions are included in the income statement along with profits and losses on disposals.

Any reductions in carrying amount for other than a temporary decline in value of long-term investments, and reversals of such reductions, and profits and losses on disposal of long-term investments are included in income.

### Specialised Investment Enterprises

Specialised investment enterprises which are prohibited from distributing profits on the disposal of investments may exclude from income changes in value of investments, whether realised or not, provided they carry their investments at fair value. Such enterprises should include in the financial statements a summary of all the movements in value of their investments for the period.

In certain countries, there are specialised investment enterprises whose main business is the holding of a portfolio of marketable securities as an investment vehicle for their individual shareholders. These enterprises carrying their investments at fair value, usually market value, because this is the most appropriate basis in the circumstances. They regard realised profits and losses on their investments as being the same in substance as unrealized gains and losses and therefore account for them in the same way. They disclose a summary of all the movements in the value of their investments for the period.

The constitutions of these enterprises prohibit the distribution as dividends of profits on disposal of investments and require a distinction to be drawn between income arising from interest and dividends and the gains or losses arising on the disposal of the investments. Hence these enterprises exclude from income all changes in value of investments whether or not they are realised.

### Illustration 7.

X Ltd. has the following portfolio of investment on 31st March 2016

Current investment	Cost	Market Value
Shares of A Ltd.	250	265
Units of UTI	160	160
Shares of C Ltd.	125	100
	535	525
Long term investment		
Shares of Y Ltd. (subsidiary)	200	210
Shares of Z Ltd.	150	130
Shares of W Ltd. (subsidiary)	80	10
	430	350

Compute the value of investment for balance sheet purpose assuming that the fall in value of investment Z Ltd. is temporary and that of W Ltd. is permanent.



**Solution:**

Current investment (at lower of cost or market value, individually) (₹ In thousand)

Shares of A Ltd.	250	
Units of UTI	160	
Shares of C Ltd.	100	510
Long term investments		
Shares of Y Ltd.	200	
Shares of Z Ltd	150	
Shares of W Ltd.	80	
	430	
Less: Provision for permanent diminution	70	360
Total: (510 + 360)		870

Interest, dividend and rental receivables in connection with an investment are generally regarded as income, being the return on the investment. However, in some circumstances, such inflows represent a recovery of cost and do not form part of income. This happens when the inflows relate to a period prior to the date of acquisition of investment. Such inflows will be deducted from the cost of acquisition.

**Illustration 8.**

Navaratna Ltd. furnishes the following particulars about their investment in shares of Samay Ltd. for the year 2015-16

Balance of shares held on 1st April 2015	₹ 262000	(10000 shares of ₹ 10 each)
Purchased 2000 shares on 1st July 2016	₹ 60000	
Sold 500 shares on 1st August 2015 @ ₹ 35 per share cum dividend	₹ 17500	
Navaratna Ltd. declared final dividend for 2014-15 on 1st September 2015. Received 1:5 bonus shares on 1st February, 2016.	20%	

Brokerage for each transaction is 2%. Find out cost of shares held by Navaratna Ltd. as on 31st March 2016.

**Solution:**

**Statement of cost**

Date	Particulars	Amount (₹)	Amount (₹)
1-4-15	Balance (10000 shares )		2,62,000
1-7-15	Purchased (2000 shares):		
	Cost (cum-div)	60,000	
	Add brokerage	1,200	
		61,200	
	Less: Dividend for 2014-15	4,000	
			57200
1-8-15	Sold (500 shares cum div)		
	Sale proceeds	17,500	
	Less: brokerage 2%	350	
		17,150	
	Less: Dividend for 2014-15	1,000	



	Cost of sales (500 × 319200/12,000)		(13300)
1-2-16	Bonus shares (1:5) i.e. (11,500 × 1/5)		Nil
	Cost of Investment		3,05,900

\*\* Cost of investment a 305900

\* Cost of sales is computed on average cost basis.

\*\* Bonus shares are free and hence nothing is shown in amount column.

#### Treatment of dividend received:

Dividend received from Samay Ltd. during 2015-16 (11500 × ₹10) × 20%	23,000
Less: Dividend deducted from cost of investment	4,000
	19,000
Add: Dividend included in sales proceeds of 500 shares (received by the new buyer)	1,000
Dividend received to be shown in Profit & Loss A/c	20,000
<b>Profit on sale of investment:</b>	
Sale proceeds of 500 shares (net of brokerage)	17,150
Less: Dividend for 2014-15 included above (to be considered as income)	1000
Less: cost of sales (on average cost basis)	13300
Profit on sales	2850

#### Bond

A company needing millions of dollars may be unable to borrow so large an amount from a single lender. To gain access to more investor, the company may issue bonds. Each bond is, in effect, a long term note payable that bears interest. Bonds are debts to the company for the amounts borrowed from the investors.

#### TYPE OF BONDS

1. Registered Bond
2. Coupon Bonds
3. Term Bonds
4. Serial Bonds
5. Unsecured Bonds, called debentures are backed only by good faith of the borrower.

These bonds again can be of secured and unsecured nature, depending upon the attachment of any asset(s) as a security against the bond for repayment, in the event the issuing entity fails to pay in normal course.

#### Valuation of Share

##### Basic Definitions

Common Stock - Ownership shares in a publicly held corporation with par voting rights. There can be other equity shares without voting right or reduced voting rights, for example one vote for every 10 shares held. In India shares with no or disproportionate voting rights are being issued. At times these are also called Class B or Class C shares.

Secondary Market - market in which already issued securities are traded by investors.

Dividend - Periodic cash distribution from the firm to the share holders.

P/E Ratio - Price per share divided by earnings per share.

Book Value - Net worth per share of the firm according to the balance sheet.



Liquidation Value - Net proceeds that would be realised by selling the firm's assets and paying off its creditors.

Market Value Balance Sheet - Financial statement that uses market value of assets and liabilities.

Expected Return - The percentage yield that an investor forecasts from a specific investment over a set period of time. Sometimes called the market capitalization rate.

Payout Ratio - Fraction of earnings paid out as dividends expressed in terms of  $(\text{Dividend} + \text{Dividend Distribution Tax}) / \text{Profit after Tax}$

Plowback Ratio - Fraction of earnings retained by the firm.

Present Value of Growth Opportunities (PVGO) - Net present value of a firm's future investments. Sustainable Growth Rate - Steady rate at which a firm can grow: plowback ratio X return on equity.

By computing the present value of growth opportunities, a company can determine what the new addition or expansion project will add to the value of the existing firm. Even further, an appropriate purchase price can be determined by using the present value model.

By deducting the purchase price from the present value of growth opportunities, one will be left with the net present value of growth opportunities.

### **Basics of Company Analysis and Stock Selection**

It should be remembered that good companies are not necessarily good investments. As an investor we are interested in comparing the intrinsic value of a stock to its market value. A prudent investor should bear in mind that the stock of a great company may be overpriced, while the stock of a lesser company may be a superior investment since it is undervalued.

What are growth companies and growth stocks? Companies that consistently experience above-average increases in sales and earnings have traditionally been thought of as growth companies. Financial theorists define a growth company as one with management and opportunities that yield rates of return greater than the firm's required rate of return.

Growth stocks do not necessarily refer to shares in growth companies. A growth stock has a higher rate of return than other stocks with similar risk or which have a higher growth potential in comparison to its peers in the same sector or the indexed rate of return say return from NIFTY 50. Superior risk-adjusted rate of return occurs because of market under-valuation compared to other stocks. Studies indicate that growth companies have generally not been growth stocks.

Defensive companies' future earnings are more likely to withstand an economic downturn, due to low business risk and not excessive financial risk. Defensive stocks' returns are not as susceptible to changes in the market, as they represent stocks with low systematic risk.

Cyclical companies' sales and earnings heavily influenced by aggregate business activity, due to high business risk and sometimes high financial risk as well. Cyclical stocks experience high returns in up markets, low returns in down markets. They are stocks with high betas.

Speculative companies invest in assets involving great risk, but with the possibility of great gain as they have very high business risk. Speculative stocks have the potential for great percentage gains and losses. They may be firms whose current price-earnings ratios are very high.

Growth stocks will have positive earnings surprises and above-average risk adjusted rates of return because the stocks are undervalued. Value stocks appear to be undervalued for reasons besides earnings growth potential. They usually have low P/E ratio or low ratios of price to book value.

### **Theory of Valuation**

The value of a financial asset is the present value of its expected future cash flows. The inputs required for valuation are:

- (a) The stream of expected future returns, or cash flows,



(b) The required rate of return on the investment.

### **Stream of Expected Returns (Cash Flows):**

Depending on the investment, returns can be in the form of:

- Earnings
- Dividends
- Interest payments
- Capital appreciation

The time period and growth rate of returns are important. This essentially means when the cash flows from the investment will be received.

### **Capital Asset Pricing Model**

A technique that can be used to estimate the cost of equity is the capital asset pricing model approach. The capital asset pricing model explain the behaviour of security prices and provides a mechanism whereby investors could assess the impact of a proposed security investment on their overall portfolio risk and return. CAPM formally describes the risk-required return trade off for securities. The capital asset pricing model describes the relationship between the required rate of return, or the cost of equity capital and the non-diversifiable or relevant risk of the firm.

### **Required Rate of Return:**

This is determined by the risk of an investment and available returns in the market. Therefore, this is determined by:

- (i) The real risk-free rate of return, plus
- (ii) The expected rate of inflation, plus
- (iii) A risk premium to compensate for the uncertainty of returns

Sources of uncertainty, and therefore risk premiums, vary by the type of investment.

### **Investment Decision Process:**

Once the expected (intrinsic) value is calculated, the investment decision is rather straightforward and intuitive:

- If Estimated Value > Market Price, buy
- If Estimated Value < Market Price, do not buy

The particulars of the valuation process vary by type of investment.

### **Valuation of Alternative Investments**

We will consider the valuation of two important types of investments:

- (a) The valuation of bonds
- (b) The valuation of common stock

### **Valuation of Bonds**

The cash flows for Bond are typically fixed:

- (a) Interest payments, for example, every six months equal to one-half of: (Coupon rate x Face value).
- (b) The payment of principal (Face or par value) at maturity.

Discount at the required rate of return to find the bond's value. The process made relatively easy with a financial calculator or spreadsheet software. For this the discounting rate will be different from what is used for equity shares. One of the options for discounting could be the Corporate Bond Yield or GSec Bond Yield of equivalent tenure published by agencies like Reuter.



### Approaches to Common Stock Valuation

There are a number of methods when it comes to common stock valuation. They are given below:

1. Discounted Cash Flow Techniques:
  - Present value of Dividends (DDM)
  - Present value of Operating Cash Flow
  - Present value of Free Cash Flow
2. Relative valuation techniques:
  - Price-earnings ratio (P/E)
  - Price-cash flow ratios (P/CF)
  - Price-book value ratios (P/BV)
  - Price-sales ratio (P/S)
  - Sales to EBIDTA Ratio
  - Market Value to EBIDTA Ratio

#### Discounted Cash Flow Techniques

This is based on the basic valuation model: the value of a financial asset is the present value of its expected future cash flows:

$$V_j = \sum CF_t / (1+k)^t$$

The different discounted cash flow techniques consider different cash flows and also different appropriate discount rates.

#### Dividend Discount Models:

Simplifying assumptions help in estimating present value of future dividends:

$$V_j = \sum D_t / (1+k)^t$$

Can also assume various dividends for a finite period of time with a reselling price, and simply calculate the combined present value of the dividends.

Alternative dividend assumptions:

Constant Growth Model:

- Assumes dividends started at  $D_0$  (last year's dividend) and will grow at a constant growth rate
- Growth will continue for an infinite period of time
- The required return ( $k$ ) is greater than the constant rate of growth ( $g$ )

$$V = D_1 / (k-g)$$

where  $D_1 = D_0(1+g)$

The growth rate can be estimated from past growth in earnings and dividends, using the sustainable growth model. The discount rate would consider the systematic risk of the investment (beta).

Valuation with Temporary Supernormal Growth:

If you expect a company to experience rapid growth for some period of time:

- (a) Find the present value of each dividend during the supernormal growth period separately.



- (b) Find the present value of the remaining dividends when constant growth can be assumed.
- (c) Find the present value of the remaining dividends by finding the present value of the estimate obtained in step 2.

#### Present Value of Operating Cash Flows:

Another discounted cash flow approach is to discount operating cash flows. Operating cash flows are pre-interest cash flows, so the required rate of return would be adjusted to incorporate the required returns of all investors (use the WACC)

$$V_{Fj} = \sum OCF_t / (1+WACC_j)^t$$

If we further assume a growth rate of  $g_{OCF}$  for operating cash flows, we can value the firm as:

$$V_{Fj} = OCF_t / (WACC_j - g_{OCF})$$

#### Present Value of Free Cash Flow to Equity:

A third discounted cash flow technique is to consider the free cash flows of a firm available to equity as the cash flow stream to be discounted. Since this is an equity stream, the appropriate discount rate is the required return on equity:

$$V_{sj} = \sum FCF_t / (1+k_j)^t$$

Once again, if we want constant growth in free cash flows, this expression reduces to the following:

$$V_{sj} = FCF_t / (k_j - g_{FCF})$$

#### Relative Valuation Techniques:

These techniques assume that prices should have stable and consistent relationships to various firm variables across groups of firms:

- (a) Price-Earnings Ratio
- (b) Price-Cash Flow Ratio
- (c) Price-Book Value Ratio
- (d) Price-Sales Ratio

#### Price – Earnings Ratio:

The Price-Earnings ratio, popularly known as P/E ratio, is affected by two variables:

1. Required rate of return on its equity ( $k$ )
2. Expected growth rate of dividends ( $g$ )

$$P/E_1 = \frac{D_1/E}{k-g}$$

Look at the relationship between the current market price and expected earnings per share over the next year. The ratio is the earnings multiplier, and is a measure of the prevailing attitude of investors regarding a stock's value.

Using the P/E approach to valuation:

1. Estimate earnings for next year
2. Estimate the P/E ratio (Earnings Multiplier)
3. Multiply expected earnings by the expected P/E ratio to get expected price

$$V = E_1 \times (P/E)$$

**Price - Cash Flow Ratio:**

Cash flows can also be used in this approach, and are often considered less susceptible to unwarranted adjustment. The steps are similar to using the P/E ratio.

$$V = CF_1 \times (P/CF)$$

**Price-Book Value Ratio:**

Book values can also be used as a measure of relative value. The steps to obtaining valuation estimates are again similar to using the P/E ratio.

$$V = BV_1 \times (P/BV)$$

**Price-Sales Ratio:**

Finally, sales can be used in relation to stock price. There are some drawbacks, in that sales do not necessarily produce profit and positive cash flows. The advantage is that sales are also less susceptible to unwarranted adjustment. However, assumptions for determination of projected sales needs to be with an approach toward near certainty. The steps are similar to using the P/E ratio.

$$V = S_1 \times (P/S)$$

**Examples:**

$$\text{Expected Return} = r = (\text{Div}_1 + P_1 - P_0) / P_0$$

**Illustration 9.**

If Modern Electronics is selling for ₹100 per share today and is expected to sell for ₹110 one year from now, what is the expected return if the dividend one year from now is forecasted to be ₹5.00?

**Solution:**

$$\text{Expected Return} = r = (5 + 110 - 100) / 100 = 0.15$$

The formula can be broken into two parts:

Dividend Yield + Capital Appreciation

$$\text{Expected Return} = r = (\text{Div}_1 / P_0) + [(P_1 - P_0) / P_0]$$

Here  $P_1 - P_0$  represents capital appreciation

**Capitalisation Rate** can be estimated using the perpetuity formula, given minor algebraic manipulation.

$$\text{Capitalisation Rate} = P_0 = [\text{Div}_1 / (r - g)]$$

$$r = (\text{Div}_1 / P_0) + g$$

$$\text{Dividend Yield} = \text{Div}_1 / P_0$$

$$\text{Return on Equity} = \text{ROE} = \text{EPS} / \text{Book Value per share}$$

**Dividend Discount Model** - Computation of today's stock price which states that share value equals the present value of all expected future dividends.

$$i = n$$

$$P_0 = \sum [\text{Div}_i / (1+r)^i]$$

$$i = 1$$

$$i = \text{the time horizon of the investment.}$$

**Illustration 10.**

Current forecasts are for XYZ Company to pay dividends of ₹3, ₹3.24, and ₹3.50 over the next three years, respectively. At the end of three years you anticipate selling your stock at a market price of ₹94.48. What is the price of the stock given a 12% expected return?

**Solution:**

$$PV = \frac{3.00}{(1+0.12)^1} + \frac{3.24}{(1+0.12)^2} + \frac{3.50+94.48}{(1+0.12)^3}$$

$$PV = ₹75.$$

If we forecast no growth, and plan to hold out stock indefinitely, we will then value the stock as PERPETUITY.

$$\begin{aligned} \text{Perpetuity} &= P_0 = (\text{Div}_1 / r) \\ &= \text{EPS}_1 / r = [\text{Assumes all earnings are paid to shareholders}] \end{aligned}$$

**Constant Growth DDM** - A version of the dividend growth model in which dividends grow at a constant rate (Gordon Growth Model).

**Illustration 11.**

(Continued of Illustration 18.)

If the same stock is selling for ₹100 in the stock market, what might the market be assuming about the growth in dividends?

**Solution:**

$$100 = 3 / (0.12 - g)$$

$$g = 0.09$$

The market is assuming the dividend will grow at 9% per year, indefinitely.

If a firm elects to pay a lower dividend, and reinvest the funds, the stock price may increase because future dividends may be higher.

Growth can be derived from applying the return on equity to the percentage of earnings plowed back into operations.

$$g = \text{return on equity} \times \text{plowback ratio}$$

**Illustration 12.**

ABC company forecasts to pay a ₹5.00 dividend next year, which represents 100% of its earnings. This will provide investors with a 12% expected return. Instead, we decide to plow back 40% of the earnings at the firm's current return on equity of 20%. What is the value of the stock before and after the plowback decision?

**Solution:**

No Growth

$$P_0 = (5 / 0.12)$$

$$= ₹41.67$$



With Growth

$$g = 0.2 \times 0.4 = 0.08$$

$$P_0 = [3 / (0.12 - 0.08)]$$

$$= ₹ 75$$

If the company did not plowback some earnings, the stock price would remain at ₹41.67. With the plowback, the price rose to ₹75.00.

The difference between these two numbers (75.00-41.67= 33.33) is called the Present Value of Growth Opportunities (PVGO).

Free Cash Flows (FCF) should be the theoretical basis for all PV calculations.

FCF is a more accurate measurement of PV than either Div or EPS.

The market price does not always reflect the PV of FCF.

When valuing a business for purchase, always use FCF.

**Valuing a Business**

The value of a business is usually computed as the discounted value of FCF out to a **valuation horizon (H)**.

The valuation horizon is sometimes called the terminal value and is calculated like PVGO

$$PV = \frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \dots + \frac{FCF_i}{(1+r)^i} + \frac{PV_i}{(1+r)^i}$$

PV (free cash flows)

$$\frac{FCF_1}{(1+r)^1} + \frac{FCF_2}{(1+r)^2} + \dots + \frac{FCF_i}{(1+r)^i}$$

$$PV \text{ (horizon value)} = \frac{PV_i}{(1+r)^i}$$

**Illustration 13.**

Given the cash flows for Modern Manufacturing Division, calculate the PV of near term cash flows, PV (horizon value), and the total value of the firm. r = 10% and g = 6%.

	Year									
	1	2	3	4	5	6	7	8	9	10
Asset Value	10.00	12.00	14.40	17.28	20.74	23.43	26.47	28.05	29.73	31.51
Earnings	1.20	1.44	1.73	2.07	2.49	2.81	3.18	3.36	3.57	3.78
Investment	2.00	2.40	2.88	3.46	2.69	3.04	1.59	1.68	1.78	1.89
Free Cash Flow	-0.80	-0.96	-1.15	-1.39	-2.0	-2.3	1.59	1.68	1.79	1.89
EPS growth (%)	20	20	20	20	20	13	13	6	6	6

**Solution:**

$$PV \text{ (horizon value)} = \frac{1}{(1.1)^6} \left( \frac{1.59}{0.10 - 0.06} \right) = 22.4$$



$$PV (FCF) = -\frac{0.80}{1.10} - \frac{0.96}{(1.1)^2} - \frac{1.15}{(1.1)^3} - \frac{1.39}{(1.1)^4} - \frac{0.20}{(1.1)^5} - \frac{0.23}{(1.1)^6} = -3.6$$

$$\begin{aligned} PV (\text{business}) &= PV(FCF) + PV(\text{horizon value}) \\ &= -3.6 + 22.4 \\ &= ₹18.8 \end{aligned}$$

## SHARES

### Illustration 14.

Z Ltd. has an issued and paid-up capital of 50,000 shares of ₹100 each. The company declared a dividend of ₹12.50 lakhs during the last five years and expects to maintain the same level of dividends in the future. The control and ownership of the company is lying in the few hands of Directors and their family members. The average dividend yield for listed companies in the same line of business is 18%.

Calculate the value of 3,000 shares in the company.

#### Solution:

$$\text{Dividend per share} = \frac{₹12,50,000}{50,000} = ₹25$$

$$\text{Dividend yield} = 18\%$$

$$\text{Value per share} = \frac{2.5}{0.18} = ₹138.90$$

$$\text{Value of 3,000 shares} = 3,000 \text{ shares} \times ₹138.90 = ₹4,16,700.$$

### Illustration 15.

The Directors of Kamdhenu Private Ltd are planning to sell the Company. For this purpose they want you to put a value on the equity share of the Company using the methods which a prospective purchaser might apply.

The following information should be considered in valuing the shares under each method, commenting briefly on each method adopted –

1. Balance Sheet as on 31st March 2015

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets: (Tangible):	
Equity Share Capital of ₹ 10 each	2,00,000	– Land and Building	5,00,000
(b) Reserve & Surplus		– Plant and Machinery	2,75,000
– Revenue Reserve	5,95,000	– Motor Vehicles	55,000
(2) Non-Current Liabilities:		(b) Other Non-Current Assets	
Long Term Borrowings		– Preliminary Expenses	2,000
– Secured Loan against Land & Building	1,50,000	(2) Current Assets:	
(3) Current Liabilities:		(a) Inventories	1,33,000
(a) Trade Payables – Sundry Creditors	1,35,000	(b) Trade Receivables	
(b) Short Term Provision		– Sundry Debtors	1,45,000
– Provision for Taxation	45,000	(c) Cash and Cash Equivalent	15,000
Total	11,25,000	Total	11,25,000



2. **Profit/ Dividend record:** The Profit record after tax and interest but before dividends over the last five years have been as follows:

Year	2011	2012	2013	2014	2015
Profit	₹80,000	₹75,000	₹95,000	₹80,000	₹85,000

The average dividend has been ₹30,000 (gross) for the last ten years.

3. The operating budget shows that estimated after tax profit for the next year will be ₹85,000 and thereafter it is estimated that this will increase by 5% p.a over the next four years.

4. In the light of recent developments in the field of financial reporting, the Company has had its Fixed Assets valued by an independent expert whose report discloses the following values – Land & Building - ₹6,10,000, Plant & Machinery- ₹2,88,000, Motor Vehicles - ₹1,02,000.

5. A study of three public companies in the same market as Kamdhenu Private Ltd shows that the average dividend yield and price earning ratio of these over last three years have been -

Year	Abhilasha Ltd		Ninder Ltd		Sanju Ltd	
	Dividend Yield %	P/E Ratio	Dividend Yield %	P/E Ratio	Dividend Yield %	P/E Ratio
2009	17.00	8.00	17.00	8.50	16.50	9.00
2010	17.00	8.00	15.00	9.00	17.00	10.00
2011	17.00	9.00	18.00	10.00	17.50	11.50
Average	17.00	8.33	16.70	9.17	17.00	10.17

6. One of the Directors has indicated that after tax cost of capital is now 17½%. The estimated net cash flow of the Company after taking into consideration taxation and capital expenditure over next five years in order to achieve/ and as a result of, the five years profit plan, are as follows:

Year	2016	2017	2018	2019	2020
CF (₹)	1,00,000	1,20,000	1,40,000	10,000	1,50,000

Another Director is of the view that profitability be measured at 12 ½% on Tangible Capital and 17 ½% on Intangible Capital.

**Solution:**

**1. Net Assets Method**

Particulars	₹	₹
Land and Building (at revalued amount)		6,10,000
Plant and Machinery (at revalued amount)		2,88,000
Motor Vehicles (at revalued amount)		1,02,000
Stock in trade (at Balance Sheet Value)		1,33,000
Sundry Debtors (at Balance Sheet Value)		1,45,000
Cash at Bank (at Balance Sheet Value)		15,000
Total Assets		12,93,000
Less: Outside Liabilities		
Secured Loans	(1,50,000)	
Sundry creditors	(1,35,000)	
Provision for Taxation	(45,000)	3,30,000
Net Tangible Assets		9,63,000
Number or Equity Shares		20,000
Value per Equity Share (₹9,63,000 ÷ 20,000)		48.15

## 2. Dividend Yield Method

a. Actual Dividend Rate of the Company = Average Dividend ÷ Paid Up Capital = ₹30,000 ÷ ₹2,00,000	15.00%
b. Average Industry Dividend Rate = (17% + 16.70% + 17%) ÷ 3	16.90%
c. Value per Equity Share = (Face Value x Actual Yield) / Industry Dividend Rate = (₹10 x 15.00%) ÷ 16.90%	8.88

## 3. PE Multiple Method (based on Projected Earnings)

**Note:** Industry Average PE Ratio = (8.33 + 9.17 + 10.17) / 3 = 9.22 times

Year	Profit after Tax	Weights*	Product
2016	₹85,000	5	4,25,000
2017	85,000 x 1.05 = ₹89,250	4	3,57,000
2018	89,250 x 1.05 = ₹93,713	3	2,81,139
2019	93,713 x 1.05 = ₹98,399	2	1,96,798
2020	98,399 x 1.05 = ₹1,03,319	1	1,03,319
Total	₹4,69,681	15	13,63,256
a. Average Profits (Simple/ Weighted)	4,69,681 ÷ 5 = ₹93,936		13,63,256 ÷ 15 = ₹90,884
b. Number of Equity Share	20,000 shares		20,000 shares
c. Projected Earnings per Share	₹4.70		₹4.54
d. Value per Share (on PE Multiple) = Co' EPS x Industry average PE Ratio	₹4.70 × 9.22 times = ₹43.33		₹4.54 × 9.22 = ₹41.86

**Note:**

- Also, PAT for the year ending on the B/s date i.e 2015 can be taken as a Future Earning Capacity i.e at ₹85,000. Hence, EPS = ₹4.25 and Value per share = ₹4.25 x 9.22 times = ₹39.19.
- Higher weightage is give to the near future years than far further future years.

## 4. Projected Earnings Capitalization Method

Particulars	Simple Average	Weighted Average
a. Projected Earnings (PAT) of the Company	₹93,936	₹90,884
b. Normal Rate of Return of the Industry = 1 ÷ PE Ratio	(1 ÷ 9.22) = 10.85%	(1 ÷ 9.22) = 10.85%
c. Capitalized Value of Projected Earnings (a ÷ b)	₹8,65,770	₹8,37,641
d. Value per share = (c ÷ 20,000 Shares)	₹43.29	₹41.88

**Note:** The valuation under PE Multiple and Earnings Capitalization Method (at 10.85%) is effectively the same. The difference is due to rounding – off aspect in calculations.

## 5. Discounted Cash Flow Method

Year	PVF at 17.5%	Cash Flows	Present Value
2016	0.85	₹1,00,000	₹85,000
2017	0.72	₹1,20,000	₹86,400
2018	0.62	₹1,40,000	₹86,800
2019	0.52	₹10,000	₹5,200
2020	0.45	₹1,50,000	₹67,500
2021 onwards (See Note below)	0.45	₹1,50,000 ÷ 10.85% = ₹13,82,488	₹6,22,120
Present Value of Future Cash Flows till perpetuity			₹9,53,020
Value per Share [₹9,53,020 ÷ 20,000 shares]			₹47.65



**Note:**

- Cash Flows of Year 2020 ₹1,50,000 are assumed to continue till perpetuity. Hence, it is divided by the Industry Normal Rate of Return, to estimate the cash flows till perpetuity. These are discounted to the present value, to ascertain the total discounted cash flows.
- Cash Flows of year 2019 is not in tune with the other years. This may be because of Capital Expenditure proposed during the year. In the absence of information of Capital Expenditure, no adjustment has been made.

**6. Summary of Value per Share**

Method	Value per Share	Remarks
1. Net Assets Method	₹48.15	Reports the Fair Values of assets available to Equity Shareholders. Provides basis for negotiating prices
2.Dividend – Yield Method	₹8.88	Suitable only for purchase of small lots and not for acquisition of controlling interest.
3. Earnings – Yield (PE Multiple)		
(a) On Simple Average	₹43.33	Recognizes market / industry expectations and the
(b) On Weighted Average	₹41.86	Company's future performance. However, weighted average
(c ) On B/s Year Profits	₹39.19	Based calculations are more appropriate.
4. Earnings Capitalization Method		
(a) On Simple Average	₹43.29	Only a variant of the PE Multiple method. Weighted Average
(b) On Weighted Average	₹41.88	Based calculations are more appropriate.
5. Discounted Cash Flows	₹47.65	Most suited for acquisition of controlling interest.

**Illustration 16.**

The Balance Sheet of Shyam Traders Ltd as on 31.12.2014 is as follow –

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital (₹100 each)		(a) Fixed Assets	
(i) 4,500 Equity Shares	4,50,000	(i) Tangible Assets:	
(ii) 1,500 6% Preference Shares	1,50,000	– Freehold Properties	3,75,000
(b) Reserve & Surplus		– Plant and Machinery	1,50,000
– P & L Account	7,50,000	(ii) Intangible Assets:	
(2) Non-Current Liabilities:		– Goodwill	1,50,000
Long Term Borrowings - 5% Debenture	3,00,000	(b) Non-Current Investments	
(3) Current Liabilities:		– Quoted (Return 10% on cost)	3,00,000
(a) Trade Payables – Sundry Creditors	2,39,250	(2) Current Assets:	
		(a) Inventories	2,70,000
		(b) Trade Receivables	
		– Sundry Debtors	2,99,250
		(c) Cash and Cash Equivalents	3,45,000
Total	18,89,250	Total	18,89,250

Profits for the three years 2012, 2013, 2014 after charging the debenture interest but before providing for Preference Dividend, were ₹2,20,500, ₹3,22,500 and ₹2,40,000 respectively.

Preference Shares are payable on Liquidation.

The purchaser wants to acquire all the 4,500 Equity Shares.

The price for Equity Shares is to be based on the following assumptions –

- Normal return of 12% on Net Asset (at revised valuation) attributable to Equity Shares.
- Goodwill to be calculated at 4 times the adjusted average super profits of the 3 years referred above.
- Debentures will be redeemed at a discount of 25% prior to the sale of the business; and in order to provide fund for this purpose, investments will be sold out.
- Value of Freehold Property is agreed to be ascertained on the basis 8% return. The current rental value is ₹50,400.
- A claim of ₹8,250 was omitted to be provided in the year 2014.
- Market Value of Quoted Investments was ₹3,75,000.
- Non-recurring profits are to be eliminated. 10% of the profits for 2013 referred to above arose from a transaction of non- recurring nature.
- A Provision of 5% on Sundry Debtors was made in 2014 is no longer required (the provision when made was taken into account for purpose of Income Tax at 50%)

Prepare a valuation for the Company's Shares (from the point of view of the purchaser) after taking into account the revised values and valuation of goodwill based on 4 years purchase of super profits based on the average profits of the three years.

#### Solution:

#### 1. Computation of Future Maintainable Equity Earnings

Particulars	2012	2013	2014
Profit After Tax	2,20,500	3,22,500	2,40,000
Less: Non- recurring Expenditure (10% x 3,22,500)	--	(32,250)	--
Claims unaccounted, now accounted	--	--	(8,250)
Add: Provision for Bad Debts not required (2,99,250 x 5/95)	--	--	15,750
Less: Tax Provision at 50% on the above (15,750 -8,250) x 50%	--	--	(3,750)
Adjusted Profits after Tax	2,20,500	2,90,250	2,43,750
Average Profits (2,20,500 +2,90,250+2,43,750)÷3			2,51,500
Add: Interest on Debentures (No Longer Payable) (₹3,00,000 x 5% x 50%) (after tax)			7,500
Less: Income from Investments (No Longer receivable) (₹3,00,000 x 10% x 50%) (after tax)			(15,000)
Future Maintainable Profits before Preference Dividend			2,44,000
Less: Preference Dividend			(9,000)
Future Maintainable Equity Earnings			2,35,000

#### Note:

- Sundry Debtors as per B/s reflects the net balance after deducting 5% provision. Since Net Debtors of ₹2,99,250 reflect 95% of the Total Debtors Amount, Provision = ₹2,99,250 x 5/95 = ₹15,750.
- Simple Average is taken due to fluctuating / oscillating trend of profits.

**2. Computation of Capital Employed**

Particulars	₹	₹
Freehold Property (Capitalization of Rental Value of ₹50,400 at 8%)		6,30,000
Plant & Machinery		1,50,000
Stock		2,70,000
Sundry Debtors [ $₹2,99,250 \div (100\% - \text{Provision at } 5\%)$ ]		3,15,000
Bank [Balance 345 + Investment Sale 375 – Debenture Redemption 225]		4,95,000
Total Assets		18,60,000
Less: Outside Liabilities (excluding Equity Shareholders' Funds)		
Sundry Creditors [ $₹2,39,250 + \text{Unaccounted Claim of } ₹8,250$ ]	2,47,500	
Preference Shareholders [Share Capital + Dividend Due]	1,59,000	
Additional Tax Liability due to unaccounted claim & provision w/back	3,750	(4,10,250)
Net Worth of Equity Share Holders on B/s date		14,49,750

**Note:**

- Since Normal Return is 12% on the Net Assets available to Equity Shares (given), Future Maintainable Equity Earnings should be compared with the Expected Equity Earnings. Hence, Net Worth of Equity Shareholders (i.e. after deducting Preference Shareholders dues) is considered.
- Goodwill in the Balance Sheet should not be considered for computing net worth for Goodwill computation.
- Redemption value of debentures = face Value ₹3,00,000 – 25% Discount = ₹2,25,000

**3. Computation of Super profits and Goodwill**

Particulars	₹
Future Maintainable Equity Earnings	2,35,000
Less: Normal Earnings = Normal Return x Capital Employed = $12\% \times 14,49,750$	(1,73,970)
Super Profit i.e., Excess Earnings available for Equity Shareholders	61,030
Goodwill at 4 years purchase of Super Profits = $₹61,030 \times 4 \text{ years}$	2,44,120

**Note:** Alternatively, Average Capital Employed can be considered as Proxy for Future Capital Employed to determine normal earnings.

**4. Valuation of Shares**

Particulars	₹
a. Net Worth attributable to Equity Holders (calculated above)	14,49,750
b. Goodwill	2,44,120
c. Total Net Assets of Equity Shareholders	16,93,870
d. Number of Equity Shares	4,500 shares
e. Value per Equity Share	₹376.42

**Illustration 17.**

The Balance Sheet of Govinda Ltd as at 31st March is given below-

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) 5,000 Equity Shares of ₹100 each	5,00,000	(i) Tangible Assets:	
(ii) 3,000 12% Preference Shares of ₹100	3,00,000	— Land and Building	3,20,000
(b) Reserve & Surplus		— Plant and Machinery (9,40,000 – Acc Depn 4,80,000)	4,60,000
(i) General Reserve	3,00,000	(b) Non-Current Investments	
(ii) P&L Account (1,20,000 b/f +4,80,000 CY Profit – 2,40,000 Prov for Tax)	3,60,000	— 6% Govt. Securities (at cost)	1,60,000
(2) Current Liabilities:		(c) Other Non-Current Assets	
(a) Trade Payables – Sundry Creditors	2,10,000	— Preliminary Expenses	60,000
(b) Short Term Provision		(2) Current Assets:	
(i) Provision for Taxation	2,40,000	(a) Inventories	4,50,000
		(b) Trade Receivables	
		— Book Debts	3,80,000
		(c) Cash and Cash Equivalents	80,000
Total	19,10,000	Total	19,10,000

The face value of the Government Securities is ₹2,00,000. The current Year profit reported in the Balance Sheet includes income from such Government Securities. Stock in Trade reported in Balance Sheet is taken at 90% of Market value.

The shares of the Company are not quoted on the Stock Exchange. A provision exists in the Articles of Association of the Company that in cases where any existing shareholder desires to transfer his holdings to another person, it should be done at a fair market value to be fixed by the Statutory Auditor of the Company. One of the shareholders desiring to transfer his holdings to X, an outsider, refers the matter of determination of the fair market value of shares to you, as the Statutory Auditor.

Indicate how you will proceed to determine such a value, based on the following additional information:

1. The Company's prospects in the near future appear good.
2. Land value is understated by ₹4,00,000. Buildings have suffered a further depreciation of ₹2,00,000.
3. Market Value of Plant and Machinery is ₹5,40,000.
4. Companies doing similar business as that of Govinda Ltd show a market return of 12% on Capital Employed.
5. Profits over the prior 3 years period have been increasing at the rate of ₹50,000 per annum.
6. It has always been the Company's practice to value stock at market prices.



**Solution:**

**1. Computation of Future Maintainable Profits**

Particulars	₹
Profit as per Profit & Loss Account	4,80,000
Less: Investment Income (₹2,00,000 x 6%)	(12,000)
Net Adjusted Profit Before Tax	4,68,000
Less: Tax Provision at 50% (See Note)	(2,34,000)
Adjusted Profit after Tax	2,34,000

**Note:**

- Tax Rate = Tax Provision as per books ÷ Profit as per books = ₹2,40,000 ÷ ₹4,80,000 = 50%.
- It is assumed that 90% of Market Value is lower than cost of stock. Since the Company has been valuing its stock at market prices, it is assumed that no further adjustment is considered necessary in this case.

We are informed that the profits (assumed as PBT) of the last 3 years have been increasing at ₹50,000 per annum. Presuming the trend of ₹50,000 increase in PBT to continue, profit after tax will increase by ₹25,000 [₹50,000 – 50%], and the expected profit of the next three years and their average will be –

Future Year	Expected PAT	Weights	Weight × PAT
Year 1	2,34,000 + 25,000 = 2,59,000	3	₹7,77,000
Year 2	2,59,000 + 25,000 = 2,84,000	2	₹5,68,000
Year 3	2,84,000 + 25,000 = 3,09,000	1	₹3,09,000
	Total	6	₹16,54,000
Weighted Average Profits = ₹16,54,000 ÷ 6			₹2,75,667
Less: Preference Dividend (₹3,00,000 x 12%)			(₹36,000)
Equity Earnings			₹2,39,667

**2. Computation of Proxy Trading Capital Employed (based on Closing Capital Employed)**

Particulars	₹	₹
Land & Buildings- Book Value	3,20,000	
Add: Increase in Value of Land	4,00,000	
Less: Decrease in Value of Building	(2,00,000)	5,20,000
Plant & Machinery		5,40,000
Book Debts		3,80,000
Stock in Trade (at Market Value) i.e. ₹4,50,000 x 100/90		5,00,000
Cash and Bank Balances		80,000
Total Assets		20,20,000
Less: External Liabilities		
Trade Creditors	2,10,000	
Provision for Taxation	2,40,000	(4,50,000)
Less: Preference Capital		(3,00,000)
Capital Employed as at 31st March (year-end)		12,70,000

**Note:** Stock is taken at Realizable Value, i. e., Market Value. In the B/s, it has been taken at 90% only.

### 3. Computation of Goodwill

Particulars	₹
a. Capitalised Value of Future Maintainable Profits i.e ₹2,39,667 ÷ 12%	19,97,225
b. Capital Employed on Balance Sheet Date	12,70,000
c. Excess attributed to Goodwill (a-b)	7,27,225

### 4. Computation of value per Share on Net Assets Basis

Particulars	₹
a. Capital Employed on Balance Sheet date	12,70,000
b. Goodwill as calculated above	7,27,225
c. Non- Trade Investments at Cost	2,00,000
d. Net Assets available to Equity Shareholders (a+b+c)	21,97,225
e. Number of Equity Shares	5,000 Shares
f. Value per Equity Share based on Net Assets (d ÷ e)	₹439.45

Assuming Equity Shares are valued at Par if yielding 12% Return on Total Capital Employed, value per share is —

Particulars	₹
Future Maintainable Profit for Equity Shareholders (as computed above)	2,39,667
Add: Non- trade Income (after Tax) (2,00,000 x 6% x 50%)	6,000
Total Equity Earnings	2,45,667
Total Value Attributable to Equity Shareholders (computed above)	21,97,225
Actual Yield on Equity Capital Employed (245667 ÷ 2197225)	11.18%
Value per Share = Par Value x Actual Yield ÷ Expected Yield = ₹100 x 11.18% ÷ 12%	₹93.17

### 6. Summary of Value per Share under different methods

Particulars	₹
a. Value per Share under Net Assets method	439.45
b. Value per Share under Yield method	93.17
c. Fair Value per Share = (₹439.45 + ₹93.17) ÷ 2	266.31

### Illustration 18.

The Summarized Balance Sheet of Amway Private Ltd as on 31.03.2016 is as under-

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) Equity Share of ₹ 10 each	5,00,000	(i) Tangible Assets:	
(ii) 9% Preference Shares of ₹10 each fully paid up	2,00,000	— Leasehold Properties (1,60,000 – Depn 70,000)	90,000
(b) Reserve & Surplus		— Plant and Machinery (2,50,000 – Depn 25,000)	2,25,000
(i) General Reserve	1,00,000	(ii) Intangible Assets:	
(ii) P&L Account	2,20,250	— Goodwill	1,75,000



(2) Current Liabilities:		(b) Non-Current Investments	4,00,000
(a) Short Term Borrowings - Bank Loan	1,00,000	(2) Current Assets:	
(b) Trade Payables – Sundry Creditors	49,750	(a) Inventories	82,500
		(b) Trade Receivables	
		– Sundry Debtors	40,500
		(c) Cash and Cash Equivalents	1,57,000
Total	11,70,000	Total	11,70,000

A holder of 10,000 of the Equity Shares in the company has agreed to sell these shares at a value based on the above Balance Sheet, but subject to adjustment of the valuation of the following:

- The leasehold property was acquired on 01.04.2006 and at the Balance Sheet date the lease has a further six years to run. The cost should be written off over the term of the lease by equal annual charges. To date ₹7,000 per annum had been written off.
- In 2013-14, goods costing ₹6,000 were purchased and have been included since that date at cost in the Stock lists. The goods were valueless on the Balance Sheet date.
- An expense Creditor ₹3,750 of the current year has been omitted from being recorded in the books.
- A General Reserve of 10% on total Debtors, after specific provision for Doubtful Debts, has been made for the First time in the current year accounts.
- Goodwill is to be valued at three years' purchase of the average Profits, after the above adjustments, of three years 2013-14; 2014-15; and 2015-16, such profits being those available for dividend for Equity shareholders.
- The profits of the company as shown by the accounts before appropriations and before providing for preference dividends were as follows – 2013-14 ₹80,400; 2014-15 ₹92,900; 2015-16 ₹89,650.

You are required to compute the total consideration due to the Vending Shareholder.

**Solution:**

**1. Future Maintainable Profits**

Particulars	2013-14	2014-15	2015-16
Profits as given	80,400	92,900	89,650
Add: Lease Charges debited in P&L A/c	7,000	7,000	7,000
Less: Equal Lease Amortization (1,60,000 ÷ 16 Years)	(10,000)	(10,000)	(10,000)
Less: Obsolete and Valueless Closing Stock (assuming it lost value on B/S date)			(6,000)
Less: Unrecorded Expense			(3,750)
Add: General Reserve on Total Debtors (40,500 x 10% ÷ 90%)			4,500
Adjusted Profits	77,400	89,900	81,400
Average Adjusted Operating Profits = (77,400 + 89,900 + 81,400) ÷ 3			82,900
Less: Preference Dividends (8% of ₹2,00,000)			(16,000)
Equity Earnings = Future Maintainable Earnings			66,900
Goodwill = 3 x Average Profit ₹66,900			2,00,700

**Notes:**

- In the absence of tax rates, tax effects are ignored on the above adjustments.
- Loss in value of stock is assumed to have taken place during the last financial year.
- General Reserve on Bad Debts has been reversed, assuming the same will not be provided in the future. Alternatively, if it is assumed that it will be continued in the future, the same may be added back to the Average Profits.



## 2. Capital Employed (based on Closing Balance Sheet)

Particulars	₹
Goodwill	2,00,700
Leasehold Property (1,60,000 Less Amortization for 10 years 10,000 x 10)	60,000
Plant and Machinery (at Balance Sheet value)	2,25,000
Investments at Cost (Assuming to be Trade Investments)	4,00,000
Stocks at Cost (82,500 – 6,000 Valueless stock)	76,500
Sundry Debtors (40,500 + Reversal of Reserve 4,500)	45,000
Balance at Bank	1,57,000
Sundry Creditors (49,750 + Expense Creditors 3,750)	(53,500)
Bank Loan	(1,00,000)
Preference Capital	(2,00,000)
Equity Capital Employed	8,10,700
No. of Equity Shares	50,000
Value per Share	₹16.214

### Illustration 19.

Following are the information of two companies for the year ended 31st March, 2016:

Particulars	Company A	Company B
Equity Shares of ₹ 10 each	8,00,000	10,00,000
10% Pref. Shares of ₹ 10 each	6,00,000	4,00,000
Profit after tax	3,00,000	3,00,000

Assume the Market expectation is 18% and 80% of the Profits are distributed.

- (i) What is the rate you would pay to the Equity Shares of each Company?
  - (a) If you are buying a small lot.
  - (b) If you are buying controlling interest shares.
- (ii) If you plan to Invest only in preference shares which company's preference shares would you prefer?
- (iii) Would your rates be different for buying small tot, if the company 'A' retains 30% and company 'B' 10% of the profits?

**[Note:** A control premium is an amount that a buyer is sometimes willing to pay over the current market price of a publicly traded company in order to acquire a controlling share in that company.]

### Solution:

**(I) (a) Buying a small lot of equity shares:** If the purpose of valuation is to provide data base to aid a decision of buying a small (non-controlling) position of the equity of the companies, dividend capitalisation method is most appropriate. Under this method, value of equity share is given by:

$$\frac{\text{Dividend per share}}{\text{Market capitalisation rate}} \times 100$$

$$\text{Company A : } ₹ \frac{2.4}{18} \times 100 = ₹ 13.33$$



$$\text{Company B: } ₹ \frac{2.08}{18} \times 100 = ₹ 11.56$$

**(b) Buying controlling interest equity shares:** If the purpose of valuation is to provide data base to aid a decision of buying controlling interest in the company, EPS capitalisation method is most appropriate. Under this method, value of equity is given by:

$$\frac{\text{Earning per share(EPS)}}{\text{Market capitalisation rate}} \times 100$$

$$\text{Company A: } ₹ \frac{3}{18} \times 100 = ₹ 16.67$$

$$\text{Company B: } ₹ \frac{2.6}{18} \times 100 = ₹ 14.44$$

(ii) Preference Dividend coverage ratios of both companies are to be compared to make such decision.

Preference dividend coverage ratio is given by:

$$\frac{\text{Profit after tax}}{\text{Preference Dividend}} \times 100$$

$$\text{Company A: } ₹ \frac{3,00,000}{60,000} = 5 \text{ times}$$

$$\text{Company B: } ₹ \frac{3,00,000}{40,000} = 7.5 \text{ times}$$

If we are planning to invest only in preference shares, we would prefer shares of B Company as there is more coverage for preference dividend.

(iii) Yes, the rates will be different for buying a small lot of equity shares, if the company 'A' retains 30% and company 'B' 10% of profits.

The new rates will be calculated as follows:

$$\text{Company A: } ₹ \frac{2.1}{18} \times 100 = ₹ 11.67$$

$$\text{Company B: } ₹ \frac{2.34}{18} \times 100 = ₹ 13.00$$

#### Working Notes:

##### 1. Computation of earning per share and dividend per share (companies distribute 80% of profits)

Particulars	Company A	Company B
Profit after tax	3,00,000	3,00,000
Less: Preference dividend	60,000	40,000
Earnings available to equity shareholders (A)	2,40,000	2,60,000
Number of Equity Shares (B)	80,000	1,00,000
Earning per share (A/B)	3.0	2.60
Retained earnings 20%	48,000	52,000
Dividend declared 80% (C)	1,92,000	2,08,000
Dividend per share (C/B)	2.40	2.08



## 2. Computation of dividend per share (Company A retains 30% and Company B 10% of profits)

Earnings available for Equity Shareholders	2,40,000	2,60,000
Number of Equity Shares	80,000	1,00,000
Retained Earnings	72,000	26,000
Dividend Distribution	1,68,000	2,34,000
Dividend per share	2.10	2.34

### Illustration 20.

The Balance Sheet of Ganguram Industries Ltd as at 31st December 2015 was as under –

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) Equity Share of ₹ 10 each		(i) Tangible Assets:	
— ₹10 paid up per share	3,00,000	— Building	2,00,000
— ₹5 paid up per share	2,00,000	— Plant and Machinery	4,00,000
(ii) 9% Preference Shares Capital (₹100)	1,00,000	(2) Current Assets:	
(b) Reserve & Surplus	3,00,000	(a) Inventories	2,50,000
(2) Current Liabilities:		(b) Trade Receivables	
(a) Trade Payables – Sundry Creditors	2,00,000	— Sundry Debtors	2,10,000
		(c) Cash and Cash Equivalents	40,000
Total	11,00,000	Total	11,00,000

Profit and Dividend in the last several years were as under:

Year	Profit	Equity Dividend
2013	₹2,20,000	12%
2014	₹2,50,000	15%
2015	₹3,20,000	18%

Land and Buildings are worth ₹4,00,000. Managerial remuneration is likely to go up by ₹20,000 p.a. Income-Tax may be provided at 50%. Equity Shares of Companies in the same industry with a dividend rate of 10% are quoted at par. Ignore Goodwill value depreciation adjustment for revaluation and the need of transfer to General Reserve.

Find the most appropriate value of an Equity Share assuming that-

- Controlling interest is transferred;
- Only a few shares are to be transferred.

**Solution:**

### 1. Computation of Future Maintainable Profits

Year	PBT	Weights	Product (₹)
2013	₹2,20,000	1	2,20,000
2014	₹2,50,000	2	5,00,000
2015	₹3,20,000	3	9,60,000
Total		6	16,80,000



Weighted Average Profits ( $\text{₹}16,80,000 \div 6$ )	2,80,000
Less: Additional Managerial Remuneration payable	(20,000)
Net Adjusted Profits before Tax	2,60,000
Less: Tax Expense at 50%	(1,30,000)
Net Adjusted Profits after Tax, but before Preference Dividend	1,30,000
Less: Preference Dividend ( $\text{₹}1,00,000 \times 9\%$ )	(9,000)
Future Maintainable PAT available for Equity Shareholders	1,21,000

**Notes:**

- It is assumed that the Profits given in the Question are Profits before Tax.
- Since Profits show an increasing trend, weighted average is more appropriate. Hence, more weights are assigned to the profits of the most recent years.
- Instead of assigning weights, Linear Trend Equation may be formed and the future profits for some years (say 3-5 years) estimated on the basis of the equation, and average of such profits be taken for determining Profits available for Equity Shareholders.

**2. Valuation of Shares under Earnings Capitalization Method**

Particulars	₹
Future Maintainable Profits for Equity Shareholders	1,21,000
Capitalized Value of Equity (Maintainable Profit $\div$ Normal Return) i.e. $1,21,000 \div 10\%$	12,10,000
Add: Notional Call on Partly Paid Shares ( $\text{₹}5 \times 40,000$ Shares)	2,00,000
Total Value of Equity	14,10,000
Total Number of Equity Shares	
a. Fully Paid Share = $\text{₹}3,00,000 \div \text{₹}10 = 30,000$ Shares;	70,000 shares
b. Partly Paid Shares = $\text{₹}2,00,000 \div \text{₹}5 = 40,000$ Shares	
Value per Fully Paid Share [Adjusted Equity Value $\div$ Total No. of Shares]	₹20.14
Value per Partly Paid Share [ $\text{₹}20.14 - \text{₹}5$ unpaid]	₹15.14

**Note:**

- Unpaid amount on partly paid-up shares is assumed to be called in the near future. In the absence of specific information, additional income on Notional Calls, is ignored.
- Normal Rate Return is assumed to Post Tax Expectation.

**3. Valuation of Shares under Net Asset Method**

Particulars	₹
Buildings (Revalued Amount)	4,00,000
Plant & Machinery	4,00,000
Sundry Debtors	2,10,000
Stock in Trade	2,50,000
Cash and Bank	40,000
Total Assets	13,00,000
Less: External Liabilities - Sundry Creditors	2,00,000
Net Assets	11,00,000
Less: Preference Share Capital	1,00,000



Net Assets Attributable to Equity Shareholders	10,00,000
Add: Notional Call on Shares	2,00,000
Adjusted Net Assets Attributable to Equity Shareholders	12,00,000
Number of Equity Shares (Fully Paid + Partly Paid) as calculated above	70,000 Shares
Value per Fully Paid Share (₹12,00,000 ÷ 70,000)	₹17.14
Value per Partly Paid Share (₹17.14 – Notional Call of ₹5)	₹12.14

#### 4. Summary of value per Share for Controlling Acquisition

Particulars	Fully Paid Share	Partly Paid Share
a. Earnings Capitalization Method	₹20.14	₹15.14
b. Net Assets Method	₹17.14	₹12.14
c. Fair Value (Average of the above)	$(20.14 + 17.14) \div 2 = ₹18.64$	$(15.14 + 12.14) \div 2 = ₹13.64$

#### 5. Computation of Value per Share for Small Lot Acquisition

Year	Dividend Rate	Weights	Product
2013	12%	1	12%
2014	15%	2	30%
2015	18%	3	54%
Total		6	96%
Weighted Average Dividend Rate (96% ÷ 6)			16%
Value per Share for Small Lot Acquisition = (Paid Up Value per Share x Company's Dividend Rate) ÷ Market Dividend Rate			
For Fully Paid Up Share: (₹10 x 16%) ÷ 10%			₹16.00
For Partly Paid Up Share: (₹5 x 16%) ÷ 10%			₹8.00

#### Note:

When small shareholders acquire shares based on dividend expectation, shares are to be valued only on basis of paid up value of shares since, generally, dividends are declared only on the paid up value of shares and not on the notional full value of shares. Here, merely reducing the value of a fully paid share by unpaid amount is not appropriate. Students should carefully observe the distinction in valuation principles between majority acquisition and small lot buying.

#### Illustration 21.

The following is the Balance Sheet of N Ltd. as on 31st March, 2016:

#### Balance Sheet

Equity and Liability	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) 4,00,000 Equity Share of ₹ 10 each	40,00,000	(i) Tangible Assets:	
(ii) 13.5% Redeemable Preference Shares of ₹100 each fully paid up	20,00,000	— Building	24,00,000



(b) Reserve & Surplus		– Machinery	22,00,000
(i) General Reserve	16,00,000	– Furniture	10,00,000
(ii) P&L Account	3,20,000	– Vehicles	18,00,000
(2) Non-Current Liabilities:		(ii) Intangible Assets:	
Long Term Borrowings		– Goodwill	4,00,000
– Secured Loan against Fixed Assets	12,00,000	(b) Non-Current Investments	16,00,000
(3) Current Liabilities:		(c) Other Non-Current Assets	
(a) Trade Payables		– Preliminary Expenses	2,00,000
– Sundry Creditors	6,00,000	(2) Current Assets:	
– Bills Payable	31,00,000	(a) Inventories	11,00,000
		(b) Trade Receivables	
		– Sundry Debtors	18,00,000
		(c) Cash and Cash Equivalents	3,20,000
Total	1,28,20,000	Total	1,28,20,000

**Further information:**

- (i) Return on capital employed is 20% in similar businesses.
- (ii) Fixed assets are worth 30% more than book value. Stock is overvalued by ₹1,00,000, Debtors are to be reduced by ₹20,000. Trade investments, which constitute 10% of the total investments, are to be valued at 10% below cost.
- (iii) Trade investments were purchased on 1.4.2015. 50% of non-Trade Investments were purchased on 1.4.2014 and the rest on 1.4.2013. Non-Trade Investments yielded 15% return on cost.
- (iv) In 2013-2014 new machinery costing ₹2,00,000 was purchased, but wrongly charged to revenue. This amount should be adjusted taking depreciation at 10% on reducing value method.
- (v) In 2014-2015 furniture with a book value of ₹1,00,000 was sold for ₹60,000.
- (vi) For calculating goodwill two years purchase of super profits based on simple average profits of last four years are to be considered. Profits of last four years are as under: 2012-2013 ₹16,00,000, -2013-2014 ₹18,00,000, 2014-2015 ₹21,00,000, 2015-2016 ₹22,00,000.
- (vii) Additional depreciation provision at the rate of 10% on the additional value of Plant and Machinery alone may be considered for arriving at average profit.

Find out the intrinsic value of the equity share. Income-tax and Dividend tax are not to be considered.

**Solution:**

**Calculation of intrinsic value of equity shares of N Ltd.**

**1. Calculation of Goodwill**

- (i) Capital employed

Fixed Assets	₹	₹
Building	24,00,000	
Machinery (₹22,00,000 + ₹1,45,800)	23,45,800	
Furniture	10,00,000	
Vehicles	18,00,000	
	75,45,800	



Add: 30% increase	22,63,740	
	98,09,540	
Trade investments (₹16,00,000 x 10% x 90%)	1,44,000	
Debtors (₹18,00,000 - ₹20,000)	17,80,000	
Stock (₹11,00,000 - ₹1,00,000)	10,00,000	
Bank balance	3,20,000	1,30,53,540
Less: Outside liabilities		
Bank Loan	12,00,000	
Bills payable	6,00,000	
Creditors	31,00,000	49,00,000
Capital employed		81,53,540

**(ii) Future maintainable profit****Calculation of average profit**

	2012-13 (₹)	2013-14 (₹)	2014-15 (₹)	2015-16 (₹)
Profit given	16,00,000	18,00,000	21,00,000	22,00,000
Add: Capital expenditure of machinery charged to revenue	--	2,00,000	--	--
Loss on sale of furniture	--	--	40,000	--
	16,00,000	20,00,000	21,40,000	22,00,000
Less: Depreciation on machinery		20,000	18,000	16,200
Income from non-trade investments		1,08,000	2,16,000	2,16,000
Reduction in value of stock				1,00,000
Bad debts Adjusted profit				20,000
Adjusted profit	16,00,000	18,72,000	19,06,000	18,47,800

Total adjusted profit for four years (2012-2013 to 2015-2016)	72,25,800
Average profit (₹72,25,800/4)	18,06,450
Less: Depreciation at 10% on additional value of machinery (22,00,000 + 1,45,800) x 30/100 i.e. ₹ 7,03,740	70,374
Adjusted average profit	17,36,076

**(iii) Normal Profit**

(20% on capital employed i.e. 20% on ₹ 81,53,540) = ₹16,30,708

**(iv) Super profit**

Expected profit - normal profit (₹17,36,076 - ₹ 16,30,708) = ₹ 1,05,368

**(v) Goodwill**

2 years' purchase of super profit ₹ 1,05,368 x 2 = ₹ 2,10,736

**2. Net assets available to equity shareholders**

	₹	₹
Goodwill as calculated in 1(v) above		2,10,736
Sundry fixed assets		98,09,540
Trade and Non-trade investments		15,84,000
Debtors		17,80,000
Stock		10,00,000
Bank balance		3,20,000
		1,47,04,276
Less: Outside liabilities		
Bank loan	12,00,000	
Bills payable	6,00,000	
Creditors	31,00,000	49,00,000
Preference share capital		20,00,000
Net assets for equity shareholders		78,04,276

**3. Valuation of equity shares**

$$\text{Value of equity share} = \frac{\text{Net assets available to equity shareholders}}{\text{Number of equity shares}}$$

$$= \frac{\text{₹}78,04,276}{4,00,000} = \text{₹}19.51$$

**Note :**

1. Depreciation on the overall increased value of assets (worth 30% more than book value) has not been considered. Depreciation on the additional value of only plant and machinery has been considered taking depreciation at 10% on reducing value method while calculating average adjusted profit.
2. Loss on sale of furniture has been taken as non-recurring or extraordinary item.
3. It has been assumed that preference dividend has been paid till date.

**Illustration 22.**

The Capital Structure of M/s XYZ Ltd., on 31st March, 2016 was as follows:

	₹
Equity Capital (18,000 Shares of ₹100 each)	18,00,000
12% Preference Capital 5,000 Shares of ₹100 each	5,00,000
12% Secured Debentures	5,00,000
Reserves	5,00,000
Profit earned before Interest and Taxes during the year	7,20,000
Tax Rate	40%

Generally the return on equity shares of this type of Industry is 15%.

Subject to:

- (a) The profit after tax covers Fixed Interest and Fixed Dividends at least 4 times.



(b) The Debt Equity ratio is at least 2;

(c) Yield on shares is calculated at 60% of distributed profits and 10% of undistributed profits;

The Company has been paying regularly an Equity dividend of 15%.

The risk premium for Dividends is generally assumed at 1%.

Find out the value of Equity shares of the Company.

**Solution:**

Calculation of profit after tax (PAT)	₹	₹
Profit before interest & tax (PBIT)		7,20,000
Less: Debenture interest (₹ 5,00,000 x 12/100)		60,000
Profit before tax (PBT)		6,60,000
Loss: Tax @ 40%		2,64,000
Profit after tax (PAT)		3,96,000
Less: Preference dividend	60,000	
Equity dividend	2,70,000	3,30,000
Retained earnings (undistributed profit)		66,000

**Calculation of Interest and Fixed Dividend Coverage**

$$= \frac{\text{PAT} + \text{Debenture interest}}{\text{Debenture interest} + \text{Preference dividend}}$$

$$= \frac{₹ 3,96,000 + 60,000}{₹ 60,000 + 60,000}$$

$$= \frac{₹ 4,56,000}{₹ 1,20,000} = 3.8 \text{ times}$$

**Calculation of Debt Equity Ratio**

Debt Equity Ratio

$$= \frac{\text{Debt (long term loans)}}{\text{Equity (shareholder's funds)}}$$

$$= \frac{\text{Debentures}}{\text{Preference share capital} + \text{Equity share capital} + \text{Reserves}}$$

$$= \frac{₹ 5,00,000}{₹ 5,00,000 + 18,00,000 + 5,00,000}$$

$$\text{Debt Equity Ratio} = \frac{₹ 5,00,000}{₹ 28,00,000} = 0.179$$

The ratio is less than the prescribed ratio.

### Calculation of Yield on Equity Shares

Yield on equity shares is calculated at 60% of distributed profits and 10% of undistributed profits:

60% of distributed profits (60% of ₹2,70,000)	1,62,000
10% of undistributed profits (10% of ₹66,000)	6,600
	1,68,600

$$\text{Yield on shares} = \frac{\text{Yield on shares}}{\text{Equity share capital}} \times 100 = \frac{\text{₹1,68,600}}{\text{₹18,00,000}} \times 100 = 9.37\%$$

### Calculation of Expected Yield on Equity Shares

Normal return expected	15%
Add: Risk premium for low interest and fixed dividend coverage (3.8 < 4)	1%*
Risk for debt equity ratio not required	Nil **
	16%

Value of an Equity Share

$$= \frac{\text{Actual yield}}{\text{Expected yield}} \times \text{Paid up value of share}$$

$$= \frac{9.37}{16} \times 100 = ₹ 58.56$$

\* When interest and fixed dividend coverage is lower than the prescribed norm, the riskiness of equity investors is high. They should claim additional risk premium over and above the normal rate of return. Hence, the additional risk premium of 1% has been added.

\*\* The debt equity ratio is lower than the prescribed ratio that means outside funds (Debts) are lower as compared to shareholders' funds. Therefore, the risk is less for equity shareholders. Therefore, no risk premium is required to be added in this case.

## 7.3 VALUATION OF INTANGIBLES-COPYRIGHTS, GOODWILL AND BRANDS

### Intangible Assets

Intangible assets include a wide array of assets ranging from intellectual property rights like brand, patents and trademarks to goodwill. The accounting standards vary across intangible assets.

In case of specifically identifiable intangibles, the cost associated with obtaining of intangibles like patents, copyrights, trademarks, etc. can be identified

In accordance with the provisions of Ind AS 38 recognition of an item as an intangible asset requires an entity to demonstrate that the item meets:

- the definition of an intangible asset as stated in paragraphs 8 to 17 of Ind AS 38 – Intangible assets; and
- the recognition criteria as stated in paragraphs

An intangible asset shall be recognised if, and only if:



(c) it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity; and

(d) the cost of the asset can be measured reliably.

An entity shall assess the probability of expected future economic benefits using reasonable and supportable assumptions that represent management's best estimate of the set of economic conditions that will exist over the useful life of the asset.

An entity uses judgement to assess the degree of certainty attached to the flow of future economic benefits that are attributable to the use of the asset on the basis of the evidence available at the time of initial recognition, giving greater weight to external evidence.

An intangible asset shall be measured initially at cost.

### Patents

A patent gives the holder the exclusive right to produce, use and sell a product or process without interference or infringement from others.

**Cost of patent:** If purchased from an inventor, the cost will include the purchase price plus any legal fees to successfully protect the patent. If any additional legal fees occur after the acquisition of a patent to successfully defend the right of the patent should also be capitalized. The cost of a patent should be amortized over the legal life or the useful life, whichever is shorter.

If a patent becomes worthless, the net value of the patent should be written-off as an expense or loss.

If a patent is internally developed, no cost can be capitalized. All the research and development (R&D) costs should be expensed.

Patents and Trademarks are valued differently depending on whether they are generated internally or acquired. When patents and trademarks are generated from internal research, the costs incurred in developing the assets are expensed in that period, even though the asset might have a life of several accounting periods unless the conditions prescribed under the aforesaid provisions of Ind AS 38 are satisfied. Thus, recognition of the costs of an internally developed intangible asset in balance sheet of a company is conditional and restrictive. In contrast, when an asset is acquired from an external party, including through merger and acquisition route, it is recognised as an asset.

Intangible assets have to be amortized over their respective expected lives.

### Copyrights

Copyright is a government granted right to authors, sculptors, painters, and other artists for their creations. A copyright is granted for the life of the creator plus 70 years. It gives the creator and heirs an exclusive right to reproduce and sell the artistic work or published work.

**Cost of Copyright:** If purchased, the cost includes the purchase price plus any legal fees. If developed by the owner (the creator), no cost can be assigned and capitalized.

Amortization is by Straight-line method or a unit-of-production method.

### Trademarks & Trade Names

Trademarks and trade names refer to a word, a phrase, or a symbol that distinguishes a product or an enterprise from another (i.e., company names such as IBM, Microsoft, Intel, and XEROX).

Cost is similar to that of copyrights. The owner should register at the Patent Office for 10 years life. The registration can be renewed every 10 years for unlimited times.

Amortization is over the shorter of the useful or legal life, not to exceed 40 years.



### **Leaseholds**

By signing a contract, the lessee acquires an exclusive right to use the property. Leasehold improvements denote the improvements made to the leased property.

### **Incorporation Costs**

Organization costs refer to costs associated with the formation of a corporation including fees to underwriters (for stock issuance), legal fees, promotional expenditures, etc.

### **Franchise & License**

A franchise is a contractual agreement under which the franchiser grants the franchisee the right to sell certain products or service or to use certain trade names or trademarks.

A license is a contractual agreement between a governmental body and a private enterprise to use public property to provide services.

### **Costs should be capitalized.**

Amortization is done over the shorter of the contractual life or the useful life, not to exceed 40 years.

When central or state government permits any entity to use some national property for commercial use, a Concessional Right agreement is entered upon against certain capital fees without or without usage based fees. For example, when radio spectrum is granted to telecom companies or any sea shore is licensed to a private company for developing and running ports. The one-time initial fee paid upon signing the contract is recognised as an intangible asset, and the recurring payment against usage is considered as a revenue expenditure.

### **Research and Development (R&D)**

R&D related expenditures are expensed and disclosed, if they are incurred for internal use.

Costs of R&D performed under contracts are capitalized as inventory. Income from these contracts can be recognized based on percentage-of completion or complete contract method as discussed for the long-term construction contracts.

R&D expenditures include salaries of personnel involved in R&D, costs of materials used, equipments, facilities and intangibles used in R&D activities. If equipment has an alternative usage, only the depreciation expense will be included in the R&D expense.

### **Purchased R&D and Earnings Quality**

When acquiring another company, the purchase price is allocated to tangible assets, intangibles (developed technology) and in-process R&D. The remaining will be the goodwill. The in-process R&D is expensed.

The more the purchase price is assigned to the in-process R&D, the lesser will be the amount assigned to goodwill.

This strategy can reduce future goodwill amortization expense and increase future earnings.

### **Computer Software Costs**

If the software is to be sold, most of the costs need to be expensed. Costs include designing, coding, testing, documentation and preparation of training materials. All these costs should be expensed as R & D expenses.

Costs occurred after technological feasibility of the product is established (i.e., the costs of design to suit the needs of customers) should be capitalized as an intangible asset.

Costs occurred after the software is ready for general release and production: These costs should be product costs.

### **Goodwill – Goodwill Creation**

When a business is able to earn profits at a rate higher than that at which a similar business earns, the former business is said to possess goodwill. Goodwill is, therefore, an invisible asset by the possession of which a business can enjoy super earning. Since it is invisible the goodwill is called an intangible asset. But since its existence can be felt through superior earning power it is a real asset.



There are several causes for which a business may have goodwill and some of them are:

- Possession of a large number of profitable contracts;
- Suitable nature of the business;
- Exclusive franchise;
- Protected valuable patents and trademarks;
- Suitable location of the business;
- Ideal window dressing;
- Government patronage;
- Reputability, respectability and reliability of the proprietor or partners or trustees;
- Special ability and skill of the persons in management, etc.

In case of transfer of business, separation of the partners from the business due to retirement, death, etc, assessment of the value of the business for any reason, goodwill may have to be valued.

### Valuation of Goodwill

There are various methods for valuation of goodwill of a business of which the following are of common use:

**Few years' Purchase of Average Profits Method:** Under this method goodwill is valued on the basis of an agreed number of years' purchase of the average maintainable profit. The word maintainable indicates several adjustments in respect of the factors which might have influenced abnormally the profits of the years over which the average is taken. If in any year there is an exceptional opportunity or an exceptional expense or absence of expense, the profit for the year has to be so adjusted as to get it free from such exceptional influences.

Sometimes instead of the simple average of the adjusted profits as discussed above, weighted average is taken into consideration. Weights are given to each year's profit on the consideration how each year's profit is likely to influence the future profit trend.

**Super Profits Method:** Under this method average super profit is ascertained. Goodwill is calculated at a few years' purchase of the super profit of the concern. The number of years to be taken for consideration depends upon the nature of the business, the steady or fluctuating nature of the profit and also the nature of goodwill.

First, ascertain the average capital employed during the year. For this purpose, take the total of the closing real assets of the concern as revalued (excluding the non-trading assets and goodwill already appearing in the balance sheet unless such goodwill represented the payment to the vendor).

In order to find out the average capital employed it is necessary to deduct from the above the current liabilities and 50% of the profits for the year after tax. The profit should also be excluding non-operating income, if any. The average capital employed in this way excludes the long term loans, debentures and preference shares.

The idea of capital employed is not suitable for the purpose of valuation of goodwill of an individual company where valuation is to be done to the advantage of the equity shareholders. In this case, from the above total assets we deduct the current liabilities, long term loans, preference capital, etc, also 50% of the profit for the year after excluding non-operating income and after charging interest on long term loans and debentures, preference dividend, etc.

The average capital employed is the mean of the opening and closing capitals. As we have taken the closing net assets which include the profits for the year it is necessary to deduct 50% of the profit in order to get the capital at the middle of the year. If, however, the closing net assets are after the payment of dividend or after setting aside a portion of the profit to proposed dividend account, necessary adjustments must be done so that the average capital ascertained includes only 50% of the profit after tax.

Now we calculate the normal average annual trading profit after tax, but before charging interest on debentures and long term loans and also preference dividend. From this average profit reasonable managerial remuneration



should also be deducted. The profit as obtained after the above adjustments is to be compared with the reasonable return on the average capital employed, calculated at the rate of return earned by similar businesses. If the former exceeds the latter the balance represents the super profit.

A few years' purchase of the super profit is taken as the value of goodwill.

**Annuity Method:** Under this method the basis is super profit. Let us take an example:

Suppose the super profit of a concern has been calculated at ₹50000 and it has been considered reasonable that 5 years' purchase of the super profit approximates the value of goodwill. The contention behind this is that, the purchaser of the business can expect to enjoy super profit of ₹50000 per year for the next 5 years. If this is the contention it is not reasonable that he should pay ₹ (50000× 5) or ₹250000. He should pay an amount which will give him an annuity of ₹50000 over the next 5 years at the current rate of interest. This is what is known as the annuity method of valuation of goodwill. Once the super profit is ascertained, the present value and hence the value of goodwill can be ascertained by the following formula:-

$$V = a/i[1 - (1+i)^{-n}] \text{ ,or,}$$

$$V = a/i[1 - 1/(1+i)^n]$$

Where,

V = the present value of the annuity or the value of goodwill in this case

a = the annuity or the annual super profit in this case

n = the number of years the annuity would be enjoyed

i = the rate of interest per rupee per year

**Capitalization Method:**

**Capitalization of Average Profit:** Under this method the average annual profit is to be ascertained after providing for reasonable management remuneration. This profit should be capitalized at the rate of reasonable return to find out the total value of business. Now the value of goodwill will be the total value of business minus its net assets. If, however, the net asset is greater there will be no goodwill, rather there is negative goodwill.

**Capitalization of Super Profit:** Under this method the average super profit is capitalised at a certain rate of interest and this capitalized amount becomes the value of goodwill.

**Issues in Valuation of Intangibles:**

Certain issues relating to some of the intangibles are given below:

- (a) **Patents:** jurisdictional coverage, status of registrations, breadth of patent claims, alternatives to the patented invention, risks of infringement and invalidity, and the possibility of blocking patents.
- (b) **Trade Secrets:** the reasonableness and effectiveness of measures taken to ensure secrecy; the possibility that the secret could be legitimately discovered by competitors through independent research; and if potentially patentable, the potential benefits, costs and risk of patenting versus holding the trade secret as a trade secret.
- (c) **Copyrights:** whether the copyright is for the original work, or for a particular derivative of it.
- (d) **Trademarks:** Ability to be extended to related products or services without infringing on the trademarks of others, the nature and status of any registrations, the possibility of abandonment due to non-use, and the possibility that a mark might have become generic.

**Illustration 23.**

The Balance Sheets of R Ltd. for the years ended on 31.3.2014, 31.3.2015 and 31.3.2016 are as follows:

Liabilities	31.3.2014	31.3.2015	31.3.2016
3,20,000 Equity Shares of ₹10 each fully paid	32,00,000	32,00,000	32,00,000
General Reserve	24,00,000	28,00,000	32,00,000
Profit and Loss Account	2,80,000	3,20,000	4,80,000
Creditors	12,00,000	16,00,000	20,00,000
Total	70,80,000	79,20,000	88,80,000
Assets	31.3.2014	31.3.2015	31.3.2016
Goodwill	20,00,000	16,00,000	12,00,000
Building and Machinery (Less: Depreciation)	28,00,000	32,00,000	32,00,000
Stock	20,00,000	24,00,000	28,00,000
Debtors	40,000	3,20,000	8,80,000
Bank Balance	2,40,000	4,00,000	8,00,000
Total	70,80,000	79,20,000	88,80,000

**Actual valuation were as under:**

Particulars	31.3.2011	31.3.2012	31.3.2013
Building and Machinery	36,00,000	40,00,000	44,00,000
Stock	24,00,000	28,00,000	32,00,000
Net Profit (including opening balance) after writing off depreciation and goodwill, tax provision and transfer to General Reserve	8,40,000	12,40,000	16,40,000

Capital employed in the business at market values at the beginning of 2014-2015 was ₹73,20,000, which included the cost of goodwill. The normal annual return on Average Capital employed in the line of business engaged by R Ltd. is 12½ %.

The balance in the General Reserve account on 1st April, 2013 was ₹20 lakhs.

The goodwill shown on 31.3.2014 was purchased on 1.4.2014 for ₹20,00,000 on which date the balance in the Profit and Loss Account was ₹2,40,000. Find out the average capital employed each year.

Goodwill is to be valued at 5 years purchase of super profits (Simple average method). Also find out the total value of the business as on 31.3.2016.

**Solution:****Note:**

- (i) Since goodwill has been paid for, it is taken as part of capital employed. Capital employed at the end of each year is shown.
- (ii) Assumed that the building and machinery figure as revalued is after considering depreciation.



	31.3.2014 (₹)	31.3.2015 (₹)	31.3.2016 (₹)
Goodwill	20,00,000	16,00,000	12,00,000
Building and Machinery (revalued)	36,00,000	40,00,000	44,00,000
Stock (revalued)	24,00,000	28,00,000	32,00,000
Debtors	40,000	3,20,000	8,80,000
Bank Balance	2,40,000	4,00,000	8,00,000
Total Assets	82,80,000	91,20,000	1,04,80,000
Less: Creditors	12,00,000	16,00,000	20,00,000
Closing Capital	70,80,000	75,20,000	84,80,000
Opening Capital	73,20,000	70,80,000	75,20,000
Total	1,44,00,000	1,46,00,000	1,60,00,000
Average Capital	72,00,000	73,00,000	80,00,000

**Maintainable profit has to be found out after making adjustments as given below:**

	31.3.2014 (₹)	31.3.2015 (₹)	31.3.2016 (₹)
Net Profit as given	8,40,000	12,40,000	16,40,000
Less: Opening Balance	2,40,000	2,80,000	3,20,000
	6,00,000	9,60,000	13,20,000
Add: Under valuation of closing stock	4,00,000	4,00,000	4,00,000
	10,00,000	13,60,000	17,20,000
Less: Adjustment for valuation in opening stock		4,00,000	4,00,000
	10,00,000	9,60,000	13,20,000
Add: Goodwill written-off		4,00,000	4,00,000
	10,00,000	13,60,000	17,20,000
Add: Transfer to Reserves	4,00,000	4,00,000	4,00,000
	14,00,000	17,60,000	21,20,000
Less: 12 1/2% Normal Return	9,00,000	9,12,500	10,00,000
Super Profit	5,00,000	8,47,500	11,20,000

Average super profits = (₹5,00,000 + ₹8,47,500 + ₹11,20,000) / 3 = 24,67,500/3 = ₹8,22,500

Goodwill = 5 years purchase = ₹8,22,500 x 5 = ₹41,12,500.

Total Net Assets (31/3/2016)	₹84,80,000
Less: Goodwill	₹12,00,000
	₹72,80,000
Add: Goodwill	₹41,12,500
Value of Business	₹1,13,92,500

**Illustration 24.**

Find out the average capital employed of ND Ltd. From its Balance Sheet as at 31st March, 2016:

Equity and Liability	₹ in Lakh	Assets	₹ in Lakh
(1) Shareholders Fund:		(1) Non-Current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) Equity Share Capital of ₹ 10 each	50.00	(i) Tangible Assets:	
(ii) 9% Preference Shares fully paid up	10.00	– Land and Building	25.00
(b) Reserve & Surplus		– Plant and Machinery	80.25
(i) General Reserve	12.00	– Furniture and Fixtures	5.50
(ii) Profit & Loss Account	20.00	– Vehicles	5.00
(2) Non-Current Liabilities:		(b) Non-Current Investments	10.00
Long Term Borrowings		(c) Other Non-Current Assets	
(i) 16% Debentures	5.00	– Preliminary Expenses	0.50
(ii) 16% Term Loan	18.00	(2) Current Assets:	
(iii) Cash Credit	13.30	(a) Inventories	6.75
(3) Current Liabilities:		(b) Trade Receivables	
(a) Trade Payables - Sundry Creditors	2.70	– Sundry Debtors	4.90
(b) Short Term Provision		(c) Cash and Cash Equivalents	10.40
– Provision for Taxation (Net)	6.40		
– Proposed Dividend			
Equity Shares	10.00		
Preference Shares	0.90		
Total	148.30	Total	148.30

Non-trade investments were 20% of the total investments.

Balances as on 1.4.2015 to the following accounts were:

Profit and Loss account ₹8.70 lakhs, General reserve ₹6.50 lakhs.

**Solution:****Computation of Average Capital employed**

(₹ in Lakhs)

Total Assets as per Balance Sheet		148.30
Less: Preliminary Expenses		0.50
Non-trade investments (20% of ₹ 10 lakhs)		2.00
		145.80
Less: Outside Liabilities:		
16% Debentures	5.00	
16% Term Loan	18.00	
Cash Credit	13.30	
Sundry Creditors	2.70	



Provision for Taxation	6.40	45.40
Closing Capital Employed		100.40
Capital Employed as on 31.03.2016		
Less: ½ of profit earned:		
Increase in reserve balance	5.50	
Increase in Profit & Loss A/c	11.30	
Proposed Dividend	10.90	
Profit earned during the year	27.70	
50% of Profit earned during the year i.e. 27.70 x ½		13.85
Average capital employed		86.55

**Illustration 25.**

Negotiation is going on for transfer of A Ltd. on the basis of Balance Sheet and the additional information as given below:

**Balance Sheet of A Ltd.  
As on 31st March 2016**

Equity and Liability	₹ in Lakh	Assets	₹ in Lakh
<b>(1) Shareholders Fund:</b>		<b>(1) Non-Current Assets:</b>	
(a) Share Capital		(a) Fixed Assets	
Equity Share Capital of ₹ 10 each	10,00,000	(i) Tangible Land and Building	3,00,000
(b) Reserve & Surplus	4,00,000	Plant and Machinery	8,00,000
<b>(2) Current Liabilities:</b>		(ii) Intangible - Goodwill	1,00,000
(a) Trade Payables - Sundry Creditors	3,00,000	(b) Non-Current Investments	1,00,000
		<b>(2) Current Assets:</b>	
		(a) Inventories	2,00,000
		(b) Trade Receivables – Debtors	1,50,000
		(c) Cash and Cash Equivalents	50,000
Total	17,00,000	Total	17,00,000

Profit before tax for 2015-16 amounted to ₹6,00,000 including ₹10,000 as interest on investment. However, an additional amount of ₹50,000 p.a. shall be required to be spent for smooth running of the business.

Market value of land & building and plant & machinery are estimated at ₹9,00,000 and ₹10,00,000 respectively. In order to match the above figures further depreciation to the extent of ₹40,000 should be taken into consideration. Income tax rate may be taken at 30%. Return on capital at the rate of 20% before tax may be considered as normal for this business for the present stage.

For the purpose of determining the rate of return, profit for this year after the aforesaid adjustments may be taken as expected average profit. Similarly, average trading capital employed is also to be considered on the basis of position in this year.

It has been agreed that a three years' purchase of supper profit shall be taken as the value of goodwill for the purpose of the deal.

You are requested to calculate the value of the goodwill for the company.

**Solution:****Valuation of goodwill**

Capital employed on 31st March, 2016	(Amount in ₹)	
Land & Building		9,00,000
Plant & machinery		10,00,000
Stock		2,00,000
Debtors		1,50,000
Cash & bank		50,000
Less: Sundry creditors		3,00,000
		20,00,000
Average maintainable trading profit for the year ending 31st March, 2016		
Net profit before tax		6,00,000
Less: Additional depreciation	40,000	
Less: additional recurring expenses	50,000	
Less: Non-operating income (interest on investment)	10,000	1,00,000
		5,00,000
Less: Provision for taxation @30% of ₹ 540000		1,62,000
		3,38,000
Average trading capital employed		
Closing capital employed		20,00,000
Less: 50% of average maintainable trading profit after tax		1,69,000
		18,31,000
Super Profit		
Average maintainable operating profit		3,38,000
Less: Normal profit 14% of capital employed ₹ 1831000		2,56,000
Valuation of goodwill		
Super profits	81,660	
Goodwill at 3 years purchase of super profits	2,44,980	

**Note:**

1. It has been assumed that additional depreciation arising out of revaluation of assets is not deductible for calculating provision for taxation.
2. Since tax rate is 30% and normal pre-tax rate being 20% the after tax normal rate of return will be 14%.

**Illustration 26.**

Marico Ltd. acquired 100% of Sun Ltd. for ₹ 2,000 (lacs). As on the date of acquisition, the net assets of Marico Ltd. were:



(₹ in lacs)

Tangible fixed assets	500
Brand (valued by management)	120
Net current assets	380

Compute goodwill on acquisition under the following situation:

- Ignore brand value.
- Consider brand value.

**Solution:**

- If brand value is ignored

Purchase consideration	2000
Less: net assets acquired (500+380)	880
Goodwill	1120

- If brand value is considered

Purchase consideration	2000
Less: Net assets acquired (500 + 120 + 380)	1000
Goodwill	1000

In first case above goodwill includes brand, in second case brand has been recognized separately.

In India no company has so far attempted to recognize brand separately from goodwill on acquisition. This is because of two reasons:

- Difficulty in measuring brand; and
- Absence of statutory or regulatory requirement to recognize brand separately from goodwill.

But with the growing importance of brand both nationally and internationally, many multinational companies started recognizing brand separately.

**Illustration 27.**

Given below is the Balance Sheet of Sandip Ltd as on 31.03.2016 (₹ Lakhs)

Equity and Liability	₹ in lakhs	Assets	₹ in lakhs
<b>(1) Shareholders Fund:</b>		<b>(1) Non-Current Assets:</b>	
(a) Share Capital		(a) Fixed Assets	72.00
Equity Share Capital of ₹ 10 each	50.00	(b) Non-Current Investments (Non Trade)	12.00
(b) Reserve & Surplus		<b>(2) Current Assets:</b>	
(ii) Reserve	32.00	(a) Inventories	7.80
(ii) P&L Account	3.00	(b) Trade Receivables – Sundry Debtors	6.20
<b>(2) Current Liabilities:</b>		(c) Cash and Cash Equivalent	5.20
(a) Trade Payables - Sundry Creditors	8.20		
(b) Short Term Provision - Proposed Dividend	10.00		
<b>Total</b>	<b>103.20</b>	<b>Total</b>	<b>103.20</b>

**Other Information:**

1. Profit Before Tax and Other relevant information: (₹ Lakhs)

Year	Profit Before Tax	Provision for Gratuity required	Gratuity Paid	Loss of uninsured stock
2012	42.00	2.20	--	--
2013	39.00	2.30	1.67	0.62
2014	44.00	2.50	0.32	--
2015	42.00	2.60	1.42	--
2016	37.00	2.70	0.12	--

2. Past Tax rate is 51% while Expected Tax Rate is 45%.

3. The Company wants to switch over towards maintaining gratuity provision on actuarial calculation rather than accounting on payment basis. The Company's Non- Trade Investments fetched 11%.

Find out value of Goodwill. It may be assumed that Super Profit, if any, is maintainable for 5 years. 18% should be the appropriate discount factor. Normal Rate of Return may be taken as 15%.

**Solution:****1. Computation of Future Maintainable Profits**

(₹ Lakhs)

Particulars	2012	2013	2014	2015	2016
Profit Before Tax	42.00	39.00	44.00	42.00	37.00
Less: Provision for Gratuity	(2.20)	(2.30)	(2.50)	(2.60)	(2.70)
Add: Gratuity Paid		1.67	0.32	1.42	0.12
Add: Abnormal Loss		0.62			
Adjusted Profits	39.80	38.99	41.82	40.82	34.42
Simple Average Profit (See Note below) $(39.80 + 38.99 + 41.82 + 40.82 + 34.42) \div 5$					39.17
Less : Income from Non-Trade Investments at 11% of ₹12 Lakhs					(1.32)
Adjusted Profit before Tax = Future Maintainable PBT					37.85
Less : Tax Expense at 45%					(17.03)
Adjusted Profit After Tax = Future Maintainable PAT					20.82

**Note:** Since Profits show an oscillating trend, Simple Average Profit shall be more appropriate than Weighted Average or Trend Equation Methods.

**2. Computation of Average Capital Employed**

Particulars	₹ Lakhs	
Total of Assets as per Balance Sheet		103.20
Less: Non- Trade Investments and Sundry Creditors (12.00 +8.20)		(20.20)
Closing Capital Employed		83.00
Less: 50% of Profit After Tax earned in 2016 as per Books		
PAT = PBT less Tax at 51% = 37.00 Less 51% thereon = ₹18.13 Lakhs	18.13	
50% of the above PAT for the year		(9.07)
Average Capital Employed		73.93



### 3. Computation of Goodwill

#### (a) Capitalization Method:

	(₹ Lakhs)
Expected Capital (Future Maintainable Profit ÷ NRR) = ₹20.82 Lakhs ÷ 15%	138.80
Less: Closing Capital Employed Less Proposed Dividend = 83.00-10.00	73.00
Goodwill using Capitalization Method	65.80

#### (b) Super Profit Method:

	(₹ Lakhs)
Future Maintainable Profit	20.82
Less: Normal Profit at 15% Average Capital Employed (15% of ₹73.93 Lakhs)	11.09
Super Profits	9.73
Goodwill at 5 years' purchase of Super Profits	48.65

**Note:** Alternatively Normal Profit can be computed based on Closing Capital Employed

#### (c) Annuity Method:

	(₹ Lakhs)
Super Profits	9.73
Annuity Factor for 5 years at 18%	3.127
Goodwill using Annuity Method	30.43

#### Note and Assumptions:

- Under Capitalization Method, Closing Capital is considered, whereas under Super Profit Method, Average Capital Employed is considered for calculating Normal Profits.
- Discount Rate and Normal Rate of Return given above are after tax rates.

#### Illustration 28.

The following are the summarized Balance Sheets of two Companies, R Ltd and S Ltd as on 31.03.2016

Equity and Liability	R Ltd	S Ltd	Assets	R Ltd	S Ltd
<b>(1) Shareholders Fund:</b>			<b>(1) Non-Current Assets:</b>		
(a) Share Capital			(a) Fixed Assets		
Equity Share Capital of ₹10 each	15,00,000	10,00,000	(i) Tangible Assets:	17,00,000	14,00,000
(b) Reserve & Surplus			(j) Intangible Assets:		
— Reserve	3,00,000	2,00,000	— Goodwill	2,00,000	1,00,000
<b>(2) Non-Current Liabilities:</b>			<b>(2) Current Assets:</b>	8,00,000	6,00,000
Long Term Borrowings					
- 10% Debentures	6,00,000	4,00,000			
<b>(3) Current Liabilities:</b>					
Trade Payables					
- Sundry Creditors	3,00,000	5,00,000			

Total	27,00,000	21,00,000	Total	27,00,000	21,00,000
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Additional Information:

**1. Assets are to be revalued as follows –**

Particulars	R Ltd	S Ltd
Revaluation of Tangible Block	21,00,000	12,00,000
Revaluation of Current Assets	10,00,000	4,00,000

2. Average Annual Profits for three years before charging Debenture Interest = R Ltd ₹4,50,000; S Ltd ₹3,10,000.

3. Goodwill is to be valued at three year's purchase of Average Super Profits for three years. Such average is to be calculated after adjustment of depreciation at 10% on the amount of increase/decrease on revaluation of fixed assets. In the case of S Ltd, claim of ₹10,000 which was omitted, is to be adjusted against its average profit. Income tax is to be ignored.

4. Normal profit on Capital Employed is to be taken at 12%, capital employed being considered on the basis of net revalued amount of tangible assets.

Ascertain the value of Goodwill of R Ltd and S Ltd.

**Solution:**

1. Computation of Capital Employed

Particulars	R Ltd	S Ltd
Revaluation of Tangible Block	21,00,000	12,00,000
Revaluation of Current Assets	10,00,000	4,00,000
Creditors	(3,00,000)	(5,00,000)
10% Debentures	(6,00,000)	(4,00,000)
Claim/ Expenses not recorded	--	(10,000)
Equity Capital Employed	22,00,000	6,90,000
Normal Profits (12% × Capital Employed)	2,64,000	82,800

**Note:** Equity Capital Employed and Equity Earnings are considered for purpose of determining Goodwill, since Goodwill is monetary value of residual business advantage, which includes, among many things, advantages of gearing as well.

2. Computation of Future Maintainable Profits

Particulars	R Ltd	S Ltd
Average Profits as Given	4,50,000	3,10,000
Less: Interest on Debentures [6,00,000 × 10%/4,00,000 × 10%]	(60,000)	(40,000)
Less: Claim / Expenses not recorded	--	(10,000)
Less: Depreciation on Increase in Value of Fixed Assets [(21L – 17L) × 10%]	(40,000)	--
Add: Depreciation on Decrease in value of Fixed Assets [(14 L- 12L) × 10%]	--	20,000
Equity Earnings = Future Maintainable Profits	3,50,000	2,80,000

3. Computation of Goodwill

Particulars	R Ltd	S Ltd
Future Maintainable Profits	3,50,000	2,80,000



Less: Normal Profits	(2,64,000)	(82,800)
Super Profits	86,000	1,97,200
Goodwill (Super Profits × 3 years)	2,58,000	5,91,600

**Illustration 29.**

On the basis of the following information, calculate the value of goodwill of Gee Ltd. at three years' purchase of super profits, if any, earned by the company in the previous four completed accounting years.

**Balance Sheet of Gee Ltd. as at 31st March, 2016**

Equity and Liability	₹ in Lakhs	Assets	₹ in Lakhs
<b>(1) Shareholders Fund:</b>		<b>(1) Non-Current Assets:</b>	
(a) Share Capital		(a) Fixed Assets	
(i) Equity Share Capital of ₹ 10 each	50,000	(i) Tangible Assets:	
(b) Reserve & Surplus		– Land and Building	1,850
(i) Capital Reserve	260	– Plant and Machinery	3,760
(ii) General Reserve	2,543	– Furniture and Fixtures	1,015
(iii) Surplus i.e., credit balance of Profit and Loss (appropriation) A/c	477	(i) Intangible Assets:	
<b>(2) Current Liabilities:</b>		– Goodwill	310
(a) Trade Payables - Sundry Creditors	568	– Patent and Trade Marks	32
(b) Short Term Provision		(b) Non-Current Investments	
– Provision for Taxation (Net)	750	– 9% Non Trade Investment	600
– Proposed Dividend (2014 - 2015)	22	(c) Other Non-Current Assets	
		– Preliminary Expenses	20
		<b>(2) Current Assets:</b>	
		(a) Inventories	873
		(b) Trade Receivables	
		– Sundry Debtors	614
		(c) Cash and Cash Equivalents	546
Total	9,620	Total	9,620

The profits before tax of the four years have been as follows:

Year ended 31st March	Profit before tax ₹ in lakhs
2012	3,190
2013	2,500
2014	3,108
2015	2,900

The rate of income tax for the accounting year 2011-12 was 40%. Thereafter it has been 38% for all the years so far. But for the accounting year 2015-2016 it will be 35%.

In the accounting year 2011-2012, the company earned an extraordinary income of ₹1 crore due to a special foreign contract. In August, 2012 there was an earthquake due to which the company lost property worth ` 50 lakhs and the insurance policy did not cover the loss due to earthquake or riots.

9% Non-trading investments appearing in the above mentioned Balance Sheet were purchased at par by the company on 1st April, 2013.



The normal rate of return for the industry in which the company is engaged is 20%. Also note that the company's shareholders, in their general meeting have passed a resolution sanctioning the directors an additional remuneration of ₹50 lakhs every year beginning from the accounting year 2015-2016.

**Solution:****(1) Capital employed as on 31st March, 2016 Refer to 'Note')**

Particulars	₹ in lakhs	₹ in lakhs
Land and Buildings		1,850
Plant and Machinery		3,760
Furniture and Fixtures		1,015
Patents and Trade Marks		32
Stock		873
Debtors		614
Cash and Cash Equivalents		546
		8,690
Less: Trade creditors	568	
Provision for taxation (net)	22	590
		8100

**(2) Future maintainable profit**

(₹ in lakhs)

	2011-2012	2012-2013	2013-2014	2014-2015
Profit before tax	3,190	2,500	3,108	2,900
Less: Extra-ordinary income due to foreign control	100			
Add: Loss due to earthquake		50		
Less: Income from non-trading investment			54	54
	3,090	2,550	3,054	2,846

As there is no trend, simple average profits will be considered for calculation of goodwill.

Total adjusted trading profits for the last four years = ₹ (3,090 + 2,550 + 3,054 + 2,846) = ₹11,540 lakhs

	₹ in lakhs
Average trading profit before tax = $\left( \frac{₹ 11,540 \text{ lakhs}}{4} \right)$	2,885
Less: Additional remuneration to directors	50
Less: Income tax @ 35% (approx.)	992 (Approx)
	1,843

**(3) Valuation of goodwill on super profits basis**

Future maintainable profits	1,843
Less: Normal profits (20% of ₹ 8,100 lakhs)	1,620
Super Profits	223

Goodwill at 3 years' purchase of super profits = 3 × ₹ 223 lakhs = ₹ 669 lakhs

**Note:**

In the above solution, goodwill has been calculated on the basis of closing capital employed (i.e. on 31st March, 2016). Goodwill should be calculated on the basis of 'average capital employed' and not 'actual capital



employed' as no trend is being observed in the previous years' profits. The average capital employed cannot be calculated in the absence of details about profits for the year ended 31st March, 2016. Since the current year's profit has not been given in the question, goodwill has been calculated on the basis of capital employed as on 31st March, 2016.

**Illustration 30.**

The following Balance Sheet of X Ltd. is given:

**Balance Sheet of X Ltd. as on 31st March, 2016**

Equity and Liability	₹ in lakhs	Assets	₹ in lakhs
<b>(1) Shareholders Fund:</b>		<b>(1) Non-Current Assets:</b>	
(a) Share Capital		(a) Fixed Assets	
Equity Share Capital of ₹ 10 each	50,00,000	(i) Tangible Assets	
(b) Reserve & Surplus		– Land and Building	32,00,000
P&L Appropriation Account	21,20,000	– Plant and Machinery	28,00,000
<b>(2) Current Liabilities:</b>		(ii) Intangible Assets:	
(a) Short Term Borrowings - Bank O/D	18,60,000	– Goodwill	4,00,000
(b) Trade Payables - Sundry Creditors	21,10,000	<b>(2) Current Assets:</b>	
(a) Short Term Provision - Provision for Taxation	5,10,000	(a) Inventories	32,00,000
		(b) Trade Receivables – Sundry Debtors	20,00,000
Total	1,16,00,000	Total	1,16,00,000

In 1993 when the company commenced operation the paid up capital was same. The Loss/Profit for each of the last 5 years was - years 2011-2012 - Loss (₹5,50,000); 2012-2013 ₹9,82,000; 2013-2014 ₹11,70,000; 2014-2015 ₹14,50,000; 2015-2016 ₹17,00,000;

Although income-tax has so far been paid @ 40% and the above profits have been arrived at on the basis of such tax rate, it has been decided that with effect from the year 2015-2016 the Income-tax rate of 45% should be taken into consideration. 10% dividend in 2012-2013 and 2013-2014 and 15% dividend in 2014-2015 and 2015-2016 have been paid. Market price of shares of the company on 31st March, 2016 is ₹125. With effect from 1st April, 2016 Managing Director's remuneration has been approved by the Government to be ₹8,00,000 in place of ₹6,00,000. The company has been able to secure a contract for supply of materials at advantageous prices. The advantage has been valued at ₹4,00,000 per annum for the next five years.

Ascertain goodwill at 3 year's purchase of super profit (for calculation of future maintainable profit weighted average is to be taken).

**Solution:****(I) Future Maintainable Profit**

Year	Profit (P) ₹	Weight (W)	Product (PW) ₹
2012-2013	9,82,000	1	9,82,000
2013-2014	11,70,000	2	23,40,000
2014-2015	14,50,000	3	43,50,000
2015-2016	17,00,000	4	68,00,000
		10	1,44,72,000



$$\text{Weighted average annual profit (after tax)} = \frac{\sum PW}{\sum W} = ₹ \frac{1,44,72,000}{10} = ₹ 14,47,200$$

Weighted average annual profit before tax = $\left( ₹ 14,47,200 \times \frac{100}{60} \right)$	24,12,000
Less: Increase in Managing Director's remuneration	2,00,000
	22,12,000
Add: Saving in cost of materials	4,00,000
	26,12,000
Less: Taxation @ 45%	11,75,400
Future maintainable profit	14,36,600

### (ii) Average Capital Employed

	₹	₹
Assets:		
Land and Buildings		32,00,000
Plant and Machinery		28,00,000
Stock		32,00,000
Sundry Debtors		20,00,000
		1,12,00,000
Less: Outside liabilities:		
Bank overdraft	18,60,000	
Creditors	21,10,000	
Provision for taxation	5,10,000	44,80,000
Capital employed at the end of the year		67,20,000
Add: Dividend @ 15% paid during the year		7,50,000
		74,70,000
Less: Half of the profit (after tax) for the year i.e. ₹ 17,00,000 x ½		8,50,000
		66,20,000

### (iii) Normal Profit

$$\text{Average dividend for the last 4 years} = \left( \frac{10+10+15+15}{4} \right) = 12.5\%$$

Market price of share = ₹125

$$\text{Normal rate of return} = \frac{12.5}{125} \times 100 = 10\%$$

Normal profit (10% of ₹66,20,000) = ₹ 6,62,000

### (iv) Valuation of goodwill



	₹
Future maintainable profit	14,36,600
Less: Normal profit	6,62,000
Super profit	7,74,600
Goodwill at 3 years' purchase of super profits (₹7,74,600 x 3)	23,23,800

**Illustration 31.**

Given below is the Balance Sheet as on 31st March of Khan Limited for the past three years. (Amount in ₹ 000's)

Equity and Liability	2013	2014	2015	Assets	2013	2014	2015
(1) Shareholders Fund:				(1) Non-Current Assets:			
(a) Share Capital	500	600	700	Fixed Assets			
(b) Reserve & Surplus				(i) Tangible Assets:			
(i) General Reserve	100	150	150	Gross Block	1,500	1,700	1,900
(ii) Profit & Loss Account	100	150	---	Less: Depreciation	400	500	650
(2) Non-Current Liabilities:				Net Block	1,100	1,200	1,250
Long Term Borrowings				(2) Current Assets:			
- 12% Debentures	400	600	700	(a) Inventories	250	450	500
(3) Current Liabilities:				(b) Trade Receivables			
(a) Short Term Borrowings				— Sundry Debtors	200	350	400
- Bank O/D	200	250	300	(c) Cash and Cash Equivalents	25	120	100
(b) Trade Payables							
- Sundry Creditors	100	200	400				
(c) Short Term Provision							
- Provision for Taxation	100	50	---				
- Proposed Dividend	75	120	---				
Total	1,575	2,120	2,250	Total	1,575	2,120	2,250

- The Company is going to sell its losing division for ₹5,00,000. This division caused cash loss to the extent of ₹1,00,00 in 2014-15.
- It has planned to buy a running factory for ₹7,50,000. This new addition is expected to produce 20% return before charging depreciation and interest.
- Excess amount required of the acquisition of the new factory will be taken at 16%p.a. from an Industrial Bank.

The Company decided to calculate Goodwill considering the following –

1. The Company decided to calculate Goodwill on the basis of excess cash earnings for 5 years.
2. 10% Discount Rate shall be used.
3. Goodwill will be calculated by taking cash return on capital employed. For this purpose, Weighted Average Cash Return may be computed for the years 2013 – 2014, 2014–2015 and 2015 – 2016 where as Capital Employed on 31.03.2015 may be taken up with suitable changes for replacements.
4. The industry, to which the Company belongs, returns cash at 4% of the investment.

Present Value of ₹1 at 10% for 5 years is 3.7908. You are asked to Value its Goodwill.

**Solution:**



### 1. Computation of Cash Earnings for the past years (₹ 000's)

Particulars	2013-14	2014-15
Retained Earnings (Closing Less Opening)	50	(150)
Add: Appropriation to General Reserve (Closing Less Opening)	50	--
Proposed Dividend	120	--
Provision for Tax made during the year	50	--
Current Year Profit / (Loss)	270	(150)
Add: Depreciation (Closing Accumulated Depreciation Less Opening)	100	150
Operating Profit Before Working Capital Changes	370	--
Adjustment for Working Capital Items:		
Stock	(200)	(50)
Sundry Debtors	(150)	(50)
Creditors	100	200
Previous Year Tax Liability Paid in Current Year	(100)	(50)
Cash Generated from Operating Activities	20	50

### 2. Computation of Projected Cash Earnings

Particulars	₹ 000's
Cash Earnings for Financial Year 2014-15	50
Add: Cash Loss pertaining to Division sold	100
Add: Cash earnings from New Division ( $7,50,000 \times 20\%$ )	150
Less : Interest on Loan from Industrial Bank ( $7,50,000 - 5,00,000$ ) $\times 16\%$	(40)
Projected Cash Earnings	260

### 3. Computation of Average Maintainable Profits (₹000's)

Year	Cash Earnings	Weights	Product
2013-2014	20	1	20
2014-2015	50	2	100
2015-2016	260	3	780
Total		6	900
Weighted Average		$900 \div 6$	150

### 4. Computation of Capital Employed

Particulars	₹ 000's	₹ 000's
Total Assets as at 31.03.2015	2,250	
Less: Debentures	(700)	
Bank Overdraft	(300)	
Sundry Creditors	(400)	850
Sale of Old Division:		
Sale Consideration	500	
Less: Net Assets Transferred (assumed to be taken at Book Value)	(500)	Nil
Purchase of New Division:		
Cost of Purchase	750	



Less: Cash Outflow	(500)	
Bank Borrowings	(250)	Nil
Capital Employed on Replacement		850

**5. Computation of Excess Cash Earning and Goodwill**

Particulars	₹ 000's
Future Maintainable Cash Earnings	150
Less: Normal Rate of Cash Return at 4% of Capital Employed (₹850 × 4%)	34
Excess Cash Earnings (Future Maintainable Cash Earnings – NRR)	116
Goodwill = Excess Cash Earnings x Annuity Factor for 5 years at 10% = ₹1,16,000 × 3.7908	440

**Illustration 32.**

Given – (a) Future maintainable Profit before Interest = ₹125 Lakhs; (b) Normal Rate of Return on Long Term Funds is 19% and on Equity Funds is 24%; (c) Long Term Funds of the Company is ₹320 Lakhs of which Equity Funds is ₹210 Lakhs; (d) Interest on Loan Fund is 18%. Find out leverage effect on Goodwill if tax rate = 30%.

**Solution:**

**1. Long Term Loan Funds** = Total Long term Funds Less Equity Funds = 320 – 210 = ₹110 Lakhs.

Interest at 18% thereon = ₹110 Lakhs × 18% = ₹19.80 Lakhs.

**2. Computation of Future Maintainable Profit**

(₹ Lakhs)

Particulars	Owners Funds	Total Funds
Profit Before Interest	125.00	125.00
Less: Interest on Long Loans	19.80	N.A
Future maintainable Profit before Tax	105.20	125.00
Less: Tax Expense at 30%	31.56	37.50
Future Maintainable Profits after Tax	73.64	87.50

**3. Computation of Goodwill under different approaches (₹ Lakhs)**

Particulars	Owners Funds	Total Funds
(a) Future Maintainable Profits after Tax	73.64	87.50
(b) Normal Rate of Return	24%	19%
(c) Normal Capital Employed = (a÷b)	306.83	460.52
(d) Actual Capital Employed (given)	210.00	320.00
(e) Goodwill = (c – d)	96.83	140.52

Hence, Leverage Effect on Goodwill = ₹140.52 - ₹96.83 = ₹43.69 Lakhs

**Illustration 33.**

Super Cars Ltd., is engaged in the business of manufacture of electric Passenger Cars. The Company requires you to determine the value of its goodwill also showing the leverage effect on goodwill. Its Balance Sheet is as on 31.03.2016 is as under –

Equity and Liability	(₹ Lakhs)	Assets	(₹ Lakhs)
<b>(1) Shareholders Fund:</b>		<b>(1) Non-Current Assets:</b>	
(a) Share Capital		(a) Fixed Assets	
Equity Share Capital of ₹ 10 each	1,500	(i) Tangible Assets:	
(b) Reserve & Surplus		Gross	1,500
(i) General Reserve	500	Less: Depreciation	500
<b>(2) Non-Current Liabilities:</b>		(b) Non-Current Investments	1,000
Long Term Borrowings		— Trade	300
- 12% Term Loan from Bank	500	— Non-Trade	90
<b>(3) Current Liabilities:</b>		<b>(2) Current Assets:</b>	
(a) Trade Payables - Sundry Creditors	210	(a) Inventories	350
(b) Short Term Provision		(b) Trade Receivables	
(i) Provision for Taxation	10	— Overseas Debtors (1\$ = ₹42)	420
(ii) Proposed Dividend	140	— Sundry Debtors	400
		(c) Cash and Cash Equivalents	300
Total	2,860	Total	2,860

Additional Information:

- The closing exchange rate for the U.S. dollar was INR 48. Income from Non-trade Investments was a loss for the year ended 31.03.2016 owing to write down of cost of acquisition by 4%. There was no other transaction under Non-trade Investments during the year.
- Current Year Depreciation changed on Historical Cost was ₹100 Lakhs. Current Cost of Fixed Assets is determined at ₹2,000 Lakhs.
- While Current Cost of Closing Stock is ₹367 Lakhs, that of the Opening Stock was ₹200 lakhs against its Historical Cost of ₹148 Lakhs. The Market Value of Non-Trade Investments at the yearend was ₹300 lakhs. The Overseas debtors made settlements in U.S.\$ only.
- The Industry Average rate of return on current cost of capital employed is 12% on long term debt and 15% on equity. The opening balance in General Reserve was ₹150 Lakhs. While prevailing tax rate is 30% such is expected to decline by 5%.

Using the above information you are required to arrive at value of the goodwill of the company under equity and long-term fund approached and also show the leverage effect on goodwill.

**Solution:**

### 1. Computation of Additional Depreciation Required

Particulars	₹ Lakhs
Calculation of Depreciation Rate:	
Book Value as on 31.03.2016	1,000
Add: Depreciation for 2015-16	100
Book Value as on 1.4.2015	1,100
Therefore, Depreciation Rate = Current Depreciation ÷ Opening bal. = 100 ÷ 1,100	9.09%
Calculation of Extra Depreciation on Sundry Fixed Assets:	
Current Cost of Sundry Fixed Assets as on 1.4.2015	2,000



Depreciation on Current Cost of Fixed Assets = ₹2,000 x 9.09%	181.80
Less: Depreciation already provided in the books	(100.00)
Extra Depreciation to be provided	81.80

**Note:** It is assumed that the Company charges WDV method of depreciation. Alternatively, Depreciation Rate can be determined based on SLM i.e. on Gross Value. [ $₹100/1500 = 6.67\%$ ]

## 2. Computation of Foreign Exchange Gain

Dollar Value of Debtors (₹420.00 Lakhs ÷ ₹42.00)	\$10.00 Lakhs
Exchange Gain [ $\$10.00 \text{ Lakhs} \times (\₹48.00 - 42.00)$ ]	₹60 Lakhs
Adjustment in Provision for Tax [30% of ₹60.00 Lakhs] (Additional Provision)	₹18 Lakhs

## 3. Computation of Future Maintainable Profits

Particulars	(₹ Lakhs)	
Profits for the year 2015-16:		
Increase in Reserves [₹500 Lakhs - ₹150 Lakhs]	350.00	
Proposed Dividend	140.00	490.00
Add back: Tax $\frac{\₹490.00 \text{ lakhs}}{100\% - \text{Tax Rate of } 30\%} = \text{Tax Rate of } 30\%$		210.00
Profit Before tax		700.00
Add: Forex Gain on Foreign Currency Debtors (See WN 2)		60.00
Add: Loss from Non- Trade Investments (₹300 Lakhs × 4/96)		12.50
Less: Extra Depreciation Required (See WN 1)		(81.80)
Add: Adjustment for Current Cost of Closing Stock (₹367 - ₹350)		17.00
Less: Adjustment for Current Cost of Opening Stock (₹200 - ₹148)		(52.00)
Future Maintainable Profit Before Tax		655.70
Less: Future Tax Expense at 25% (₹655.70 × 25%)		(163.93)
Future maintainable Profit After Tax		491.77
Add: Interest on Long Term Loan (after considering tax) $\₹500 \times 12\% \times (100\% - 25\%)$		45.00
Future Maintainable Profit After Tax Before Interest		536.77

Therefore, Future Maintainable Profit on: –

(a) Long Term Capital Employed (including Long term Loans) is ₹536.77 Lakhs

(b) Net Worth (Shareholders Funds) is ₹491.77 Lakhs

## 4. Computation of Capital Employed

Particulars	₹	₹
Fixed Assets (1,000 + Revaluation Gain 1,000 – Addl. Depreciation ₹81.80)		1,918.20
Investments Trade		90.00
Overseas Debtors ( $\$10.00 \text{ Lakhs} \times \₹48$ )		480.00
Indian Debtors		400.00
Stock in Trade at Current Cost		367.00
Cash and Bank Balances		300.00
Current Cost of Total Assets		3,555.20
Less: Outside Liabilities:		



Sundry Creditors	210.00	
Provision for Taxation [ 10.00 + Additional for Exchange Rate Difference 18.00]	28.00	
Proposed Dividend (See Note)	140.00	(378.00)
Capital Employed (Total Long Term Funds)		3,177.20
Less: 12% Term Loan		500.00
Equity Capital Employed		2,677.20

**Note:** Since the Proxy Capital Employed is based on Closing Balances, proposed dividend is treated as a liability. This is because, such funds will not stand invested in the business in the future, but distributed in the immediate future. Adjustments for Exchange Rate differences are assumed to be tax deductible.

### 5. Computation of Goodwill using different approaches

Particulars	Owners funds	Total Funds
a. Future Maintainable Profits	491.77	536.77
b. Normal Rate of Return	15%	12%
c. Capitalized Value of Future Maintainable Profits (a ÷ b)	3,278.47	4,473.08
d. Capital Employed	2,677.20	3,177.20
e. Goodwill (c-d)	601.27	1,295.88

### 6. Leverage Effect on Goodwill

- Goodwill computed using Equity Fund Concept (₹601.27 Lakhs), is low when compared to the Goodwill as computed using Total Long Term Funds Concept (₹1,295.88 Lakhs)
- Leverage Effect on Goodwill = ₹1,295.88 - ₹601.27 = ₹694.61

### Illustration 34.

The following is the extract from the Balance Sheets of Popular Ltd.:

Equity and Liability	As at 31/03/15	As at 31/03/16	Assets	As at 31/03/15	As at 31/03/16
<b>(1) Shareholders Fund:</b>			<b>(1) Non-Current Assets:</b>		
(a) Share Capital			(a) Fixed Assets	550	650
Equity Share Capital of ₹ 10 each	500	500	(b) Non-Current Investments		
(b) Reserve & Surplus			— 10% Investment	250	250
(i) General Reserve	400	425	<b>(2) Current Assets:</b>		
(ii) Profit & Loss Account	50	80	(a) Inventories	260	300
<b>(2) Non-Current Liabilities:</b>			(b) Trade Receivables		
Long Term Borrowings			— Sundry Debtors	170	110
(i) 18% Debentures	180	165	(c) Cash and Cash Equivalents	46	43
<b>(3) Current Liabilities:</b>					
(a) Trade Payables - Sundry Creditors	35	45			
(b) Short Term Provision					
— Provision for Taxation	11	13			



— Proposed Dividend	100	125			
Total	1,276	1,353	Total	1,276	1,353

Additional information:

- (i) Replacement values of Fixed assets were ₹1,100 lakhs on 31.3.15 and ₹1,250 lakhs on 31.3.2016 respectively.
- (ii) Rate of depreciation adopted on Fixed Assets was 5% p.a.
- (iii) 50% of the stock is to be valued at 120% of its book value,
- (iv) 50% of investments were trade investments.
- (v) Debtors on 31st March, 2016 included foreign debtors of \$35,000 recorded in the books at ₹35 per U.S. Dollar. The closing exchange rate was \$1 = ₹39.
- (vi) Creditors on 31st March, 2016 included foreign creditors of \$60,000 recorded in the books at \$1 = ₹33. The closing exchange rate was \$1 = ₹39.
- (vii) Profits for the year 2015-16 included ₹60 lakhs of government subsidy which was not likely to recur.
- (viii) ₹125 lakhs of Research and Development expenditure was written off to the Profit and Loss Account in the current year. This expenditure was not likely to recur.
- (ix) Future maintainable profits (pre-tax) are likely to be higher by 10%.
- (x) Tax rate during 2015-16 was 50%, effective future tax rate will be 40%.
- (xi) Normal rate of return expected is 15%.

One of the directors of the company Sherjahan, fears that the company does not enjoy a goodwill in the prevalent market circumstances.

Critically examine this and establish whether Popular Ltd. has or has not any goodwill.

If your answers were positive on the existence of goodwill, show the leverage effect it has on the company's result.

Industry average return was 12% on long-term funds and 15% on equity funds.

**Solution:**

**1. Future Maintainable Profit**

Particulars	₹ in Lakhs	
Increase in General Reserve	25	
Increase in Profit and Loss Account	30	
Proposed Dividends	125	
Profit After Tax		180
Pre-Tax Profit = $\frac{180}{1-0.5}$		360
Less: Non-Trading investment income (10% of ₹125)	12.50	
Subsidy	60.00	
Exchange Loss on creditors [ $\$ 0.6 \text{ lakhs} \times (\text{₹ } 39 - \text{₹ } 33)$ ]	3.60	
Additional Depredation on increase in value of Fixed Assets (current year)	30.00	106.10
$1250-650 = \left( 1250 - 650 = 600 \times \frac{5}{100} \right)$ i.e.,		
		253.90



Add: Exchange Gain on Debtors [ $\$ 0.35$ lakhs x ( $\text{₹}39 - \text{₹}35$ )]	1.40	
Research and development expenses written off	125.00	
Stock Adjustment (30-26)	4.00	130.40
		384.30
Add: Expected increase of 10%		38.43
Future Maintainable Profit before Tax		422.73
Less: Tax @ 40% (40% of ₹422.73)		169.09
Future Maintainable Profit		253.64

## 2. Calculation of Capital employed (CE)

Particulars	₹ in Lakhs	
	As on 31.3.15	As on 31.3.16
Replacement Cost of Fixed Assets	1100.00	1250.00
Trade Investment (50%)	125.00	125.00
Current cost of stock		
$130 + 130 \times \frac{120}{100}$	286.00	
$150 + 150 \times \frac{120}{100}$		330.00
Debtors	170.00	111.40
Cash-at-Bank	46.00	43.00
Total (A)	1727.00	1859.40
Less: Outside Liabilities		
18% term loan	180.00	165.00
Sundry creditors	35.00	48.60
Provision for tax	11.00	13.00
Total (B)	226.00	226.60
Capital employed (A – B)	1501.00	1632.80

Average Capital employed at current value =  $\frac{\text{CE as on 31.03.2015} + \text{CE as on 31.03.2016}}{2}$

$$= \frac{1501 + 1632.80}{2} = 1566.90 \text{ Lakhs}^*$$

\* Average capital employed can also be calculated in the following manner:

Closing capital employed as on 31.3.2016	₹1,632.80 lakhs
Less: $\frac{1}{2}$ of actual post tax profit for 2013-2016	₹90.00 lakhs
Average capital employed	₹1,542.80 lakhs

## 3. Valuation of Goodwill

### (i) According to Capitalisation of Future Maintainable Profit Method

	₹ in lakhs
--	------------



Capitalised value of Future Maintainable Profit = $\frac{253.64}{15} \times 100$	1690.93
Less: Average capital employed	1566.90
Value of Goodwill	124.03

Or

**(ii) According to Capitalisation of Super Profit Method**

	₹ in lakhs
Future Maintainable Profit	253.64
Less: Normal Profit @15% on average capital employed (1566.90 x 15%)	235.03
Super Profit	18.61
Capitalised value of super profit i.e., Goodwill	124.06

Goodwill exists; hence director's fear is not valid.

**Leverage Effect on Goodwill**

	₹ in lakhs	₹ in lakhs
Future Maintainable Profit on equity fund		253.64
Future Maintainable Profit on Long-term Trading Capital employed		
Future Maintainable Profit After Tax	253.64	
Add: Interest on Long-term Loan (Term Loan) (After considering Tax) $165 \times 18\% = 29.7 \times \frac{50}{100}$	14.85	268.49
Average capital employed (Equity approach)		1,566.90
Add – 18% Term Loan (180+165)/2		172.50
Average capital employed (Long-term Fund approach)		1739.40

**Value of Goodwill**

	₹ in lakhs	₹ in lakhs
(A) Equity Approach		
Capitalised value of Future Maintainable Profit = $\frac{253.64}{15} \times 100$		1690.93
Less: Average capital employed		1566.90
Value of Goodwill		124.03
(B) Long-Term Fund Approach		
Capitalised value of Future Maintainable Profit = $\frac{268.49}{12} \times 100$		2237.42
Less: Average capital employed		1739.40
Value of Goodwill		498.02

**Comments on Leverage effect of Goodwill:**

Adverse Leverage effect on goodwill is 373.99 lakhs (i.e., ₹498.02 - 124.03). In other words, Leverage Ratio of Popular Ltd. is low as compared to industry for which its goodwill value has been reduced when calculated with reference to equity fund as compared to the value arrived at with reference to long term fund.

**Working Notes:**

	₹ in lakhs
(1) Stock adjustment	
(i) Excess current cost of dosing stock over its Historical cost (330 – 300)	30.00
(ii) Excess current cost of opening stock over its Historical cost (286-260)	26.00
(iii) Difference [(i – ii)]	4.00
(2) Debtors' adjustment	
(i) Value of foreign exchange debtors at the dosing exchange rate (\$35,000 x 39)	13.65
(ii) Value of foreign exchange debtors at the original exchange rate (\$35,000x35)	12.25
(iii) Difference [(i – ii)]	1.40
(3) Creditors' adjustment	
(i) Value of foreign exchange creditors at the dosing exchange rate (\$60,000 x 39)	23.40
(ii) Value of foreign exchange creditors at the original exchange rate (\$60,000 x 33)	19.80
(iii) Difference [(i – ii)]	3.60

**Brand**

Brands are strategic assets. The key to survival of companies is their brands in the modern world of complex and competitive business environment. According to American Marketing association, brand means a name, term, sign, symbol or design or group of sellers and to differentiate them from those of competitors. For example, the logo and name Airtel, together represent the Brand of Airtel Ltd., a telecom company. Name Bata is by itself a brand as their name itself, written in a particular style, is their corporate logo. At times name of a product is considered as a brand name, e. g., Maggi. It conveys the noodles product of Nestle. Nestle as a company has its own separate corporate brand logo of two small birds sitting on a small nest.

Corporate Branding represents the Brand of a corporate house, e. g., Reliance Industries Ltd. has their corporate brand name as RIL with the image of a Lamp drawn in a particular style. Over and above this brand all their products have separate brand name, e. g., Vimal is the brand name of their suiting and shirting cloths.

Thus corporate branding can be taken to mean strategic exercise by managerial decision making of creating, developing, maintaining, conveying to market and monitoring the identity, image and ownership of a product etc. Brand comprises an important item in that they greatly determine the corporate market value of a firm.

Brand achieves a significant value in commercial operation through the tangible and intangible elements. Brand is that intangible assets which is acquired from outside source while acquiring business or may also be nurtured internally by a company, which are known as home grown brands. By assigning a brand name to the product, the manufacturer distinguishes it from rival products and helps the customer to identify it while going in for it.

Necessity of branding of products has increased enormously due to influence of various factors like growth of competition, increasing importance of advertising etc, attracting customer loyalty to a corporate house and its products, e. g., Tata Group, standing for unflinching quality and ethics. A powerful brand creates lasting impact on the consumers and it is almost impossible to change his / her preference even if cheaper and alternative products are available in the market, e. g., Zillet safety razors and baldes. Brands have major influence on takeover decisions as the premium paid on takeover is almost always in respect of the strong brand portfolio of the acquired company and of its long term effect on the profit of the acquiring company in the post –acquisition period.

**Brands Asset**

An asset is having following characteristics;

- (i) there must exist some specific right to future benefits or service potentials;
- (ii) rights over asset must accrue to specific individual or firm;



- (iii) there must be legally enforceable claim to the rights or services over the asset;
- (iv) asset must arise out of past transaction or event or long standing business use, practice and marking of products and corporate houses by one name and representing Logo for it.

Based on above characteristics, brands are considered as an asset. The sole purpose of establishing brand names is to incur future benefit increased sale to loyal customers increased sale price of the brand itself or the business that owns the brand. For example, if any healthcare products company wants to purchase 'Dettol' as a product, from Reckit Benckiser including its manufacturing facilities, the buyer will have to pay huge money for the brand Dettol in addition to net fair value of assets and liabilities, because of acquiring the Dettol brand which by the name itself indicates large volume of profit earning abilities

The companies with valuable brand register those names with the Patent Registration authority and are legally entitled to sole ownership and use of them. International brands held by MNCs like Pepsi or Coca Cola are registered in every country their operated their business. Brands are created through marketing efforts over time. They are the result of several past transactions and events.

### Objectives of corporate branding

Important objectives of corporate branding are as follows;

**Corporate Identity:** Brands help corporate houses to create and maintain identity for them in the market. This is chiefly facilitated by brand popularity and the eventual customer loyalty attached to the brands.

**Total Quality Management (TQM):** By building brand image, it is possible for a body corporate to adopt and practice TQM. Brands help in building lasting relationship between the brand owner and the brand user.

**Customer Preference:** Interaction between a specified group of products and services and a specified group of loyal customers creates a psychological lasting impression in the mind of those customers. Branding gives them advantage of status fulfilment.

**Market Strength:** By building strong brands, firms can enlarge and strengthen their market base. This would also facilitate programmes, designed to achieve maximum market share.

**Market Segmentation:** By creating strong brand values, companies classify market into more strategic areas on a homogeneous pattern of efficient operations. It enables firms to focus on target group of customers to meet competition.

**Quality, Governance and Ethical Values:** A corporate house wants to convey through their brand about their longstanding pursuit for quality, governance and ethical values.

### Factors that have influence on brand valuation.

Mode of valuation of brands depends on type of brands; (i) acquired or (ii) self-generated. In general method of valuation of brands depends on one or more following variables;

- Cost of acquisition of brand,
- Expenses incurred on nurturing a home grown brand,
- Earning power of the brand,
- Product life cycle,
- Separating one brand from other less important value drivers,
- Intrinsic strength of the people and process handling the brand,
- Impact of other new brands in the market,
- Accuracy in projecting the super or extra earnings offered by a brand and the rate of discounting cash flows
- Cost of withdrawing or rejecting the brand.



### Value acquired brand

A purchased brand is one, which is acquired from other existing concerns. The acquiring company may acquire only the brand names. The value of acquired brands is given below:

Brand value = Price paid for acquisition.

On the other hand, a company may acquire an existing business concern along with its brands. It happens in case of mergers and acquisitions. The sum involved in these transactions provides an indication of the financial value of brands. In this case;

Brand Value = Purchase consideration(X)- Net assets acquired(Y).

Does excess price always represent brand value? (X-Y) represents the amount of purchased goodwill but acquiring company might have paid excess price for varied factors also. Those are;

- Location of manufacturing facility and possibility to enter into new marker areas;
- Long term contracts with suppliers;
- Better manufacturing technology;
- Possible competitive advantages, benefits of scale and synergic values that can be added to existing and the new business acquired,
- Killing competition or acquiring the brand etc.

Competitive force may make the acquirer to increase the bid price thereby increasing the amount of purchased goodwill. This inseparability of brand from other intangible assets makes it difficult to value brands. In such a situation professional valuers are appointed to determine the value of any assets acquired, other than those recognised by the acquiree in their balance sheet, e. g., intangible assets like Brand(s) acquired, which is an essential necessity under the new accounting standard of Ind AS. The purchase consideration has to be first allocated, including intangibles.

### Value self- generated brands – Different methods of self-generated brands

Important methods for valuation of self-generated brands are discussed below;

- (i) Historical Cost Model: Under historical cost model actual expenses incurred in creation, maintenance and growth of corporate brands are taken into consideration. The value of corporate brands is computed as follows:

Brand Value = Brand Development Cost + Brand marketing and Distribution Cost + Brand promotion cost including advertising and other costs.

Historical cost model is applied for home-grown brands in most of the cases for which various costs like development costs, marketing costs, advertising and general communication costs etc. are incurred. However, the total advertisement costs cannot be regarded as incurred for brand. Further, several heavily advertised brands show hardly any value or presence. This is a simple method as it depends on actual cost but it fails to explain the impact of brand value on the profitability of the firm.

- (ii) Replacement Cost Model: Under replacement cost model brands are valued at the costs which would be required to recreate the existing brands. The method is based on the assumption that the existing brands can be recreated exactly by new brands. It is the opportunity cost of investment made for the replacement of the brand.

Brand Value = Replacement Cost of Brand.

- (iii) Market Price Model: Probable value that a company would fetch by selling its brand is taken as the value of the brand. Brand value is given by:

Brand Value = Net realisable value

As there is no readymade market for many brands, the value is only assumed one. Although the method



determines the value from seller's point of view, the actual value is determined on the basis of expected benefit to be derived by the purchaser by purchasing the brand.

(iv) Present Value Model:

According to present value model, the value of a brand is the sum total of present value of future estimated flow of brand revenues for the entire economic life of brand plus the residual value attached to the brand. The model is also called Discounted Cash Flow model which has widely been used by considering the year wise revenue attributable to the brand over a period of 5,8 or 10 years. The discounting rate is the weighted average cost of capital. The residual value is estimated on the basis of a perpetual income, assuming that such revenue is constant or increased at a constant rate.

$$\text{Brand value} = \frac{R_t}{(1+r)^t} + \frac{\text{Residual value}}{(1+r)^N}$$

Where,  $R_t$  = Anticipated revenue in year t, attributable to the brand

r = Discounting rate

**Residual value beyond year N**

Brands supported by strong customer loyalty, may be visualised as a kind of an annuity. Great care must be taken to estimate as much correctly as possible, the future cash flow likely to be generated from a strongly positioned specific brand. A realistic present value of a particular brand having strong loyalty of customers can be obtained from summation of discounted values of the expected future incomes from it.

DCF model for evaluating brand values has got three sources of failure; (i) anticipation of cash flow; (ii) choice of period and (iii) discounting rate.

**Illustration 35.**

The following data is given to you regarding a company having a share in branded portion as well as unbranded portion;

Branded revenue	₹ 500 per unit
Unbranded revenue	₹ 120 per unit
Branded cost	₹350 per unit
Unbranded cost	₹100 per unit
Research & Development	₹20 per unit
Branded products	1 lakh unit
Unbranded Products	40,000 units
Tax rate is 39.55%; capitalization factor 18%	

Calculate the brand value.

**Solution:**

The net revenue from the branded product = (revenue-cost) × Quantity sold

$$= (\text{₹}500 - \text{₹}350) \times 100,000$$

$$= \text{₹}1,50,00,000$$

Net revenue from the unbranded product

$$= (\text{₹}120 - \text{₹}100) \times 40,000$$

$$= \text{₹}8,00,000.$$



PAT for branded product

$$= (1,50,00,000 - 28,00,000) \times (1 - 0.3955)$$

$$= (1,22,00,000)(0.6045)$$

$$= ₹73,74,900$$

Brand value = Returns / Capitalization rate = ₹73,74,900/0.18

$$= ₹409,71,666$$

### **Brand valuation needed – Steps in valuation of a brand**

#### **Measurement of Brand valuation is needed for:**

- (i) Accounting purpose
- (ii) Business valuation and transactional purposes
- (iii) Brand management purposes

#### **Various companies find brand valuation helpful for the followings:**

- (i) Making decisions on business investments;
- (ii) Measuring the return on brand investment based on brand value to arrive at an ROI that can be directly compared with other investments;
- (iii) Allocating marketing expenditures according to the benefit each business unit derives from the brand asset;
- (iv) Organizing and optimizing the use of different brands in the business;
- (v) Managing a portfolio of brands across a variety of markets;
- (vi) Assessing fair transfer prices for the use of brands in subsidiary companies;
- (vii) Determining brand royalty rates for optimal exploitation of the brand asset through licensing the brand to third parties;
- (viii) Capitalizing brand assets on the balance sheet according to US GAAP, IAS in compliance with country specific accounting standards, whenever needed.

#### **Steps in Valuation of Brand:**

- (i) Market segmentation: Brands influence customer choice, but the influence varies depending on the market in which brand operates. For valuation we need to split brand's market into non-overlapping and homogeneous groups of consumers according to applicable criteria such as product or service, distribution channels, consumption patterns, purchase sophistication, geography existing and new customers and so on. The brand is valued in each segment and the sum of the segments constitutes the total value of the brand.
- (ii) Financial analysis: Identify and forecast revenue and earnings from intangibles generated by the brand for each of the distinct segments determined in step-1. Intangibles earnings are defined as brand revenue less operating costs, applicable taxes and a charge for the capital employed. The concept is similar to the economic profit.
- (iii) Demand analysis: Assess the role that the brand plays in driving demand for products and services in the markets in which it operates and determine what proportion of intangible earning is attributable to the brand measured by an indicator referred to as the "role of branding index". The role of branding index represents the percentage of intangible earnings that are generated by the brand. Brand earnings are calculated by multiplying the role of branding index by intangible earnings.
- (iv) Competitive benchmarking: Determine the competitive strengths and weaknesses of the brand to derive the specific brand discount rate that reflects the risk profile of its expected future earnings. This comprises extensive competitive benchmarking and a structured evaluation of the brand's market, stability, leadership position,



growth trend, support geographic footprint and legal protect ability.

- (v) Brand value measurement: Brand value is the net present value (NPV) of the forecast brand earnings, discounted by the brand discount rate. The NPV calculation comprises both the forecast period and the period beyond, reflecting the ability of brands to continue generating future earnings.

This computation is useful for brand value modelling in a wide range of situations, viz.,

- Predicting the effect of marketing and investment strategies;
- Determining and assessing communication budgets;
- Calculating the return on brand investment;
- Focus it as an icon of quality and customer loyalty;
- Assessing opportunities in new or unexpected markets; and
- Tracking brand value management and its consequential effect on business value and overall corporate image

### **Ingredient Brand**

An ingredient brand, as the name implies is an element of a product with an identifiable brand identity. The host product includes the ingredient product.

The element or the ingredient brand enhances the value of the product and mostly used as a label or icon on the main product. The idea is to convey to the customers that they are getting a quality, trustworthy product. Ingredient branding helps increase awareness and easily connects with wide-ranging consumers.

### **Difference between In Branding and Co-Branding**

Ingredient Branding, also known as In Branding differs from Co Branding. In Branding, a new product can exist individually from the ingredient brand, while in Co Branding, the two brands unite resulting in a unique product, which does not exist if either separates.

### **Examples of ingredient brands**

- Intel Inside branding of PCs (The Intel Inside program started in 1991)
- Microsoft Mediaroom – Microsoft's IPTV platform
- NutraSweet in soft drinks
- GE's Ecomagination
- Dolby noise reduction in stereos
- Honda Civic Sedan with XM Satellite radio
- Techron in Chevron gasoline
- Teflon in cookware
- Gore-Tex in outerwear and ski apparel
- Sainsbury with brand ambassador Jamie Oliver
- Smart phones with Android OS
- Siri-powered iPhone 4S
- 3M brand used in various products
- Swarovski with Play Bling as its authorized retail brand partner in China
- Vibram rubber soles in many leading shoe brands



- Chiquita banana in Beechnut baby foods
- Smucker's Jam – Kellogg's pop tarts

**Illustration 36.**

RS Ltd. furnishes the following information relating to the previous three years, and requests you to compute the value of the brand of the Company —

[₹ in Lakhs]

Particulars	2014	2015	2016
Profits Before Interest and Tax	75.00	85.25	150.00
Loss on Sale of Assets	3.00	---	18.00
Non Operating Income	12.00	7.25	8.00

Inflation was 9% for 2015 and 15% for 2016. If the capitalization factor considering internal and external value drivers to the brand is 14, determine the brand value. Assume an all inclusive future tax rate of 35%.

**Solution:**

[₹ in Lakhs]

Particulars	2014	2015	2016
Profits Before Interest and Tax	75.00	85.25	150.00
Add: Loss on Sale of Assets	3.00	---	18.00
Less: Non Operating Income	(12.00)	(7.25)	(8.00)
Branded Earnings	66.00	78.00	160.00
Inflation Adjustment Factor	1.09 × 1.15 = 1.25	1.15	1.00
Inflation Adjusted Earnings as at 31.03.2016	82.50	89.70	160.00
Weights	1	2	3
Product	82.50	179.40	480.00
Weighted Average Earnings Before Tax [(82.50 + 179.40 + 480)/(1+2+3)]			123.65
Less: Taxes at 35%			(43.28)
Weighted Average Brand Earnings After Tax			80.37
Capitalization Factor			14
Brand Value			₹1125.18 Lakhs

**Illustration 37.**

The following financial share data pertaining to TECHNO LTD an IT company is made available to you:

Year ended March 31st	2016	2015	2014
EBIT (₹)	696.03	325.65	155.86
Non-branded Income (₹)	53.43	35.23	3.46



Inflation compound factor @ 8%	1.000	1.087	1.181
Remuneration of Capital	5% of average capital employed		
Average capital Employed (₹)	1112.00		
Corporate Tax Rate	35%		
Capitalization Factor	16%		

You are required to calculate the Brand Value for Techno Ltd.

**Solution:**

**TECHNO LTD.**  
**Computation of Brand Value**

(Amount in ₹ Crores)

Year ended March 31st	2016	2015	2014
EBIT	696.03	325.65	155.86
Less : Non-brand income	53.43	35.23	3.46
Adjusted Profits	642.60	290.42	152.40
Inflation Compound Factor @ 8%	1.000	1.087	1.181
Present Value of Profits for the brand	642.60	315.69	179.98
Weight age Factor	3	2	1
Weight age Profits	1927.80	631.38	179.98
Weight Average Profits = $\frac{1927.80 + 631.38 + 179.98}{3 + 2 + 1}$	456.53		
Remuneration of Capital [5% of Average capital employed] (i.e. 1112×5%)	55.60		
Brand Related	400.93		
Corporate tax @ 35%	140.33		
Brand Earning	260.60		
Capitalization Factor	16%		

Brand Value: (Return / Capitalization Rate)

260.60 / 0.16 = ₹1628.75 Crore

**Illustration 38.**

From the following information determine the Possible Value of Brand as per Potential Earning Model –

(₹ Lakhs)

Particulars	CASE A	CASE B
(i) Profit Before Tax (PBT)	--	15.00
(ii) Income Tax	--	3.00
(iii) Profit After Tax (PAT)	2,700	--
(iv) Tangible Fixed Assets	10,000	20.00
(v) Identifiable Intangible other than Brand	1,500	10.00
(vi) Weighted Average Cost of Capital (%)	15%	
(vii) Expected Normal Return on Tangible Assets Weighted Average Cost (15%) + Normal Spread 5%	20%	6.00
(viii) Appropriate Capitalization Factor for Intangibles	25%	25%

**Solution:****CASE A ....**

Particulars	₹ Lakhs	₹ Lakhs
Profit After Tax	2,700	2,700
Less: Normal Return from Tangible Assets (₹10,000 Lakhs x 20%)	(2,000)	(2,000)
Less: Normal Return from Other Intangible Assets (₹1,500 Lakhs x 25%)	(375)	(375)
Brand Earnings	325	325
Capitalization Factor = WACC	25%	15%
Therefore, Value of Brand	₹1,300 Lakhs	₹2,166.67 Lakhs

**CASE B ---**

Particulars	₹ Lakhs
Profit Before Tax	15.00
Less: Income Tax	(3.00)
Profit After Tax	12.00
Less: Normal Return Tangible Assets	(6.00)
Less: Normal Return from Other Intangible Assets (₹10 Lakhs x 25%)	(2.50)
Brand Earnings	3.50
Capitalization factor	25%
Therefore, Value of Brand (₹3.50 Lakhs ÷ 25%)	14 Lakhs

**Illustration 39.**

Sanju Ltd. has hired a Marketing Consultancy Firm for doing market research and provide data relating to Tyre industry for the next 10 years. The following were the observations and projections made by the consultancy firm ---

1. The Tyre Industry in the target area i.e. Whole of India, is expected to grow at 5% p. a. for the next 3 years, and thereafter at 7% p. a. over the subsequent seven years.
2. The market size in terms of unencumbered basic sales of Tyres was estimated at ₹8,000 Lakhs in the last year, dominated by medium and large players. This includes roughly 9.0% of fake brands and locally manufactured Tyres. Market share of this segment is expected to increase by 0.5%.
3. Cheap Chinese imports accounts for 40% of the business (but 60% of the volume). This is expected to increase by 0.25% over the next decade.
4. The other large players account for roughly 35% of the business value, which is expected to go down by 0.5% over the next ten years, due to expansion of Sanju Ltd.'s product portfolio.
5. The Company is in the process of business re-engineering, which will start yielding results in 2 years' time, and increase its profitability by 3% from its existing 12%.

If the appropriate discount rate is 15% what is the Brand Value of Sanju Ltd., under Market Oriented Approach?

**Solution:**

(a) **Current Market share** = 100 – Fake Brands 9% - Chinese Imports 40% - Other Domestic Brands 35% = 16%

(b) **Increase or Decrease in Market Share:** Chinese Imports 0.25% + Local Brands 0.5% - Other Players 0.5% = 0.25% increase other product's market share. Hence, market share is expected to fall by 0.25% every year over the decade, from the current levels of 16%. Therefore, next year it will be 15.75%, the year after 15.50% etc.

## 2. Brand Valuation under Market Approach

Year	Market Size (₹ Lakhs)	Market Share of Sanju Ltd.	Market Share ₹ Lakhs	Expected Profit (₹ Lakhs)	Discount Factor at 15%	Discounted Cash Flow
1	8,000.00 + 5% = 8,400.00	15.75%	1,323.00	@ 12% = 158.76	0.870	138.12
2	8,400.00 + 5% = 8,820.00	15.50%	1,367.10	@ 12% = 164.05	0.756	124.02
3	8,820.00 + 5% = 9,261.00	15.25%	1,412.30	@ 15% = 211.84	0.658	139.39
4	9,261.00 + 7% = 9,909.27	15.00%	1,486.39	@ 15% = 222.96	0.572	127.53
5	9,909.27 + 7% = 10,602.92	14.75%	1,563.93	@ 15% = 234.59	0.497	116.59
6	10,602.92 + 7% = 11,345.12	14.50%	1,645.04	@ 15% = 246.75	0.432	106.60
7	11,345.12 + 7% = 12,139.28	14.25%	1,729.85	@ 15% = 259.48	0.376	97.56
8	12,139.28 + 7% = 12,989.03	14.00%	1,818.46	@ 15% = 272.77	0.327	89.20
9	12,989.03 + 7% = 13,898.26	13.75%	1,911.01	@ 15% = 286.65	0.284	81.41
10	13,898.26 + 7% = 14,871.14	13.50%	2,007.60	@ 15% = 301.14	0.247	74.38
	Brand Value					1094.80

Brand Value of Sanju Ltd under Market Oriented Approach is ₹1094.80 Lakhs.

## 7.4 VALUATION OF HUMAN RESOURCES

### Introduction

The past few decades have witnessed a global transition from manufacturing to service based economies. The fundamental difference between the two lies in the very nature of their assets. In the former, the physical assets like plant, machinery, material etc. are of utmost importance. In contrast, in the latter, knowledge and attitudes of the employees assume greater significance. For instance, in the case of an IT firm, the value of its physical assets is negligible when compared with the value of the knowledge, experience, development and application skills of its personnel. Similarly, in hospitals, academic institutions, consulting firms, etc., the total worth of the organisation depends mainly on the skills of its employees and the services they render. Hence, the success of these organizations is contingent on the quality of their Human Resource – its knowledge, skills, competence, motivation and understanding of the organisational culture.

In knowledge – driven economies, therefore, it is imperative that the human resources be recognized as an integral part of the total worth of an organisation. However, in order to estimate and project the worth of the human capital, it is necessary that some method of quantifying the worth of the knowledge, motivation, skills, and contribution of the human element as well as that of the organisational processes, like recruitment, selection, training etc., which are used to build and support these human aspects, is developed. Human Resource Accounting (HRA) denotes just this process of quantification/measurement of the Human Resource.

Human resource management activities include attraction, selection, acquisition, utilization retention, development and utilization for next higher level of value additions. In the past, these activities were evaluated in behavioral and statistical terms. Behavioral measures were the reactions of various groups of what individuals have learned or of how their behaviors have changed on the job. Statistical Measures were ratios, percentages, measures of central tendency and variability, and measures of correlation.

Today, because of rising costs, there is a need to evaluate HR management activities in economic terms. This requires gathering information from Accounting, Finance, Economics and Behavioral Science.

### Definition of Human Resource Accounting (HRA)

There are no generally accepted accounting procedures for employee valuation. The first major attempt at employee valuation was made by R.G. Barry Corporation of Columbus, Ohio in their 1971 annual report, to enable the company to report accurate estimates of the worth of the organization's human assets.



The American Accounting Association's Committee on Human Resource Accounting (1973) has defined Human Resource Accounting as "the process of identifying and measuring data about human resources and communicating this information to interested parties". HRA, thus, not only involves measurement of all the costs / investments associated with the talent acquisition, placement, training and development of employees, but also the quantification of the economic value of the people in an organisation.

Flamholtz (1971) too has offered a similar definition for HRA. They define HRA as "the measurement and reporting of the cost and value of people in organizational resources".

In India, the Companies Act, 1956 does not mandate furnishing of HRA related information in the financial statements of the companies. The Institute of Chartered Accountants of India too, has not brought out any definitive standard or measurement in the reporting of human resources costs. Some general qualitative pronouncements are made by the top management in major forums such as an annual general meeting on the importance of human resources, which have sounded more like platitudes and prosaic. However, some organizations in India such as Infosys, BHEL and ACC have furnished the value of their human resources and related information in their annual reports.

### **Benefits of HRA**

According to Likert (1971), HRA serves the following purposes in an organisation:

- (i) It furnishes cost / value information for making management decisions about acquiring, allocating, developing, and maintaining human resources in order to attain cost-effectiveness;
- (ii) It allows management personnel to monitor effectively the use of human resources;
- (iii) It provides a sound and effective basis of human asset control, that is, whether the asset is appreciated, depleted or conserved;
- (iv) It helps in the development of management principles by classifying the financial consequences of various practices.

Basically, HRA is a management resource which is designed to assist senior management in understanding the long term cost and benefit implications of their HR decisions so that better business decisions can be taken. If such accounting is not done, then the management runs the risk of taking decisions that may improve profits in the short run but may also have severe repercussions in future. For example, very often organisations hire young people from outside on very high salaries because of an immediate business requirement. Later on, however, they find that the de-motivating impact of this move on the existing experienced staff has caused immense long – term harm by reducing their productivity and by creating salary distortions across the organisational structure.

HRA also provides the HR professionals and management with information for managing the human resources efficiently and effectively. Such information is essential for performing the critical HR functions of acquiring, developing, allocating, conserving, utilizing, evaluating and rewarding in a proper way. These functions are the key transformational processes that convert human resources from 'raw' inputs (in the form of individuals, groups and the total human organization) to outputs in the form of goods and services. HRA indicates whether these processes are adding value or enhancing unnecessary costs.

In addition to facilitating internal decision making processes, HRA also enables critical external decision makers, especially the investors in making realistic investment decisions. Investors make investment decisions based on the total worth of the organisation. HRA provides the investors with a more complete and accurate account of the organisations' total worth, and therefore, enables better investment decisions. For example, conventional financial statements treat HR investments as "expenditures". Consequently, their income statement projects expenditures to acquire, place, train and retain human resources as expenses during the current year rather than capitalizing and amortizing them over their expected service life. The balance sheet, thus, becomes distorted as it inaccurately presents the "total Assets" as well as the "net income" and, thereby, the "rate of return" which is the ratio of net income to the total assets. HRA helps in removing this distortion.

Furthermore, in a business environment where corporate social responsibility is rapidly gaining ground, HRA reflects the extent to which organisation contributes to society's human capital by investing in its development.



Finally, in an era where performance is closely linked to rewards and, therefore, the performance of all groups, departments, and functions needs to be quantified to the extent possible, HRA helps in measuring the performance of the HR function as such.

### **Cost Based Model**

**Historical Cost Model:** This model was first introduced by R. Likert at R.G. Barry Corporation in Columbus, Ohio (USA) in 1967. Under this model, The actual cost of recruiting, selecting, hiring, placing and developing the employees of an organisation are capitalized and amortized over the expected useful life of the asset concerned. The sum of are the cost as mentioned above for all the employees of the enterprise is taken to represent the total value of human resources. If the assets are liquidated permanently, losses are recorded and if the asset has longer life than estimated, are made in the amortized value. If an employee's leaves the firm before the expiry of expected service life of the employees the net asset value to that extent is charged to current revenue.

The model is simple and easy to understand and to be consistent with the matching principle. But it fails to provide reasonable value to human assets. It only capitalize only recruiting training, development, placement and inducting cost but ignores the future expected costs to incurred for their maintenance. Secondly estimation of the number of years over which the capitalized expenditure is to be taken and is likely to be largely subjective. It is difficult to calculate the rate which total expenditure on human resources is to be amortized. Lastly value of human resource increase but through this treatment capital cost decrease through amortization.

### **The Replacement Cost Approach**

Value to an organisation of an individual's services is reflected by the amount that the organisation would have to pay to replace these services. This method consists of estimating the cost of replacing a firm's existing human resources; these costs will include costs of recruiting, selecting, hiring, training, placing and developing new compliance of the existing employee. Falmhotz has offered two different concepts of replacement cost individual and replacement cost refers to the cost that would have been incurred to replace an individual by a substitute who can provide the some kind of services as that of the individual replacement. On the other hand, positional replacement cost represents cost of replacing the set services of any individual in a defined position in an organisation. The replacement cost approach incorporates the current value of the company's human resources. It takes into account fluctuation of the job market and general rise in price level. This method is regarded as a good surrogate for the economic value of the asset in the sense that market consideration is essential in reaching a final figure. But it is difficult to find replacement of the excising human resources in actual practice.

### **Opportunity Cost Approach:**

This model proposed by J.S. Hekimian and C.H. Jones in 1967. These methods are used to value employees processing certain skills and thus are rate in availability. Under this method it is assumed that opportunity cost as the best means to value HRs. According to this approach, the opportunity cost of on employee is determined by using comparative bidding method. Under this method the investment centre managers will be for rare (scarce) employees they need to recruit. In other words, employees who are not consider, are not included in the human asset base of the organisation. This model provides for more optimal allocation of human resource and sets a quantitative base for planning, Developing and evaluation human resources of the organisation. However, this approach adopts discriminating attitude. Since it takes into account only scarce HRs.

### **Illustration 40.**

A company has a capital base of ₹1 crore and has a earned profits to the tune of ₹11,00,000. The return on investment (ROI) of the particular industry to which the company belongs is 12.5%. If acquired by a company, it is expected that profits will increase by ₹250,000 over and above the target profit.

Determine the amount of maximum bid price for that particular exceptive and the maximum salary that could be offered to him.

**Solution:**

Capital base ₹ 100,00,000

Actual profit ₹ 11,00,000

Target profit ₹ 100,00,000 × 12.5% = ₹ 1250,000

Expected profit on employing the particular exceptive = ₹ 12,50,000 + ₹ 250,000

Additional profit = expected profit – Actual profit

$$= ₹ 15,00,000 – ₹ 11,00,000$$

$$= ₹ 4,00,000$$

Maximum bid price = Additional profit / rate of return on

$$= ₹ 400,000 / 12.5%$$

$$= ₹ 32,00,000$$

Maximum salary that can be offered = ₹ 32,00,000 × 12.5%

$$= ₹ 400,000$$

Maximum salary can be offered to that particular exceptive up to the amount of additional profit is ₹ 400,000

**Value based model:****Present value of future earnings:**

This model was introduced by Baruch Lev and Schwarz. According to the authors, valuations of HRs of homogenous group can be done by aggregating the present values of wages and salary payable to individual employees during the stay with the organisation. Comment Measurement of HRs under this method involves (a) division of employee according to their age, grade of pay and designation (b) determination of average per year (c) calculating of total earnings based on the remaining tenure of the service life (d) discounted total earning on the basis of average rate of return.

This HRs can be valued on the basis of following formula:

$$V_x = \sum_{t=x}^T \frac{I(t)}{(1+R)^{T-x}}$$

Where  $V_x$  = The human capital value of a person 'x' years old.

T = Retirement Age

I(t) = The person's annual earning up to retirement.

R = Discount rate

**Stochastic Rewards valuation model**

This model was proposed by Eric G Flamholtz in 1971 to measure the HR value to the organisation with the help of stochastic process. This model focuses on the measurement of a person's value to a specified organisation. It is recognized that a person renders value for on organisation as he occupies and plays different roles and renders services to the organisations. The movement of people from one organisation role (service state) to another over some specified period of time may be valued as stochastic process, depended up on the roles previously occupied and such movement can be estimated probabilistically. The expected service to be derived from an individual is ascertained by

$$E(R) = \sum_{i=1}^n R_i P(R_i)$$



$R_i$  = Represent quantity of services expected to be derived in each state.

$P(R_i)$  = The probability that they will be obtained.

The major advantage of this model that it takes into account the probability of an individual's career movement and of his leaving the organisation prior to the retirement or death. However, it is very difficult to obtain reliable data pertaining to incomes of employee for various positions during different time periods.

#### **Group basis valuation model:**

This model is proposed by Jaggi and Law. This model recognised the fact that proper valuation of human resource is not possible unless the contributions of individuals as a group are taken into view. A group refers to homogeneous employees whether in the same investment centre or not. It might be difficult to predict an individual's expected service tenure in the organisation or at a particular level or position but on a group basis, it is easier to ascertain the percentage of people in a particular group likely either to leave the firm during each of the fourth-coming period or to be promoted to higher leaves. The model aims at calculating the present value of all existing employees in each grade or rank. The following methodology is followed to measure present value.

- Ascertain the number of employees in each rank.
- Estimate the probability that an employee will be his grade within organisation or terminated/promoted in the next period.
- Ascertain the economic value of an employee in a specified grade during each period of time.
- The present value of existing employees in each rank/grade is obtained by multiplying the above three factors.

#### **Limitations:**

- The existing HR valuation models are not free from drawback. Thus no model can be traded universally as a suitable model yet.
- There is no clear guidance how to differentiate the cost and value of human resources. Like physical assets human assets can't be owned, retained or utilized at the sweet will and pressure of organisation.
- There is no consensus as yet among the Account and Finance professionals regarding in what form and manner the human assets are to valued and then shown in B-sheet.
- There is also a fear that employees and trade unions may not accept the idea valuing HR and this may lead to division of labours.

### **Case Study**

#### **Human Resources Valuation**

##### **Extracted from Infosys Annual Report, 2007**

The dichotomy in accounting between human and non-human capital is fundamental. The latter is recognized as an asset and is, therefore, recorded in the books and reported in the financial statements, whereas the former is ignored by accountants. The definition of wealth as a source of income inevitably leads to the recognition of human capital as one of the several forms of wealth such as money, securities and physical capital.

We have used the Lev & Schwartz model to compute the value of human resources. The evaluation is based on the present value of future earnings of employees and on the following assumptions:

- Employee compensation includes all direct and indirect benefits earned both in India and abroad.
- The incremental earnings based on group/age have been considered.
- The future earnings have been discounted at the cost of capital of 14.97% (previous year – 12.96%).

in ₹ crore, unless stated otherwise

Employees (No.)	2007	2006
Software professionals	68,156	49,495
Support	4,085	3,220
Total	72,241	52,715
Value of human resources		
Software professionals	53,592	43,336
Support	3,860	3,301
Total	57,452	46,637
Total income	13,893	9,521
Total employee cost	7,112	4,801
Value-added	11,879	8,030
Net profits excluding exceptional items	3,861	2,479
Ratios		
Value of human resources per employee	0.80	0.88
Total income / human resources value (ratio)	0.24	0.20
Employee cost / human resources value (%)	12.4	10.3
Value-added / human resources value (ratio)	0.21	0.17
Return on human resources value (%)	6.7	5.3

Value-added	in ₹ Crore			
	2007	%	2006	%
Income	13,893		9,521	
Less: Operating expenses excluding personnel costs				
Software development expenses	1,187		812	
Selling and marketing expenses	371		231	
General and administration expenses	834		587	
	2,392		1,630	
Value-added from operations	11,501		7,891	
Other income (including exceptional items)	378		139	
Total value-added	11,879		8,030	
Distribution of value-added				
Human resources:				
Salaries and bonus	7,112	59.9	4,801	59.8
Providers of capital:				
Dividend	654	5.5	1,238	15.4
Minority interest	11	0.1	21	0.3
Interest	--	--	--	--
	665	5.6	1,259	15.7
Taxes:				
Income taxes	386	3.2	313	3.9



Tax on dividend	102	0.9	174	2.2
	488	4.1	487	6.1
Retained in business:				
Depreciation (Yearly cash retention against which money has been expended at the time of acquiring the asset)	514	4.3	437	5.4
Income retained in business	3,100	26.1	1,046	13.0
	3,614	30.4	1,483	18.4
Total	11,879	100.0	8,030	100.0

**Note:** The figures above are based on the consolidated Indian GAAP financial statements. Dividends for fiscal 2007 include one-time silver jubilee dividend of ₹ 827 crore. Income taxes for fiscal 2007 include tax reversal of ₹125 crore.

**Illustration 41.**

From the following data in respect of an employer kindly calculate the total value of Human Capital under 'Lev and Schwarts' Model –

**Distribution of Employees**

Age Group	Unskilled		SEMI- SKILLED		Skilled	
	No	Average Annual Earnings	No	Average Annual Earnings	No	Average Annual Earnings
30-39	100	₹18,000	60	₹36,000	40	₹84,000
40-49	50	₹30,000	30	₹48,000	20	₹1,20,000
50-54	30	₹36,000	20	₹60,000	10	₹1,80,000

Retirement age is 55 years. Apply discount factor of 15%. In calculation of total value of Human factor the lowest value of each class should be taken Annuity factor @ 15%.

5 years	10 years	15 years	20 years	25 years
3.352	5.019	5.847	6.259	6.464

**Solution:**

**VALUATION IN RESPECT OF UNSKILLED EMPLOYEES**

**1. Age Group 30-39:** (assuming that all 100 employees are just 30 years old)

Particulars	Computation	Present Value
₹18,000 p.a for next 10 years	18,000 x 5.019	90,342
₹30,000 p.a from years 11 to 20	30,000 x (6.259 - 5.019)	37,200
₹36,000 p.a from years 21 to 25	36,000 x (6.464 - 6.259)	57,384
	Total	1,84,926

**2. Age Group 40-49:** (assuming that all 50 employees are just 40 years old)

Particulars	Computation	Present Value
₹30,000 p.a for next 10 years	30,000 x 5.019	1,50,570
₹36,000 p.a from years 11 to 15	36,000 x (5.847 - 5.019)	29,808
	Total	1,80,378

**3. Age Group 50-54:** (assuming that all 30 employees are just 50 years old)

Particulars	Computation	Present Value
₹36,000 p.a for next 5 years	$36,000 \times 3.352$	1,20,672

**VALUATION IN RESPECT OF SEMI- SKILLED EMPLOYEES****1. Age Group 30-39:** (assuming that all 60 employees are just 30 years old)

Particulars	Computation	Present Value
₹36,000 p.a for next 10 years	$36,000 \times 5.019$	1,80,684
₹48,000 p.a from years 11 to 20	$48,000 \times (6.259 - 5.019)$	59,520
₹60,000 p.a from years 21 to 25	$60,000 \times (6.464 - 6.259)$	12,300
	Total	2,52,504

**2. Age Group 40-49:** (assuming that all 30 employees are just 40 years old)

Particulars	Computation	Present Value
₹48,000 p.a for next 10 years	$48,000 \times 5.019$	2,40,912
₹60,000 p.a from years 11 to 15	$60,000 \times (5.847 - 5.019)$	49,680
	Total	2,90,592

**3. Age Group 50-54:** (assuming that all 20 employees are just 50 years old)

Particulars	Computation	Present Value
₹60,000 p.a for next 5 years	$60,000 \times 3.352$	2,01,120

**VALUATION IN RESPECT OF SKILLED EMPLOYEES****1. Age Group 30-39:** (assuming that all 40 employees are just 30 years old)

Particulars	Computation	Present Value
₹84,000 p.a for next 10 years	$84,000 \times 5.019$	4,21,596
₹1,20,000 p.a from years 11 to 20	$1,20,000 \times (6.259 - 5.019)$	1,48,800
₹1,80,000 p.a from years 21 to 25	$1,80,000 \times (6.464 - 6.259)$	36,900
	Total	6,07,296

**2. Age Group 40-49:** (assuming that all 20 employees are just 40 years old)

Particulars	Computation	Present Value
₹1,20,000 p.a for next 10 years	$1,20,000 \times 5.019$	6,02,280
₹1,80,000 p.a from years 11 to 15	$1,80,000 \times (5.847 - 5.019)$	1,49,040
	Total	7,51,320

**3. Age Group 50-54 :** (assuming that all 10 employees are just 50 years old)

Particulars	Computation	Present Value
₹1,80,000 p.a for next 5 years	$1,80,000 \times 3.352$	6,03,360

**TOTAL VALUE OF HUMAN CAPITAL**

		Unskilled		Semi-skilled		Skilled		Total
Age	No.	PV of future earning	No.	PV of future earning	No.	PV of future earning	No.	PV of future earning
30-39	100	$1,84,926 \times 100 = 1,84,92,600$	60	$2,52,504 \times 60 = 1,51,50,240$	40	$6,07,296 \times 40 = 2,42,91,840$	200	5,79,34,680
40-49	50	$1,80,378 \times 50 = 90,18,900$	30	$2,90,592 \times 30 = 87,17,760$	20	$7,51,320 \times 20 = 1,50,26,400$	100	3,27,63,060
50-54	30	$1,20,672 \times 30 = 36,20,160$	20	$2,01,120 \times 20 = 40,22,400$	10	$6,03,360 \times 10 = 60,33,600$	60	1,36,76,160
Total	180	3,11,31,660	110	2,78,90,400	70	4,53,51,840	360	10,43,73,900

**Illustration 42.**

A company has a capital base of ₹3 crore and has earned profits of ₹33 Lakhs. Return on investment of the particular industry to which the company belongs is 12.5%. If the services of a particular executive are acquired by the company, it is expected that the profits will increase by ₹7.5 lakhs over and above the target profit. Determine the amount of maximum bid price for that particular executive and the maximum salary that could be offered to him.

Particulars	₹
Capital Base	3,00,00,000
Actual profit	33,00,000
Target profit (₹3Cr × 12.5%)	37,50,000

**Solution:****1. Maximum Salary Payable:**

Particulars	₹ Lakhs
Capital Base	300.00
Target Profits (= Capital Base × 12.50%)	37.50
Add: Extra Profits due to induction of the Executive	7.50
Total Profits of the Company (anticipated after induction of the Executive)	45.00
Less: Current Profits	33.00
Incremental Profit	12.00

Maximum Salary = Incremental Profit due to introduction = ₹12.00 Lakhs per annum.

**2. Maximum Bid Price:**

= Value of Salary Payable in perpetuity

= Maximum Salary Payable ÷ Desired Rate of Return on Investment

= ₹12 Lakh ÷ 12.5% = ₹96 Lakhs.

## 7.5 VALUE ADDED, ECONOMIC VALUE ADDED, MARKET VALUE ADDED

### VALUE ADDED

Value Added is the wealth created by a Firm, through the combined effort of (1) Capital (2) Management and (3) Employees. This wealth concept arises due to the input - output exchange between a Firm and components of its external environment. Value Added = Sale Value of Outputs Less Cost of Bought in goods, utilities and services.

### Economic Value Added (EVA) – an aid to Valuation

It is a performance metric that calculates the creation of shareholder value. It distinguishes itself from traditional financial performance metrics such as net profit and EPS. EVA is the calculation of what profits remain after the cost of company's capital, comprising of both debt and equity, are deducted from operating profit.

The value of a firm is the sum of the capital invested and the present value of the economic value added. The present value of the economic value added by an asset over its life is the net present value of that asset. The value of a firm can be written as the sum of three components, the capital invested in assets in place, the present value of the economic value added by these assets, and the expected present value of the economic value that will be added by future investments. It can be calculated as:

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t, \text{Assets in place}}}{(1 + \text{WACC})^t} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t, \text{Future Project}}}{(1 + \text{WACC})^t}$$

Where:

Economic Value Added for all years = (Return on Capital Invested – WACC) (Capital Invested)

Terminal EVA = EVA / (WACC – Net sales growth rate).

WACC = Cost of capital means the "fair rate of return to invested capital", which goes to all claimholders. It is computed by multiplying Capital invested with WACC.

Return on Capital = Operating Income (1 – tax rate) / Capital Invested

NOPAT = Net Operating Profit After Tax

NOPLAT = Net Operating Profit Less Adjusted Taxes.

It means total operating profit for a firm with adjustments made for taxes. It is used in variant of the FCF and used in mergers of acquisitions.

NOPLAT is very similar to NOPAT, except its (net income + after tax interest expenses + Deferred taxes)

Capital Invested for all years = Total equity + Interest bearing liabilities + Convertibles - Total interest bearing financial assets.

Capital Invested for terminal year = (NOPLAT – Gross capital expenditure – Change in working capital + Increase in non-interest bearing liabilities – Total depreciation) / (Net sales growth × NOPLAT).

### Illustration 43.

Consider a firm that has assets in place in which it has capital invested of ₹100 crores. Assume the following further facts about the firm:

1. The after-tax operating income on assets in place is ₹15 crores. This return on capital of 15% is expected to be sustained in the future, and the company has a cost of capital of 10%.
2. At the beginning of each of the next 5 years, the firm is expected to make investments of ₹10 crores each. These investments are also expected to earn 15% as a return on capital, and the cost of capital is expected to remain 10%.



3. After year 5, the company will continue to make investments and earnings will grow 5% a year, but the new investments will have a return on capital of only 10%, which is also the cost of capital.
4. All assets and investments are expected to have infinite lives. Thus, the assets in place and the investments made in the first five years will make 15% a year in perpetuity, with no growth.

This firm can be valued using an economic value added approach as follows:

Capital Invested in Assets in Place		₹ 100 crores
+ EVA from Assets in Place	$\frac{(0.15 - 0.10)(100)}{0.10}$	₹ 50 crore
+ PV of EVA from New Investments in Year 1	$\frac{(0.15 - 0.10)(10)}{(0.10)}$	₹ 5 crore
+ PV of EVA from New Investments in Year 2	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^1}$	₹ 4.55 crore
+ PV of EVA from New Investments in Year 3	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^2}$	₹ 4.13 crore
+ PV of EVA from New Investments in Year 4	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^3}$	₹ 3.76 crore
+ PV of EVA from New Investments in Year 5	$\frac{(0.15 - 0.10)(10)}{(0.10)(1.10)^4}$	₹ 3.42 crore
Value of Firm		₹ 170.85 crore

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{\infty} \frac{\text{EVA}_{t, \text{Assets in place}}}{(1 + \text{WACC})^t} + \sum_{t=1}^{\infty} \frac{\text{EVA}_{t, \text{Future Project}}}{(1 + \text{WACC})^t}$$

Thus, ₹ 170.85 crores = ₹ 100 crores + ₹ 50 crores + ₹ 20.85 crores

#### Limitations of EVA Method of Firm Valuation

- (1) Needs calculation of invested capital for every year which depends on valuation issues.
- (2) Economic profits as excess returns are fairly subjective, depending on the valuation of invested capital.
- (3) Economic profit framework may provide date inducing illusionary accuracy of the quantified business plan.

#### MARKET VALUE ADDED

Market value Added (MVA) is the difference between the current market value of a firm and the capital contributed by investors. If MVA is positive, the firm has added value. If it is negative the firm has destroyed value.

To find out whether management has created or destroyed value since its inception, the firm's MVA can be used:

$$\text{MVA} = \text{Market value of equity capital (No. Shares} \times \text{Quoted Rate)} - \text{capital employed}$$



Another school of thought about this formula is as under:

No. of outstanding Equity Shares (Common Stock) at the closing day of a financial year multiplied by the market rate on that day minus No. of those shares on the last date of the previous financial year multiplied by that year end rate.

If in between the financial year any new share has been issued, then difference between closing market value of those shares at the yearend less the gross issue value, including premium received, is added to the value calculated as per the immediately preceding paragraph,

This calculation shows the difference between the market value of a company and the capital contributed by investors (both bondholders and shareholders). In other words, it is the sum of all capital claims held against the company plus the market value of debt and equity. Calculated as:

The higher the MVA, the better. A high MVA indicates the company has created substantial wealth for the shareholders. A negative MVA means that the value of the actions and investments of management is less than the value of the capital contributed to the company by the capital markets, meaning wealth or value has been destroyed.

The aim of the company should be to maximize MVA. The aim should not be to maximize the value of the firm, since this can be easily accomplished by investing ever-increasing amounts of capital.

#### RELATIONSHIP BETWEEN EVA AND MARKET VALUE ADDED

- The relationship between EVA and Market Value Added is more complicated than the one between EVA and Firm Value
- The market value of a firm reflects not only the Expected EVA of Assets in place but also the Expected EVA from future projects To the extent that the actual economic value added is smaller than the expected EVA the market value can decrease even though the EVA is higher.

This does not imply that increasing EVA is bad from a corporate finance stand point. In fact, given a choice between delivering a "below-expectation" EVA and no EVA at all, the firm should deliver the "below- expectation" EVA. It does suggest that the correlation between increasing year-to-year EVA and market value will be weaker for firms with high anticipated growth (and excess returns ) than for firms with low or no anticipated growth. It does suggest also that "investment strategies" based upon EVA have to be carefully constructed, especially for firms where there is an expectation built into prices of "high" surplus returns.

#### Illustration: 44

Equity Share Capital	₹ 5,00,000
13% Preference Share Capital	₹ 2,00,000
Reserves and Surplus	₹ 6,00,000
Non trade investments (Face value 1,00,000) Rate of Interest	10%
20% Debentures	₹ 3,00,000
Profits before tax	₹ 2,00,000
Tax Rate	40%
WACC	13%

Calculate EVA

#### Solution:

Economic Value Added = (Return on operating capital – weighted average cost of capital) × Operating capital.

#### Working Note – 1

Calculation of Return on operating capital



NOPAT =	₹
Profit before tax	2,00,000
+ Interest Expense	60,000
- Non operating income	10,000
Operating EBIT	2,50,000
Less: economic taxes @ 40%	1,00,000
NOPAT	1,50,000

**Working Note – 2**

Calculation of Operating Capital

	₹
Equity Share capital	5,00,000
Reserve and surplus	6,00,000
13% preference share capital	2,00,000
20% debenture	3,00,000
Total	16,00,000
Less: Non operating assets	1,00,000
Operating Capital	15,00,000

$$ROOC = \frac{1,50,000}{15,00,000} \times 100 = 10\%$$

$$EVA = (10\% - 13\%) \times 15,00,000 = ₹ (45,000)$$

**Illustration: 45**

Following is the Profit and Loss Account and Balance Sheet for M/s Henry Ltd.

(₹ in lakhs)

	2015	2016
Turnover	652	760
Pre-tax accounting profit	134	168
Taxation	46	58
Profit after tax	88	110
Dividends	30	36
Retained earnings	58	74

**Balance Sheet extracts are as follows:**

(₹ in lakhs)

	2015	2016
Fixed Assets	240	312
Net current assets	260	320
Total	500	632
Equity Share holders funds	390	472
Medium and long-term bank loan	110	160



The Companies performance in regard to turnover had increased by 17% along with increase in pre- tax profit by 25% but shareholders are not satisfied by the company's preference in the last 2 years. You are required to calculate economic value added as suggested by M/s. Stern Stewerts & Co., USA, so that reasons of non-satisfaction can be evaluated. You are also given -

SN.	Particulars	2015	2016
1.	Pre-tax cost of debt	9%	10%
2.	Cost of equity	15%	17%
3.	Tax rate	35%	35%
4.	Interest expense	₹8	₹12

**Solution:****Calculation of ROOC:**

(₹ in lakhs)

	2015	2016
NOPAT		
PBT	134	168
Add: Int. Expenses	8	12
Less: Taxes @ 35%	142	180
	49.7	63
NOPAT (A)	92.3	117
Operating Capital		
Equity Shareholder's Funds	390	472
Long Term Debt	110	160
Operating Capital(B)	500	632
ROOC = A/B×100	18.46%	18.52%

**Calculation of WACC:**

Particulars	2013	2014
$K_d$	$9\%(1-0.35) \times 110/500$	$10\%(1-0.35) \times 160/632$
	1.287%	1.645%
$K_e$	$15\% \times 390/500$	$17\% \times 472/632$
	11.7%	12.7%
	12.99%	14.34%
EVA		
ROOC	18.46%	18.51%
Less: WAAC	12.99%	14.34%
EVA Spread	5.47%	4.17%
EVA = Spread x Op. Cap.	2,735 Lakhs	2635.44 Lakhs

Since EVA has declined in Year 2014 by 99.56 Lakhs this can be attributed as reason for non-satisfaction.

**Illustration: 46**

- (a) Explain the concept of market value added (MVA). How is EVA connected with MVA?
- (b) From the following information concerning Nebula Ltd., prepare a statement showing computation of EVA for the year ended 31st March 2016:



**Summarized Profit and Loss Account  
for the year ended 31st March 2016**

	₹	₹
Sales		20,00,000
Cost of goods sold		12,00,000
Gross Profit		8,00,000
Expenses:		
General	2,00,000	
Office and administration	2,50,000	
Selling and distribution	64,000	5,14,000
Profit before interest and tax (PBIT)		2,86,000
Interest	36,000	36,000
Profit before tax (PBT)		2,50,000
Tax 40%		1,00,000
Profit after tax		1,50,000

**Summarized Balance Sheet as on 31st March 2016**

Particular	2016 (₹)
EQUITY AND LIABILITIES:	
SHAREHOLDER'S FUNDS	
Share capital	2,40,000
Reserves and Surplus	1,60,000
	4,00,000
NON-CURRENT LIABILITIES	
Long-term Borrowings	2,40,000
	2,40,000
CURRENT LIABILITIES	
Trade payables	1,60,000
	1,60,000
TOTAL	8,00,000
ASSETS	
NON-CURRENT ASSETS	
FIXED ASSETS:	
Tangible assets	6,00,000
	6,00,000
CURRENT ASSETS	
Inventories	1,20,000
Trade receivables	60,000
Cash and bank balances	20,000
	2,00,000
TOTAL	8,00,000



Other particulars:

- (i) Cost of goods includes depreciation expenses of ₹60,000.
- (ii) The expectation return of shareholders is 12%.

**Solution:**

**(a) Market Value Added (MVA)** is the value added to the business by management since the business was established, over and above the money invested by the owners. Thus, MVA = Market capitalization – invested equity capital. According to another version, MVA is the difference between a company's market value. (debt plus equity) at any point of time minus the total capital invested in the company, since inception. For all practical purposes, MVA may be considered as the accumulated EVA As generated by the business over time. If a company goes on by creating EVA year after year, then these will add up to give a high MVA.

**(b) Calculation of ROOC**

EBIT	2,86,000
Less: Tax (40%)	1,14,400
NOPAT	1,71,600
Calculation of Operating Capital	
Equity Share Capital	2,40,000
+ Reserve & Surplus	1,60,000
+ Term Loans	2,40,000
Operating Capital	6,40,000

$$\text{ROOC} = \frac{1,71,600}{6,40,000} \times 100 = 26.81\%$$

**Calculation of WACC**

$$K_d = \frac{36,000}{6,40,000} \times (1 - 0.40) = 3.38\%$$

$$K_e = \frac{12\%}{6,40,000} \times 4,00,000 = 7.50\%$$

$$\text{WACC} (3.38\% + 7.50\%) = 10.88\%$$

$$\text{EVA} = (26.81\% - 10.88\%) \times 6,40,000 = ₹ 1,01,95,200$$

**Illustration: 47**

Following is the information collected for a company, provided to you:

**BALANCE SHEET OF XYZ LTD AS AT 31st MARCH .....**

(₹ in Crores)

Particular	2016
EQUITY AND LIABILITIES:	
SHAREHOLDER'S FUNDS	
Share capital	36.37



Reserves and Surplus	2,225.66
	2,262.03
NON-CURRENT LIABILITIES	
Long-term Borrowings	6,322.76
Deferred tax liabilities (Net)	39.39
Other long-term liabilities	7.09
Long-term provisions	355.03
	6,724.27
CURRENT LIABILITIES	1,797.88
Trade payables	12.24
Other current liabilities	19.00
Short-term provisions	1,829.11
TOTAL	10,815.41
ASSETS	
NON-CURRENT ASSETS	
FIXED ASSETS:	
Tangible assets	4,535.68
Capital work-in-progress	898.83
Intangible assets	550.00
	5,984.51
Non-current investments	1,664.30
Long-term loans and advances	891.97
Other non-current assets	3.03
	2,559.30
CURRENT ASSETS	
Current investments	142.50
Inventories	1,389.92
Trade receivables	585.77
Cash and bank balances	38.41
Short-term loans and advances	115.00
	2,271.60
TOTAL	10,815.41

STATEMENT OF PROFIT AND LOSS OF XYZ LTD. FOR THE YEAR ENDING ON 31st MARCH ....

(₹ in Crores)

Particulars	2016
Revenue from operations	295.00
Less: Excise Duty	26.39
	268.61
Other Operating Income	0.30
Other Income	0.13
TOTAL Revenue	269.04



EXPENSES	
Raw materials consumed	132.79
Power & Fuel Cost	21.37
Changes in inventories of finished goods, work-in-progress, and stock-in-trade	(1.63)
Employee benefits expense	5.97
Depreciation and amortization expense	20.77
Interest cost	32.19
Other expenses	34.23
TOTAL expenses	245.69
PROFIT/(LOSS) BEFORE TAX AND EXTRA-ORDINARY ITEMS	23.35
Less: Extra-Ordinary items	0.64
PROFIT/(LOSS) BEFORE TAX	22.71
Tax Expenses	7.38
Tax paid @ 32.50%	1.37
Deferred Tax	8.75
PROFIT/(LOSS) AFTER TAX	13.96

If the Weighted Average Cost of Capital (WACC) is 15% then you are required to calculate EVA for the year 2015-16.

**Solution:**

EVA = NOPAT – Capital Employed x Cost of Capital

Calculation of NOPAT	(₹ in crores)
Profit /(Loss) Before Tax and Extra – ordinary items	₹ 23.35
Adjustments for .....	
Add: Interest Cost	₹32.19
Less: Non –Operating Income	(₹ 0.13)
Operating Profit Before Tax	₹ 55.41
Less: Income Tax @ 32.50%	₹ 18.01
Net Operating Profit After Tax (NOPAT)	₹ 37.40

Calculation of Capital Employed:	(₹ in crores)
Share Capital	₹ 36.37
Reserves and Surplus	₹ 2,225.66
Long – Term Borrowings	₹ 6,322.76
Other long term liabilities	₹ 7.09
Long term provisions	₹ 355.03
Capital Employed	₹ 8946.91
Net Operating Profit After Tax (NOPAT)	₹ 37.40
Less: The cost of Capital Employed (8,946.91 x 15%)	₹ 1,342.04
EVA	₹ (1,304.64)



## 7.6 VALUATION OF LIABILITIES

Liabilities may be defined as currently existing obligation which a business enterprise intends to meet at some time in future. Such obligations arise from legal or managerial considerations and impose restrictions on the use of assets by the enterprise for its own purposes. Accounting Board of USA defines liabilities as economic obligations of an enterprise that are recognised and measured in conformity with generally accepted accounting principles. Liabilities also include certain deferred credits that are not obligations but that are recognised and measured in conformity with generally accepted accounting principles.

Actual liabilities valuation can be done on the basis of true and fair financial position of the business entity. Valuation should be properly disclose, otherwise it can make disturb to show actual financial health of the company. More clearly under valuation or over valuation of liabilities may not only affect the operating result and financial position of the current period but will also affect these for the next accounting period.

### Determinants of Liabilities Valuation

- (a) The obligation must, of course, exist at the present time. That is, it must arise out of some past transaction or event. It may arise from the acquisition of goods or services, from losses already sustained for which the firm is liable, or from the expectation of losses for which the firm has obligation itself.
- (b) Equitable obligations or duties should be included if they are based on the necessity of making future payment to maintain good business relationship or if they are in accordance with normal business practice.
- (c) There should be little or no discretion to avoid the future sacrifice. It is necessary that the amount of the obligation be known with certainty so long as a future sacrifice is probable.
- (d) There should be a determinable maturity value or the expectation that payment of an amount determined by reasonable estimation will be required at some specific time in the future, even though the exact thing is not known at present. The time of payment may be extended by the substitution of new liabilities, or the obligation may be terminated by their conversion into stockholder equities.
- (e) Normally, the payee would be known or be identifiable either specifically or as a group. However, so long the payee becomes identifiable by the settlement date, it is not necessary that the payer knows the identity of payee or that the creditor professes the claim or has knowledge of it at the present time.

The valuation of liabilities is part of the process of measuring both capital and income, and is important to such problems as capital maintenance and the ascertainment of a firm's financial position. According to Borton, the requirements for an accurate measurement of the financial position and financial structure should determine the basis for liability valuation. Their valuation should be consistent with the valuation of assets and expenses. The need for consistency arises from the objectives of liability valuation, which are similar to those to asset valuation. Probably the most important of these objectives is the desire to record expenses and financial losses in the process of measuring income. However, the valuation of liabilities should also assist investors and creditors in understanding the financial position.

Liabilities may be values (i) at their discounted net values in accordance with the manner of valuing assets in economics; (ii) in accordance with accounting conventions, they may be recorded at their historic value, that is, the valuation attached to the contractual basis by which they were created. There is no difference between the two methods of valuation as regards liabilities which are payable immediately and it is only as the maturity date of liabilities, that makes the difference. While accounting conventions dicte that the valuation of liabilities should be based on the sum which is payable, it is accounting practice to make a distinction between current and long-term liabilities. As regard current liabilities there is little difference between the discounted net value and the contractual value of liabilities. In this connection, current liabilities are defined as those which will mature during the course of accounting period. The gap between the two methods of valuation is significant as regard long term liabilities. Long term liabilities are valued on the basis of their historical value, that is, by reference to the contract from which they originated, and hence, during periods of inflation or where the interest payable is less than the current market rate of interest, the accounting valuation will certainly be overstated by comparison with the discounted net value.

### Different Processes involved in Liabilities Valuation

There is different process of valuation of liabilities which are discussed below:

**Historical Cost:** The value of liabilities are recorded at the amount of proceeds received in exchange for the

obligation, or in some situation, at the amount of cash equivalents expected to be paid to satisfy the liabilities in the normal course of business.

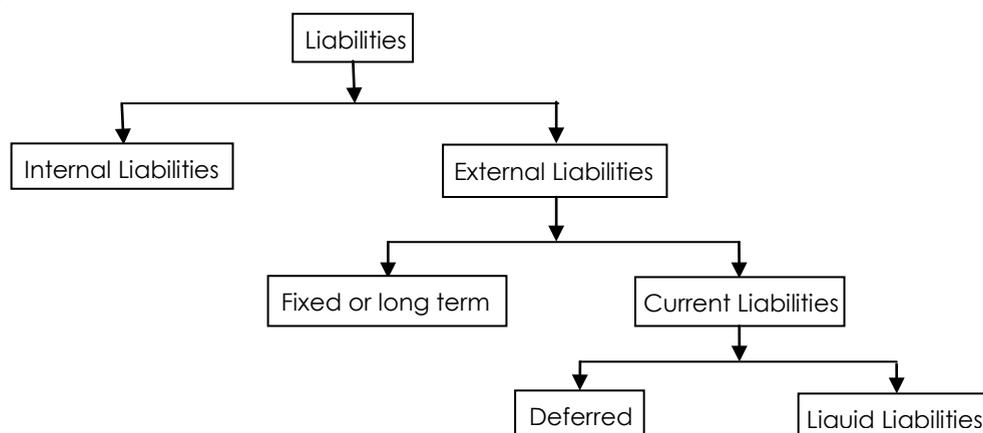
**Current Cost:** Liabilities are carried at the undiscounted amount of cash equivalents that would be required to settle the obligation currently.

**Settlement Value:** The undiscounted amounts of cash equivalents expected to be required to settle the liabilities in the normal course of business.

**Present Value:** Liabilities are carried at the present value of the future cash flow that are expected to be required to settle the liabilities in the normal course of business.

### Classification of Liabilities

Liabilities may be classified as follows:



Example of the above liabilities are as follows:

Internal Liabilities: Capital Reserve

External Liabilities- Debentures: Creditors, Bills Payable, Bank over Draft etc.

Fixed or long term liabilities: Debentures, Loan or Mortgage

Current Liabilities: Creditors, Bills Payable, Bank Over Draft

Deferred Liabilities: The liabilities which are payable after one month but within one year are called Deferred liabilities.

Liquid Liabilities: The liabilities which are payable within one month called liquid liabilities.

### Contingent Liability

A Contingent Liabilities is not a actual liability. Instead, it is a potential liability that depends on a future event arising out of a past transaction. For example, a town Government may sue the company that setup new light, claiming that the electrical wiring is fault. The past transaction is the street light installation. The future event is the court case that will decide the suit. The light companies thus face a contingent liability, which may or may not become a actual obligation.

Sometimes this liability has a definite amount. Discounting a note receivable creates a contingent that is, a potential liability for the endorser. If the market of the note pays at maturity, the contingent liability ceases to exist. However if the maker defaults the payee, who sold the note, must pay its maturity value to the purchaser.

Another contingent liability of know amount arise from guaranteeing that another company will pay a note payable that the other company owes a third party, this practice is called consignment a note.

The line between contingent liabilities and real liabilities is heard to draw. The contingent liabilities appear in the body of the balance sheet of total liability, but with no amount. Generally an explanatory note accompanies a short presentation.



As a practical guide, the FASB says to record an actual liability if a (a) it is probable that the business has suffered a loss and (b) it amount can be reasonably estimated. If both of these conditions are met, the FASB reasons that the obligation has passed from contingent to real, even if its amount is estimated.

**Short Question and Answer:**

**(a) State whether the following statements are true or false:**

- (i) In condition of rising prices for change from LIFO to FIFO method, earnings should rise.
- (ii) Whenever the yield on a bond is more than coupon rate, the bond will be trading at a discount.
- (iii) Increasing the company's future Economic Value Added is key to creating shareholder value.
- (iv) Zero coupon bonds have no coupon rate, hence no yield.
- (v) Systematic risk of a portfolio is diversifiable.
- (vi) Deferred Tax Liabilities are the liabilities towards payment of tax at some future point of time and hence, while calculating the Net Worth of a company.
- (vii) A lower discount would be applied to the cash flows of a government bond compared to a corporate debenture.
- (viii) Price to Book Value (P/B) Ratio is a positive function of Price/Earning (P/E) Ratio but a negative function of Return on Equity.
- (ix) Divestitures represent the sale of a part of a total undertaking.
- (x) For trading investments, the valuation is at market value.

**Answer:**

- (i) True
- (ii) True
- (iii) True
- (iv) False
- (v) False
- (vi) False
- (vii) True
- (viii) False
- (ix) True.
- (x) True.

**(b) Fill in the blanks by using the words / phrases given in the brackets:**

- (i) Intangible assets are treated as \_\_\_\_\_assets. (Fictitious/Fixed)
- (ii) \_\_\_\_\_is a measure of value of which tells whether a company is able to generate returns that exceed the costs of capital employed. (Economic Value Added/Market Value Added/ Enterprise Value Added)
- (iii) If a bond of a company is trading at a premium in the market then its yield-to-maturity will be \_\_\_\_\_ its current yield. (more than / less than / same as)
- (iv) Net Operating Profit After Taxes (Capital Employed x the Cost of Capital) is called \_\_\_\_\_. (Book Value Added/Market Value Added/ Economic Value Added)



- (v) Current liabilities are payable \_\_\_\_\_ (within/beyond) a period of 1 year.
- (vi) Super profit is the excess of future maintainable profits over \_\_\_\_\_ expected profits. (normally/ abnormally)
- (vii) A firm having positive EAT but negative EVA is actually \_\_\_\_\_ Value. (creating /destroying)
- (viii) The stronger a brand of a company is, -----its risk, (lower is/higher is/nothing can be said regarding)
- (ix) The -----(Tangible/ Intangible)Assets monitor is a management tool for organizations that wish to track and value their-----assets, (tangible/ intangible)
- (x) EVA is -----related to shareholders' value. (directly / inversely)

**Answer:**

- (i) Fixed
- (ii) Economic Value Added
- (iii) less than
- (iv) Economic Value Added
- (v) Within
- (vi) normally
- (vii) destroying
- (viii) lower is
- (ix) Intangible, Intangible
- (x) Directly

**(c) In each of the questions given below one out of the four options is correct. Indicate the correct answer:**

- (i) Which is not a, human –capital related intangible asset?
  - (A) Trained workforce
  - (B) Employment agreements
  - (C) Union contracts
  - (D) Design patent
- (ii) X Ltd. has ₹100 crores worth of common equity on its balance sheet comprising of 50 lakhs shares. The company's Market Value Added (MVA) is ₹24 crores. What is company's stock price?
  - (A) ₹230
  - (B) ₹238
  - (C) ₹248
  - (D) ₹264
- (iii) A firm's current assets and current liabilities are 1600 and 1000 respectively. How much can it borrow on a short-term basis without reducing the current ratio below 1.25?
  - (A) ₹1,000
  - (B) ₹1,200
  - (C) ₹1,400
  - (D) ₹1,600



- (iv) Identify which of the following is not a financial liability
- (A) X Ltd. has 1 lakh ₹10 ordinary shares issued
  - (B) X Ltd. has 1 lakh 8% ₹10 redeemable preference shares issued
  - (C) X Ltd. has ₹2,00,000 of 6% bonds issued
  - (D) Both (A) and (B)
- (v) An investment is risk free when actual returns are always-----the expected returns.
- (A) equal to
  - (B) less than
  - (C) more than
  - (D) depends upon circumstances

**Answer:**

(i) (D) Design Patent

(ii) (C) ₹248

₹(100+24) crores / 50 lakhs shares

= ₹248

(iii) (B) ₹1400

Amount of borrowing be x. (Current Asset will increase because borrowing will increase the cash amount)

$$\therefore \frac{1600 + X}{1000 + X} = 1.25$$

Or, X = 1400

(iv) (A) X Ltd. has 1 lakh ₹10 ordinary shares issued

A share is an indivisible unit of capital, expressing the proprietary relationship between the company and the shareholder.

(v) (A) Equal to

# Study Note - 8

## VALUATION IN MERGERS AND ACQUISITIONS



### This Study Note includes

- 8.1 Meaning of Business Mergers and Acquisitions and Types
- 8.2 Application of Valuation Models for Business Mergers and Acquisitions
- 8.3 Determination of Exchange Ratio (Swap) or Purchase Consideration
- 8.4 Synergistic Benefits and Distribution of Synergy Gains
- 8.5 Recognition of Interest of Various Stakeholders
- 8.6 Selection of Appropriate Cost of Capital for Valuation
- 8.7 Forms of Consideration and Terms of Acquisitions
- 8.8 Impact of Merger on Value of Shares

### 8.1 MEANING OF BUSINESS MERGERS AND ACQUISITIONS AND TYPES

**Business Strategy:** A business strategy typically is a document that clearly articulates the direction that a business will pursue and the steps it will take to achieve its goals. In a standard business plan, the business strategy results from goals established to support the stated mission of the business. A typical business strategy is developed in three steps: analyses, integration and implementation. Analyses include PESTEL, SWOT and Risks. The former calls for analyses of contemporary business ecosystem covering Product, Economy, Society, Technology, Environment and Legal.

#### Strategies for entering to a new business

An organization can enter into a new or unrelated business in any of the following three forms:

- (a) Acquisition
- (b) Internal start-up
- (c) Joint Ventures or strategic partnerships

#### Corporate Restructuring

Restructuring of business is an integral part of the new economic paradigm. As controls and restrictions give way to competition and free trade, restructuring and reorganization become essential. Restructuring usually involves major organizational change such as shift and /or medication in corporate strategies to meet increased competition or changed market conditions. This is also required by way of a measure to prepare for and mitigating forthcoming threats, risks and challenges as well as make best use of emerging opportunities.

This activity can take place internally in the form of new investments in plant and machinery, research and development at product and process levels. It can also take place externally through mergers and acquisitions (M&A) by which a firm may acquire another firm or by which joint venture with other firms. At times there may be a need to demerge an existing activity, division or desubsidiarising a subsidiary from the group held by a parent company.

This restructuring process has been mergers, acquisitions, takeovers, collaborations, consolidation, diversification, demergers etc. Domestic firms have taken steps to consolidate their position to face increasing competitive pressures and MNC's have taken this opportunity to enter Indian corporate sector.



### The Different forms of Corporate Restructuring

The different forms of corporate restructuring are summarized as follows:

#### Corporate Restructuring

A. Expansion		B. Contraction		C. Corporate Control	
•	Amalgamation	•	Demerger	•	Going Private
•	Absorption		• Spin off	•	Equity Buyback
•	Tender offer		• Equity carve out	•	Anti Takeover defences
•	Asset acquisition		• Split off	•	Leveraged Buyouts
•	Joint Venture		• Split up	•	Step up acquisition or stake dilution
			• Divestitures		
		•	Asset sale		

#### A. Expansion

- **Amalgamation:** This involves fusion of one or more companies where the companies lose their individual identity and a new company comes into existence to take over the business of companies being liquidated. The merger of Brooke Bond India Ltd. and Lipton India Ltd. resulted in formation of a new company Brooke Bond Lipton India Ltd.
- **Absorption:** This involves fusion of a small company with a large company where the smaller company ceases to exist after the merger. The merger of Tata Oil Mills Ltd. (TOMCO) with Hindustan Lever Ltd. (HLL) is an example of absorption.
- **Tender offer:** This involves making a public offer for acquiring the shares of a target company with a view to acquire management control in that company. Takeover by Tata Tea of Consolidated Coffee Ltd. (CCL) is an example of tender offer where more than 50% of shareholders of CCL sold their holding to Tata Tea at the offered price which was more than the investment price.
- **Asset acquisition:** This involves buying assets of another company. The assets may be tangible assets like manufacturing units or intangible like brands. Hindustan Lever Limited buying brands of Lakme is an example of asset acquisition. In this process only working assets are taken over leaving behind all liabilities and human resources to the selling company.
- **Joint venture:** This involves two companies coming whose ownership is changed. DCM group and DAEWOO MOTORS entered into a joint venture to form DAEWOO Ltd. for manufacturing automobiles in India.

#### B. Contraction

There are generally the following types of DEMERGER:

- **Spinoff:** This type of demerger involves division of company into wholly owned subsidiary of parent company by distribution of all its shares of subsidiary company on Pro-rata basis. By this way, both the companies i.e. holding as well as subsidiary company exist and carry on business. For example, Kotak, Mahindra Finance Ltd. formed a subsidiary called Kotak Mahindra Capital Corporation, by spinning off its investment banking division. At time demerger also takes place by one company selling one of its line of activities and / or group of assets including brand if required.
- **Split ups:** This type of demerger involves the division of parent company into two or more separate companies where parent company ceases to exist after the demerger.
- **Equity carve out:** This is similar to spin offs, except that same part of shareholding of this subsidiary company is offered to public through a public issue and the parent company continues to enjoy control over the subsidiary company by holding controlling interest in it. This is also called unleashing of values.

Promoters of a company can also dilute their holding in a listed company through 'Offer for Sale' following the



SEBI's OFS Regulation of, 2012. A non-listed company can also do this, e.g. Private Equity investors are brought in as equity partners during a distress or expansion phase for eventual exit after valuation of the company increases manifold.

- **Divestitures:** These are sale of segment of a company for cash or for securities to an outside party. Divestitures, involve some kind of contraction.
- **Asset sale:** This involves sale of tangible or intangible assets of a company to generate cash. A partial sell off, also called slump sale. It involves the sale of a business unit or plant of one firm to another. It is the mirror image of a purchase of a business unit or plant. From the seller's perspective, it is a form of contraction and from the buyer's point of view it is a form of expansion. For example, When Coromandal Fertilizers Limited sold its cement division to India Cement limited, the size of Coromandal Fertilizers contracted whereas the size of India Cements Limited expanded.

### C. Corporate controls

- **Going unlisted:** This involves converting a listed company into a private company by buying back all the outstanding shares from the markets. Several companies like Castrol India and Phillips India, Essar Shipping, Essar Ports have done this in recent years. A well known example from the U.S. is that of Levi Strauss & Company.
- **Equity buyback:** This involves the company buying its own shares back from the market. This results in reduction in the equity capital of the company. This strengthens the promoter's or group of promoters' position by increasing his/ their stake in the equity of the company.
- **Anti takeover defences:** With a high value of hostile takeover activity in recent years, takeover defences both premature and reactive have been restored to by the companies.
- **Leveraged Buyouts:** This involves raising of borrowed funds from the market or institutions by the management to acquire a company on the strength of its assets. In such a deal the acquiring company pays-off to the shareholders of the acquire much less from its own internal source and leverages the process by borrowings.

### Merger

Merger refers to a situation when two or more existing firms combine together and form a new entity. Either a new company may be incorporated for this purpose or one existing company (generally a bigger one) survives and another existing company (which is smaller) is merged into it. Laws in India use the term amalgamation for merger.

- Merger through absorption
- Merger through consolidation

### Absorption

Absorption is a combination of two or more companies into an existing company. All companies except one lose their identity in a merger through absorption. An example of this type of merger is the absorption of Tata Fertilizers Ltd. (TFL), TCL an acquiring company (a buyer), survived after merger while TFL, an acquired company (the seller), ceased to exist. TFL transferred its assets, liabilities and shares to TCL.

### Consolidation

A consolidation is a combination of two or more companies into a new company. In this type of merger, all companies are legally dissolved and a new entity is created. In a consolidation, the acquired company transfers its assets, liabilities and shares to the acquiring company for cash or exchange of shares. An example of consolidation is the merger of Hindustan Computers Ltd., Hindustan Instruments Ltd., and Indian Reprographics Ltd., to an entirely new company called HCL Ltd.

### Types of Mergers

Generally, the following five different types of mergers are possible:

- (a) **Horizontal merger:** The two companies which have merged are in the same industry, normally the market share of the new consolidated company would be larger and it is possible that it may move closer to being



a monopoly or a near monopoly. In common parlance when a large FMCG company acquires and merges with it a logistics management company by way of a cost reduction measure, essentially it is considered as a part of horizontal merger. It may or may not decide to take business from any other third party

- (b) **Vertical merger:** It means the merger of two companies which are in different field altogether, the coming together of two concerns may give rise to a situation similar to a monopoly. Under this group the examples could of an upstream company merging with downstream company, e. g., merger of a crude oil exploration company with an oil refining company.
- (c) **Reverse merger :** Where, in order to avail benefit to carry forward of losses which are available according to tax law only to the company which had incurred them, the profit making company is merged with companies having accumulated losses.
- (d) **Conglomerate merger:** Such mergers involved firms engaged in unrelated type of business operations. In other words, the business activities of acquirer and the target are not related to each other horizontally or vertically, i.e. producing the same or competitive products nor vertically having relationship of buyer and supplier.
- (e) **Co-generic merger:** In these mergers, the acquirer and the target companies are related through basic technologies, production processes or market. The acquired company represents an extension of product line, market participants or technologies of the acquirer. When a smart phone manufacturing company takes over a company manufacturing Tabs, it will be a considered as a co-generic merger as product groups are essentially same except the voice part.

### Amalgamation

Amalgamation is an arrangement or reconstruction. It is a legal process by which two or more companies are to be absorbed or blended with another. As a result, the amalgamating company loses its existence and its shareholders become shareholders of a new company or the amalgamated company. In case of amalgamation a new company may come into existence or an old company may survive while amalgamating company may lose its existence. There may be amalgamation by transfer of one or more undertakings to a new company or transfer of one or more undertaking to an existing company. Amalgamation signifies the transfers of all or some part of assets and liabilities of one or more than one existing company or two or more companies to a new company.

### Types of Amalgamation

The Accounting Standard, AS-14, issued by the Institute of Chartered Accountants of India has defined the term amalgamation by classifying (i) Amalgamation in the nature of merger, and (ii) Amalgamation in the nature of purchase.

**(a) Amalgamation in the nature of merger:** As per AS-14, an amalgamation is called in the nature of merger if it satisfies all the following condition:

- All the assets and liabilities of the transferor company should become, after amalgamation; the assets and liabilities of the other company.
- Shareholders holding not less than 90% of the face value of the equity shares of the transferor company (other than the equity shares already held therein, immediately before the amalgamation, by the transferee company or its subsidiaries or their nominees) become equity shareholders of the transferee company by virtue of the amalgamation.
- The consideration for the amalgamation receivable by those equity shareholders of the transferor company who agree to become equity shareholders of the transferee company is discharged by the transferee company wholly by the issue of equity share in the transferee company, except that cash may be paid in respect of any fractional shares.
- The business of the transferor company is intended to be carried on, after the amalgamation, by the transferee company.
- No adjustment is intended to be made in the book values of the assets and liabilities of the transferor

company when they are incorporated in the financial statements of the transferee company except to ensure uniformity of accounting policies.

Amalgamation in the nature of merger is an organic unification of two or more entities or undertaking or fusion of one with another. It is defined as an amalgamation which satisfies the above conditions.

**(b) Amalgamation in the nature of purchase:** Amalgamation in the nature of purchase is where one company's assets and liabilities are taken over by another and lump sum is paid by the latter to the former. It is defined as the one which does not satisfy any one or more of the conditions satisfied above.

As per Income Tax Act 1961, merger is defined as amalgamation under Sec. 2(1B) with the following three conditions to be satisfied.

- I. All the properties of amalgamating company(s) should vest with the amalgamated company after amalgamation.
- II. All the liabilities of the amalgamating company(s) should vest with the amalgamated company after amalgamation.
- III. Shareholders holding not less than 75% in value or voting power in amalgamating company(s) should become shareholders of amalgamated companies after amalgamation.

Amalgamation does not mean acquisition of a company by purchasing its property and resulting in its winding up. According to Income tax Act, exchange of shares with 90% of shareholders of amalgamating company is required.

### Acquisition

Acquisition refers to the acquiring of ownership right in the properties and assets without any combination of companies. Thus in acquisition two or more companies may remain independent, separate legal entity, but there may be change in control of companies. Acquisition results when one company purchase the controlling interest in the share capital of another existing company in any of the following ways:

- (a) By controlling interest in the other company. By entering into an agreement with a person or persons holding shares of other company.
- (b) By subscribing new shares being issued by the other company.
- (c) By purchasing shares of the other company at a stock exchange, and
- (d) By making an offer to buy the shares of other company, to the existing shareholders of that company.

### Demerger

It has been defined as a split or division. As the name suggests, it denotes a situation opposite to that of merger. Demerger or spin-off, as called in US involves splitting up of conglomerate (multi-division) of company into separate companies.

This occurs in cases where dissimilar business are carried on within the same company, thus becoming unwieldy and cyclical almost resulting in a loss situation. Corporate restructuring in such situation in the form of demerger becomes inevitable. Merger of SG Chemical and Dyes Ltd. with Ambalal Sarabhai Enterprises Ltd. (ASE) has made ASE big conglomerate which had become unwieldy and cyclic, so demerger of ASE was done.

A part from core competencies being the main reason for demerging companies according to their nature of business, in some cases, restructuring in the form of demerger was undertaken for splitting up the family owned large business empires into smaller companies.

The historical demerger of DCM group where it split into four companies' viz., DCM Ltd., DCM Shriram Industries Ltd., Shriram Industrial Enterprise Ltd. and DCM Shriram Consolidated Ltd. is one example of family units splitting through demergers. Such demergers are accordingly, more in the nature of family settlements and are affected through the courts order. In 2005 RIL demerged its telecom business to the then Reliance Infocomm Ltd. when two brothers split their ownership interests from RIL in the form of spinning-off businesses into separate companies.



Thus, demerger also occur due to reasons almost the same as mergers i.e. the desire to perform better and strengthen efficiency, maximisation of synergy benefits business interest and longevity and to curb losses, wastage and competition. Undertakings demerge to delineate businesses and fix responsibility, liability and management so as to ensure improved results from each of the demerged unit.

Demerged Company, according to Section (19AA) of Income Tax Act, 1961 means the company whose undertaking is transferred, pursuant to a demerger to a resulting company.

Resulting company, according to Section 2(47A) of Income Tax Act, 1961 means one or more company, (including a wholly owned subsidiary thereof) to which the undertaking of the demerged company is transferred in a demerger, and the resulting company in consideration of such transfer of undertaking issues shares to the shareholders of the demerged company and include any authority or body or local authority or public sector company or a company established, constituted or formed as a result of demerger.

### **Reverse Merger**

Normally, a small company merges with large company or a sick company with healthy company. However, in some cases, reverse merger is done. When a healthy company merges with a sick or a small company is called reverse merger. This may be for various reasons. Some reasons for a reverse merger are:

The transferee company is a sick company and has carry forward losses and Transferor Company is profit making company. If Transferor Company merges with the sick transferee company, it gets advantage of setting-off carry forward losses without any conditions. If sick company merges with healthy company, many restrictions are applicable for allowing set off, the most important one is change of ownership at entity level.

In such cases, it is provided that on the date of merger, name of Transferee Company will be changed to that of Transferor Company. Thus, outside people even may not know that the transferor company with which they are dealing after merger is not the same as earlier one. One such approved in Shiva Texyarn Ltd.

### **Forces that drive M & A Activities**

The major forces which drive M&A activities since the early 1990's have been identified as the following:

- (i) Rapid pace of technological change;
- (ii) Low costs of communication and transportation;
- (iii) Globalization and global markets;
- (iv) Nature of competition in terms of forms, sources and intensity;
- (v) Emergence of new types of industries;
- (vi) Regulation in some industries and sectors;
- (vii) Liberalization in some industries and sectors;
- (viii) Maximisation of synergy benefits, deriving benefits of scale, larger market share, expansion of complimentary product basket, extending benefits of corporate brand, etc.
- (ix) Growing inequalities in incomes and wealth.

Merger activity generally comes in waves, and is most common when shares are overvalued. The late 1990's saw fevered activity. Then the pace slowed in most industries, particularly after September 11, 2001. It picked up again in mid-2003 as companies that weathered the global recession sought bargains among their battered brethren. By the start of 2006, a mergers and acquisitions boom was in full swing, provoking a nationalist backlash in some European countries. The future of the merger wave now depends on how deep the downturn in private equity proves to be.

### **Possible causes of different types of Merger**

An extensive appraisal of each merger scheme is done to patterns the causes of mergers. These hypothesized causes (motives) as defined in the mergers schemes and explanatory statement framed by the companies at the



time of mergers can be conveniently categorized based on the type of merger. The possible causes of different type of merger schemes are as follows:

- (i) **Horizontal merger:** These involve mergers of two business companies operating and competing in the same kind of activity. They seek to consolidate operations of both companies. These are generally undertaken to :
  - (a) Achieve optimum size,
  - (b) Improve profitability,
  - (c) Carve out greater market share,
  - (d) Increase profit and profitability by deriving benefits from operating synergies,
  - (e) Reduce its administrative and overhead costs.
- (ii) **Vertical merger:** These are mergers between firms in different stages of industrial production in which a buyer and seller relationship exists. Vertical mergers are an integration undertaken either forward to come close to customers or backward to come close to raw materials suppliers. These mergers are generally endeavoured to :
  - (a) Increased profitability,
  - (b) Economic cost by eliminating avoidable sales tax and excise duty payments,
  - (c) Increased marketing power without violating Competition Law,
  - (d) Increased size, etc.
- (iii) **Conglomerate merger:** These are mergers between two or more companies having unrelated business. These transactions are not aimed at explicitly sharing resources, technologies, synergies or product. They do not have an impact on the acquisition of monopoly power and hence are favoured throughout the world. They are undertaken for diversification of business in other products, trade and for advantages in bringing separate enterprise under single control namely :
  - (a) Synergy arising in the form of economies of scale.
  - (b) Cost reduction as a result of integrated operation.
  - (c) Risk reduction by avoiding sales and profit instability.
  - (d) Achieve optimum size and carve out optimum share in the market.
- (iv) **Reverse mergers:** Reverse mergers involve mergers of profit making companies with companies having accumulated losses in order to:
  - (a) Claim tax savings on account of accumulated losses that increase profits.
  - (b) Set up merged asset base and shift to accelerate depreciation.
- (v) **Group company mergers:** These mergers are aimed at restructuring the diverse units of group companies to create a viable unit and making the company more controllable under reduced umbrella span. Such mergers are initiated with a view to affect consolidation in order to:
  - (a) Cut costs and achieve focus,
  - (b) Eliminate intra-group competition,
  - (c) Correct leverage imbalances and improve borrowing capacity, etc

### Diversification

A commonly stated motive for mergers is to achieve risk reduction through product or business diversification. The extent, to which risk is reduced, depends upon the correlation between the earnings of the merging entities. While negative correlation brings greater reduction in risk, positive correlation brings lesser reduction in risk. If investors can diversify on their own by buying stocks of companies which propose to merge, they do not derive any benefits



from the proposed merger. Any investor who wants to reduce risk by diversifying between two companies, say, ABC Company and PQR Company, may simply buy the stocks of these two companies and merge them into a portfolio. The merger of these companies is not necessary for him to enjoy the benefits of diversification. As a matter of fact, his 'home-made diversification give him far greater flexibility. He can contribute the stocks of ABC Company and PQR Company in any proportion he likes as he is not confronted with a 'fixed' proportion that result from the merger.

Thus, Diversification into new areas and new products can also be a motive for a firm to merge another with it. A firm operating in North India, if merges with another firm operating primarily in South India, can definitely cover broader economic areas. Individually these firms could serve only a limited area. Moreover, products diversification resulting from merger can also help the new firm fighting the cyclical/ seasonal fluctuations. For example, firm A has a product line with a particular cyclical variations and firm B deals in product line with counter cyclical variations. Individually, the earnings of the two firms may fluctuate in line with the cyclical variations. However, if they merge, the cyclically prone earnings of firm A would be set off by the counter cyclically prone earnings of firm B. Smoothing out the earnings of a firm over the different phases of a cycle tends to reduce the risk associated with the firm.

Through the diversification effects, merger can produce benefits to all firms by reducing the variability of firm's earnings. If firm A's income generally rises when B's income generally falls, and vice-a-versa, the fluctuation of one will tend to set off the fluctuations of the other, thus producing a relatively level pattern of combined earnings. Indeed, there will be some diversification effect as long as the two firm's earnings are not perfectly correlated (both rising and falling together). This reduction in overall risk is particularly likely if the merged firms are in different lines of business.

A firm wants to diversify to achieve:

- Sales and growth with stability or lesser volatility in long run,
- Favourable growth developments,
- Favourable competition shifts,
- Benefits from technological changes, etc.

(a) **External and Internal Growth:** A company may expand and/or diversify its markets internally or externally. If the company cannot grow internally due to lack of physical and managerial resources, it can grow externally by combining its operations with other companies through mergers and acquisitions. Mergers and acquisitions may help to accelerate the pace of a company's growth in a convenient and inexpensive manner.

For example, RPG Group had a turnover of only ₹ 80 crores in 1979. This has increased to about ₹ 5600 crores in 1996. This phenomenal growth was due to the acquisitions of several companies by the RPG Group. Some of the companies acquired are Asian Cables, Ceat, Calcutta Electricity Supply, etc. This kind of strategies to achieve growth is termed as inorganic growth strategy.

(b) **Market Share:** A merger can increase the market share of the merged firm. The increased concentration or market share improves the profitability of the firm due to economies of scale.

The acquisition of Universal Luggage by Blow Plast is an example of limiting competition to increase market power. Before the merger, the two companies were competing fiercely with each other leading to a severe price war and increased marketing costs. As a result of the merger, Blow Plast has obtained a strong hold on the market and now operates under near monopoly situation. Yet another example is the acquisition of Tomco by Hindustan Lever. Hindustan Lever at the time of merger was expected to control one-third of three million ton soaps and detergents markets and thus, substantially reduce the threat of competition.

(c) **Purchase of assets at bargain price:** Mergers may be explained by the opportunity to acquire assets, particularly land, mined rights, plant and equipment at lower cost than would be incurred if they were purchased or constructed at current market prices. If market prices of many stocks have been considerably below the replacement cost of the assets they represent, expanding firm considering constructing plants developing mines, or buying equipment.



- (d) **Increased external financial capability:** Many mergers, particularly those of relatively small firms into large ones, occur when the acquired firm simply cannot finance its operations. This situation is typical in a small growing firm with expanding financial requirements. The firm has exhausted its bank credit and has virtually no access to long term debt or equity markets. Sometimes the small firms have encountered operating difficulty and the bank has served notice that its loans will not be renewed. In this type of situation, a large firm with sufficient cash and credit to finance the requirements of the smaller one probably can obtain a good situation by making a merger proposal to the small firm. The only alternative the small firm may have is to try to interest two or more larger firms in proposing merger to introduce competition into their bidding for the acquisition.
- (e) **Increased managerial skills:** Occasionally, a firm will have good potential that it finds itself unable to develop fully because of deficiencies in certain areas of management or an absence of needed product or production technology. If the firm cannot hire the management or develop the technology it needs, it might combine with a compatible firm that has the needed managerial personnel or technical expertise. Any merger, regardless of the specific motive for it, should contribute to the maximization of owner's wealth.
- (f) **Reduction in tax liability:** Under Income Tax Act, there is a provision for set-off and carry forward of losses against its future earnings for calculating its tax liability. A loss making or sick company may not be in a position to earn sufficient profits in future to take advantage of the carry forward provision. If it combines with a profitable company, the combined company can utilize the carry forward loss and save taxes with the approval of government. In India, a profitable company is allowed to merge with a sick company to set-off against its profits the accumulated loss and unutilized depreciation of that company. A number of companies in India have merged to take advantage of this provision.

The following is the list of some companies along with the amount of tax benefits enjoyed:

- Orrisa Synthesis merged with Straw product Ltd. (₹ 16 crores)
  - Ahmadabad Cotton Mills merged with Arvind Mills (₹ 3.34 crores)
  - Sidhpur Mills merged with Reliance Industries Ltd. (₹ 3.34 crores)
  - Alwyn Missan merged with Mahinder and Mahindra Ltd. (₹ 2.47 crores)
  - Hyderabad Alwyn merged with Voltas Ltd. (₹ 1600 crores)
- (g) **Economies of Scale:** Economies of scale arise when increase in the volume of production leads to a reduction in the cost of production per unit. Merger may help to expand volume of production without a corresponding increase in fixed costs. Thus, fixed costs are either distributed over a large volume of production or some common costs are rationalised or fully avoided causing the unit cost of production to decline. For example, in a merged company needs one service function team/ head like Secretarial, Procurement, Human Resource etc. Economies of scale may also arise from other indivisibilities such as production facilities, management functions and management resources and systems. This happens because a given function, facility or resource is utilized for a large scale of operation. For example, a given mix of plant and machinery can produce scale economies when its capacity utilization is increased. Economies will be maximized when it is optimally utilized. Similarly, economies in the use of the marketing function can be achieved by covering wider markets and customers using a given sales force and promotion and advertising efforts. Economies of scale may also be obtained from the optimum utilization of management resource and systems of planning, budgeting, reporting and control. A company establishes management systems by employing enough qualified professionals irrespective of its size. A combined firm with a large size can make the optimum use of the management resource and systems resulting in economies of scale.
- (h) **Vertical Integration:** Vertical integration is a combination of companies business with the business of a supplier or customer generally motivated by a pure desire :
- (a) To secure a source of supply for key materials or sources,
  - (b) To secure a distribution outlet or a major customer for the company's products,
  - (c) To improve profitability by expanding into high margin activities of suppliers and customers, etc.



Thus, vertical merger may take place to integrate forward or backward. Forward integration is where company merges to come close to its customers. A holiday tour operator might acquire chain of travel agents and use them to promote his own holiday rather than those of rival tour operators. So forward or downstream vertical integration involves takeover of customer business.

Tata Tea's acquisition of consolidated coffee which produces coffee beans and Asian Coffee, which possesses coffee beans, was also backward integration which helped reduce exchange inefficiencies by eliminating market transactions. The merger of Samtel Electron services (SED) with Samtel Color Ltd. (SCL) entailed backward integration of SED which manufactures electronic components required to make picture tubes with SCL, a leading maker of color picture tube.

### **Mergers & Acquisitions have gained importance in recent time**

Merger - It's the most talked about term today creating lot of excitement and speculative activity in the markets. But before Mergers & Acquisitions (M&A) activity speeds up, it has to actually pass through a long chain of procedures (both legal and financial), which at times delays the deal.

With the liberalization of the Indian economy in 1991, restrictions on Mergers and Acquisitions have been lowered. The process has further been simplified in the Companies Act, 2013 and also by introducing several business friendly regulatory provisions by RBI and FEMA, FDI for outbound and inbound M&As involving off-shore companies. The numbers of Mergers and Acquisitions have increased many times in the last decade compared to the slack period of 1970-80s when legal hurdles trimmed the M&A growth. To put things in perspective, from 15 mergers in 1998, the number crossed to over 280 in FY01. With a downturn in the capital markets, valuations have come down to historic lows. It's high time that the consolidation game speeds up.

In simple terms, a merger means blending of two or more existing undertakings into one, consequent to which each undertaking would lose their separate identity. The most common reasons for mergers are, operating synergies, market expansion, diversification, growth, consolidation of production capacities and tax savings. However, these are just some of the illustrations and not the exhaustive benefits.

Again, before the idea of Merger and Acquisition crystallizes, the firm needs to understand its own capabilities and industry position. It also needs to know the same about the other firms it seeks to tie up with, to get a real benefit from a merger.

Globalization has increased the competitive pressure in the markets. In a highly challenging environment a strong reason for merger and acquisition is a desire to survive. Thus apart from growth, the survival factor has off late, spurred the merger and acquisition activity worldwide.

The present study gives some insight as to why the companies are going for merger and acquisition and what are the legal, tax and financial aspects governing them. The study also deals with other aspects such as types of merger, motives, reasons, and successful consolidation in merger, recent trend in merger and acquisition activity. Lastly few case studies involving the merger and acquisition have been taken.

Mergers, acquisitions and restructuring have become a major force in the financial and economic environment all over the world. Essentially an American phenomenon till the middle of 1970s, they have become a dominant global business theme at present. On Indian scene too corporate are seriously making at mergers, acquisitions which has become order of the day.

Mergers and acquisitions (M&A) and corporate restructuring are a big part of the corporate finance world. Every day, Wall Street investment bankers arrange M&A transactions, which bring separate companies together to form larger ones. When they're not creating big companies from smaller ones, corporate finance deals do the reverse and break up companies through spin-offs, carve-outs or tracking stocks.

Not surprisingly, these actions often make the news. Deals can be worth hundreds of millions, or even billions, of dollars. They can dictate the fortunes of the companies involved for years to come. For a CEO, leading an M&A can represent the highlight of a whole career. And it is no wonder we hear about so many of these transactions; they happen all the time. Next time you flip open the newspaper's business section, odds are good that at least one headline will announce some kind of M&A transaction.





Budgets and forecasts

- Financial ratios
  - Return on Assets
  - Return on Net worth
  - GP / NP
  - D/ E Ratio
  - Expense Ratio

Replacement cost data

Valuation of Assets / Liabilities

(c) Management Analysis : Assessment of Senior Management

Business Experience

Union Contract / Strike History

Labour Relations / Agreements

Personnel Schemes

Profile of permanent employees

(d) Marketing Analysis : Data on Past Sales

Customer profile

Major sales agreements

Trends

Distribution channels

Product Profile

Development / Disclosure

(e) Manufacturing : Location

Technology

Manufacturing process

Quality

R & D

(III) Other Information

- Inventory valuation, obsolescence, over valuation.
- Litigation
- Doubtful debts
- Unrealized / Unrealizable Assets / Investments
- Tax status / Assessments / Outstanding dues

(IV) Economic Analysis

- Business Cycles
- Public Interest
- Government Prices / Incentives



- Condition of securities market
- (V) Comparison of Alternative Target companies and Arrival of decision as regards target company.
- (VI) Strategy for takeover - method to be employed.
  - Friendly takeover through negotiations
  - Hostile
- (VII) Valuation of Assets and arriving at Purchase consideration.
- (VIII) Mode of Payment
  - Cash
  - Share Exchange Ratio
- (IX) Legal formalities
  - Takeover code
  - Company law
  - Income tax / SICA / IDR / MRTTP
- (X) Post Merger Integration and monitoring of implementation with a keen eye on ensuring that synergic benefits are derived in full.

### **Merger can revive a sick company**

An important motive for merger is to turn around a financially sick company through the process of merger. Amalgamation taking place under the aegis of Board for Industrial and Financial Reconstruction (BIFR) fall under this category.

BIFR found revival of ailing companies through the means of their merger with healthy company as the most successful route for revival of their financial health. Firstly, the purpose is to revive a group of sick companies by merging it with groups of healthy company by obtaining concessions from financial institution and government agencies and obtaining benefits of tax concessions u/s 72A of Income Tax Act, 1961. Secondly, it also helps to preserve group reputation. Some of the group companies which have amalgamated through the BIFR include Mahindra Missan Allwyn with Mahindra and Mahindra, Hyderabad, Allwyn with Voltas etc.

### **Major theories of Mergers & Acquisitions**

The following theories of mergers and acquisitions are discussed below:

- (i) **Synergy or Efficiency** : In this theory, the total value from the combination is greater than the sum of the values of the component companies operating independently.
- (ii) **Hubris**: The result of the winner's curse, causing bidders to overpay. It is possible that value is unchanged.
- (iii) **Agency**: The total value here is decreased as a result of mistakes or managers who put their own preferences above the well-being of the company.

## 8.2 APPLICATION OF VALUATION MODELS FOR BUSINESS MERGERS AND ACQUISITIONS

Investors in a company that are aiming to take over another one must determine whether the purchase will be beneficial to them. In order to do so, they must ask themselves how much the company being acquired is really worth.

Naturally, both sides of an M&A deal will have different ideas about the worth of a target company: its seller will tend to value the company at as high of a price as possible, while the buyer will try to get the lowest price that he can.



There are, however, many legitimate ways to value companies. The most common method is to look at comparable companies in an industry, but deal makers employ a variety of other methods and tools when assessing a target company. Here are just a few of them:

1. **Comparative Ratios** - The following are two examples of the many comparative metrics on which acquiring companies may base their offers:
  - Price-Earnings Ratio (P/E Ratio) - With the use of this ratio, an acquiring company makes an offer that is a multiple of the earnings of the target company. Looking at the P/E for all the stocks within the same industry group will give the acquiring company good guidance for what the target's P/E multiple should be.
  - Enterprise-Value-to-Sales Ratio (EV/Sales) - With this ratio, the acquiring company makes an offer as a multiple of the revenues, again, while being aware of the price-to-sales ratio of other companies in the industry.
2. **Replacement Cost** - In a few cases, acquisitions are based on the cost of replacing the target company. For simplicity's sake, suppose the value of a company is simply the sum of all its equipment and staffing costs. The acquiring company can literally order the target to sell at that price, or it will create a competitor for the same cost. Naturally, it takes a long time to assemble good management, acquire property and get the right equipment. This method of establishing a price certainly wouldn't make much sense in a service industry where the key assets - people and ideas - are hard to value and develop.
3. **Discounted Cash Flow (DCF)** - A key valuation tool in M&A, discounted cash flow analysis determines a company's current value according to its estimated future cash flows. Forecasted free cash flows (net income + depreciation/amortization - capital expenditures - change in working capital) are discounted to a present value using the company's weighted average costs of capital (WACC). Admittedly, DCF is tricky to get right, but few tools can rival this valuation method.

**Synergy: The Premium for Potential Success**

For the most part, acquiring companies nearly always pay a substantial premium on the stock market value of the companies they buy. The justification for doing so nearly always boils down to the notion of synergy; a merger benefits shareholders when a company's post-merger share price increases by the value of potential synergy.

Let's face it; it would be highly unlikely for rational owners to sell if they would benefit more by not selling. That means buyers will need to pay a premium if they hope to acquire the company, regardless of what pre-merger valuation tells them. For sellers, that premium represents their company's future prospects. For buyers, the premium represents part of the post-merger synergy they expect can be achieved. The following equation offers a good way to think about synergy and how to determine whether a deal makes sense. The equation solves for the minimum required synergy:

$$\frac{\text{Pre - Merger Value of Firms} + \text{Synergy}}{\text{Post - Merger Number of Shares}} = \text{Pre - Merger Stock Price}$$

In other words, the success of a merger is measured by whether the value of the buyer is enhanced by the action. However, the practical constraints of mergers, which we discuss in part five, often prevent the expected benefits from being fully achieved. Alas, the synergy promised by deal makers might just fall short.

**8.3 DETERMINATION OF EXCHANGE RATIO (SWAP) OR PURCHASE CONSIDERATION**

**Commonly used bases to compute the Exchange Ratio**

Aspect	Earnings Per share (EPS)	Market Price per share (MPS)	Book Value per share (BVS)
Computation		$\frac{\text{MPS of Selling Co.}}{\text{MPS of Buying Co.}}$	$\frac{\text{BVS of Selling Co.}}{\text{BVS of Buying Co.}}$

Suitability	When there are no differential risks associated with the two companies entering into Merger.	When the shares of the acquiring and the target Firm are actively traded in the market	If accounting policies are to be reflected in the determination of Exchange Ratio.
Demerits	1. Difference in growth rate of earnings of two companies will not be highlighted.	1. When the trading is thin, market prices may not be a reliable measure.	Exchange ratio determined under this method does not reflect the purchasing power of money, and are highly different from true economic values.
	2. Gains in earnings arising out of merger are not considered to determine Exchange Ratio.	2. Market prices may be manipulated by vested interest and the Exchange Ratio determined may not reflect the true position.	

#### 8.4 SYNERGISTIC BENEFITS AND DISTRIBUTION OF SYNERGY GAINS

While the target company always gains, the acquirer gains when synergy accrues from combined operations, and loses under the other two theories. The total value becomes positive under synergy, becomes zero under the second, and becomes negative under the third.

##### Motives of for Mergers and Acquisitions

Mergers and acquisitions are strategic decisions leading to the maximization of a company's growth by enhancing its production and marketing operations. They have become popular in the recent times because of the enhanced competition, breaking of trade barriers, free flow of capital across countries and globalization of business as a number of economies are being deregulated and integrated with other economies. A number of motives are attributed for the occurrence of mergers and acquisitions.

- (i) **Synergies through Consolidation:** Synergy implies a situation where the combined firm is more valuable than the sum of the individual combining firms. It is defined as 'two plus two equal to five' ( $2 + 2 = 5$ ) phenomenon. Synergy refers to benefits other than those related to economies of scale. Operating economies are one form of synergy benefits. But apart from operating economies, synergy may also arise from enhanced managerial capabilities, creativity, innovativeness, R&D and market coverage capacity due to the complementary nature of resources and skills and a widened horizon of opportunities.

An undervalued firm will be a target for acquisition by other firms. However, the fundamental motive for the acquiring firm to takeover a target firm may be the desire to increase the wealth of the shareholders of the acquiring firm. This is possible only if the value of the new firm is expected to be more than the sum of individual value of the target firm and the acquiring firm. For example, if A Ltd. and B Ltd. decide to merge into AB Ltd. then the merger is beneficial if

$$V (AB) > V (A) + V (B)$$

Where

V (AB) = Value of the merged entity

V (A) = Independent value of company A

V (B) = Independent value of company B

Igor Ansoff (1998) classified four different types of synergies. These are :

- (a) **Operating synergy:** The key to the existence of synergy is that the target firm controls a specialized resource that becomes more valuable when combined with the bidding firm's resources. The sources of synergy of specialized resources will vary depending upon the merger. In case of horizontal merger, the synergy comes from some form of economies of scale which reduce the cost or from increase market power which increases profit margins and sales. There are several ways in which the merger may generate operating economies.



The firm might be able to reduce the cost of production by eliminating some fixed costs. The research and development expenditures will also be substantially reduced in the new set up by eliminating similar research efforts and repetition of work already done by the target firm. The management expenses may also come down substantially as a result of corporate reconstruction. Certain major examples are Tata Indica deriving technology advantage from Jaguar Land Rover acquisition as well as using the same distribution channel in western countries for selling exported Indica cars and imported JLR cars through its own channel. R&D benefits getting generated due to SunPharma acquiring Ranbaxy will be for mutual advantage besides cost savings from convergence.

The selling, marketing and advertisement department can be streamlined. The marketing economies may be produced through savings in advertising (by reducing the need to attract each other's customers), and also from the advantage of offering a more complete product line (if the merged firms produce different but complementary goods), since a wider product line may provide larger sales per unit of sales efforts and per sales person. When a firm having strength in one functional area acquires another firm with strength in a different functional area, synergy may be gained by exploiting the strength in these areas. A firm with a good distribution network may acquire a firm with a promising product line, and thereby can gain by combining these two strength. The argument is that both firms will be better off after the merger. A major saving may arise from the consolidation of departments involved with financial activities e.g., accounting, credit monitoring, billing, purchasing etc.

Thus, when two firms combine their resources and efforts, they will be able to produce better results than they were producing as separate entities because of saving various types of operating costs. These resultant economies are known as synergistic operating economies.

In a vertical merger, a firm may either combine with its supplier of input (backward integration) and/or with its customers (forward integration). Such merger facilitates better coordination and administration of the different stages of business stages of business operations-purchasing, manufacturing and marketing – eliminates the need for bargaining (with suppliers and/or customers), and minimizes uncertainty of supply of inputs and demand for product and saves costs of communication.

An example of a merger resulting in operating economies is the merger of Sundaram Clayton Ltd. (SCL) with TVS-Suzuki Ltd. (TSL). By this merger, TSL became the second largest producer of two-wheeler after Bajaj. The main objective motivation for the takeover was TSL's need to tide over its different market situation through increased volume of production. It needed a large manufacturing base to reduce its production costs. Large amount of funds would have been required for creating additional production capacity. SCL also needed to upgrade its technology and increase its production. SCL's and TSL's plants were closely located which added to their advantages. The combined company has also been enabled to share the common R&D facilities.

(b) **Financial synergy:** Financial synergy refers to increase in the value of the firm that accrues to the combined firm from financial factors. There are many ways in which a merger can result into financial synergy and benefit. A merger may help in:

- Eliminating financial constraint
- Deployment surplus cash
- Enhancing debt capacity
- Lowering the financial costs
- Better credit worthiness

**Financial Constraint:** A company may be constrained to grow through internal development due to shortage of funds. The company can grow externally by acquiring another company by the exchange of shares and thus, release the financing constraint.

**Deployment of Surplus Cash:** A different situation may be faced by a cash rich company. It may not have enough internal opportunities to invest its surplus cash. It may either distribute its surplus cash to its shareholders or use it to acquire some other company. The shareholders may not really benefit much if surplus cash is



returned to them since they would have to pay tax at ordinary income tax rate. But if a Company can return cash to shareholders either by payment of Dividend or through buy back of shares at the current appreciated value, then the dividend distribution tax will be paid by the company and no capital gains will be paid by the shareholders if holding is for more than one year. Their wealth may increase through an increase in the market value of their shares if surplus cash is used to acquire another company. If they sell their shares, they would pay tax at a lower, capital gains tax rate. The company would also be enabled to keep surplus funds and grow through acquisition.

**Debt Capacity:** A merger of two companies, with fluctuating, but negatively correlated, cash flows, can bring stability of cash flows of the combined company. The stability of cash flows reduces the risk of insolvency and enhances the capacity of the new entity to service a larger amount of debt. The increased borrowing allows a higher interest tax shield which adds to the shareholders wealth.

**Financing Cost:** The enhanced debt capacity of the merged firm reduces its cost of capital. Since the probability of insolvency is reduced due to financial stability and increased protection to lenders, the merged firm should be able to borrow at a lower rate of interest. This advantage may, however, be taken off partially or completely by increase in the shareholders risk on account of providing better protection to lenders.

Another aspect of the financing costs is issue costs. A merged firm is able to realize economies of scale in flotation and transaction costs related to an issue of capital. Issue costs are saved when the merged firm makes a larger security issue.

**Better credit worthiness:** This helps the company to purchase the goods on credit, obtain bank loan and raise capital in the market easily.

RP Goenka's Ceat Tyres sold off its type cord division to Shriram Fibers Ltd. in 1996 and also transferred its fiber glass division to FGL Ltd., another group company to achieve financial synergies.

### (c) Managerial synergy:

One of the potential gains of merger is an increase in managerial effectiveness. This may occur if the existing management team, which is performing poorly, is replaced by a more effective management team. Often a firm, plagued with managerial inadequacies, can gain immensely from the superior management that is likely to emerge as a sequel to the merger. Another allied benefit of a merger may be in the form of greater congruence between the interests of the managers and the shareholders. In present day scenario banks consider the managerial abilities and reliability factor as one of the considerations for adding margin spread over base rate or marginal rate of lending to fix the rate of interest to be charged to a company. Hence higher the dependency factor lower the rate of interest on borrowings.

A common argument for creating a favourable environment for mergers is that it imposes a certain discipline on the management. If lacklustre performance renders a firm more vulnerable to potential acquisition, existing managers will strive continually to improve their performance.

### (d) Sales synergy:

These synergies occurs when merged organization can benefit from common distribution channels, sales administration, advertising, sales promotion and warehousing.

The Industrial Credit and Investment Corporation of India Ltd. (ICICI) acquired Tobacco Company, ITC Classic and Anagram Finance to obtain quick access to a well dispersed distribution network.

## 8.5 RECOGNITION OF INTEREST OF VARIOUS STAKEHOLDERS

It is evident that numerous parties other than the bidder and biddee will be affected by an acquisition. A variety of stakeholders in the company will be involved in some way, for example: employees, suppliers, customers, environmental and health agencies, the government (through taxation and grants) and indeed, any person or institution whose activities may be directly affected by the entity's operations.



Failure to discuss takeover plans with some of these stakeholder groups, especially employee representatives and government, can lead to prolonged and expensive confrontations. The interests of the local community need to be recognised also as localised protests can commercially sound proposal.

## 8.6 SELECTION OF APPROPRIATE COST OF CAPITAL FOR VALUATION

### Capital Asset Pricing Model:

The most widely used method in calculating the cost of equity is the capital asset pricing model (CAPM). In CAPM, the required return on equity is a risk-free return plus a risk component.

Cost of equity = Risk-free rate + market price of risk x beta

### Illustration 1.

The risk-free rate = 5.5%

The market price of risk = 7%

The company's beta = 1.2

Cost of equity = 5.5% + 7% (1.2) = 13.9%

### The Dividend Growth Model:

Cost of equity = Expected Dividend yield + expected growth rate.

### Bond Yield Plus Equity Risk Adjustment:

Cost of equity = Bond yield + spread over bond yields.

### Cost of Debt:

Cost of debt should be on after-tax basis, as interest is tax deductible. Therefore, the cost of debt is given by:

The after-tax cost of DEBT =  $K_d (1-T)$  Where T = Tax rate.

### Weighted Average Cost of Capital:

The financial proportions of debt and equity are used as guide.

### Illustration 2.

Cost of debt 8%

Tax rate = 40%

Capital structure: Debt: 40% and Equity: 60%

Weighted average cost of capital =  $13.9\%(0.60) + 8\%(1-0.40)(0.40) = 10.26\%$

## 8.7 FORMS OF CONSIDERATION AND TERMS OF ACQUISITION

The provisions of Accounting Standard (AS-14) on Accounting for Amalgamations need to be referred to in this context.

### Methods of Payment:

The two main methods of financing an acquisition are cash and share exchange.

- (1) **Cash:** This method is generally considered suitable for relatively small acquisitions. It has two advantages: (i) the buyer retains total control as the shareholders in the selling company are completely bought out, and (ii) the value of the bid is known and the process is simple.

**Illustration 3.**

	Company A	Company B
Market price per share	₹ 75	₹15
No. of shares	1,00,000	60,000
Market Value of the company	₹ 75,00,000	₹ 9,00,000

Assume Company A intends to pay ₹12,00,000/- cash for Company B.

If the share price does not anticipate a merger:

The share price in the market is expected to accurately reflect the true value of the company.

The cost to the bidder Company A = Payment - The market value of Company B

= ₹12 lakhs – ₹9 lakhs

= ₹3 lakhs.

Company A is paying ₹3 lakhs for the identified benefits of the merger.

If the share price includes a speculation element of ₹2 per share:

The cost to Company A = ₹3,00,000 + (60,000 × ₹2)

= ₹3,00,000 + ₹1,20,000

= ₹4,20,000/-

Worth of Company B = (₹15 – ₹2) × 60,000

= ₹13 × 60,000

= ₹7,80,000/-

This can also be expressed as: ₹12,00,000 – ₹4,20,000 = ₹7,80,000

**(2) Share Exchange**

The method of payment in large transactions is predominantly stock for stock. The advantage of this method is that the acquirer does not part with cash and does not increase the financial risk by raising new debt. The disadvantage is that the acquirer's shareholders will have to share future prosperity with those of the acquired company and also loses the benefits from tax shield on interest which it would have derived.

Such settlement of an acquisition transaction through equity share of the acquirer is also technically called as 'Equity as the Currency of the Deal'

**Illustration 4.**

Suppose Company A wished to offer shares in Company A to the shareholders of Company B instead of cash:

Amount to be paid to shareholders of Company B = ₹12,00,000

Market price of shares of Company A = ₹75

No. of shares to be offered = ₹12,00,000 / ₹ 75

= 16,000

Now, shareholders of Company B will own part of Company A, and will benefit from any future gains of the merged enterprise.

Their share in the merged enterprise = 16,000 / (1,00,000 + 16,000)

= 13.8%



Further, now suppose that the benefits of the merger has been identified by Company A to have a present value of ₹4,00,000

$$\begin{aligned} \text{The value of the merged entity} &= ₹ 75,00,000 + (₹ 9,00,000 + ₹ 4,00,000) \\ &= ₹ 88,00,000 \end{aligned}$$

True cost of merger to the shareholders of Company A:

	Company A	Company B
Proportion of ownership in merged enterprise	86.2%	13.8%
Market Value: Total = ₹ 88,00,000	75,85,600	12,14,400
No. of shares currently in issue	100,000	60,000
Market price per share	₹75.86	₹20.24

The above gives the value of shares in the company before the merger is completed, based on estimates of what the company will be worth after the merger.

The valuation of each company also recognizes the split of the expected benefits which will accrue to the combined entity once the merger has taken place.

The true cost can be calculated as given below:

60,000 shares in Company B @ ₹20.24	₹12,14,400
Less: Current market value	₹ 9,00,000
Benefits being paid to shareholders of Company B	₹ 3,14,400

### Participants in the Merger and Acquisition Process

There are many professionals who play an essential role in the successful completion of a deal.

- Investment Bankers:** Investment bankers are always at the forefront of the acquisition process. They offer strategic and tactical advice, screen potential buyers and sellers, make initial contact with a seller and buyer and provide negotiation support, valuation and deal structuring. Investment bankers in addition providing investment advisory services also provide various types of due diligence services as discussed above.
- Lawyers:** The legal framework surrounding a typical transaction has become so complicated that no one individual can have sufficient expertise to address all the issues. So, legal teams consist of more than a dozen lawyers each of whom represents a specialised aspect of the law.
- Accountants:** Accountants perform the role of auditors by reviewing the target's financial statements and operations through a series of interviews with senior and middle level managers. These services are generally provided by Accounting Advisory Group of professional accounting firms like a Big4.
- Valuation Experts:** They build models that incorporate various assumptions such as costs or revenues growth rate.
- Institutional Investors:** Institutional investors can announce how they intend to vote on a matter and advertise their position in order to seek support and have more influence.
- Arbitrageurs:** Arbitrageurs provide market liquidity during transactions. With the number of merger arbitrageurs increasing, they are becoming more proactive in trying to anticipate takeover situations. Their objective is to identify the target before the potential acquirer is required by law to announce its intentions.

## 8.8 IMPACT OF MERGER ON VALUE OF SHARES

Shareholder Value Analysis (SVA) focuses on the creation of economic value for Shareholders, as measured by share price performance and flow of funds.

Shareholder Value is used to link management strategy and decision to the creating of value for shareholders.



**Value Drivers:** Factors or value Drivers which influence the Shareholder's Value are identified.

**Example:** Growth in Sales, profit Margin, Capital Investments Decisions, etc.

**Management Responsibilities:** Management should pay attention to Value drivers, while taking investment and finance decisions.

**Benefit**

- (a) SVA helps the management to concentrate on activities which create value to the shareholders rather than on short- term profitability.
- (b) SVA and EVA together helps to strengthen the competitive position of the Firm, by focusing on wealth creation.
- (c) They provide an objective and consistent framework of evaluation and decision- making across all function, departments and units of the Company.

**Illustration 5.**

Assume the current market value of the bidding company is ₹40 crores, and that of the target company is also ₹40 crores. Then, the sum of the values as independent companies is ₹ 80 crores. Suppose, as a combined entity, due to synergistic effects, the value increases to ₹100 crores. The amount of value created is ₹20 crores. How will the increase in value be shared or divided between the bidder and the target company?

**Solution:**

Targets usually receive a premium. If the bidder pays the target a premium of less than ₹20 crores, it will share in the value increases. If the bidder pays ₹60 crores to the target, all gains will go the target company. The bidder achieves no value increase for itself. On the other hand, if the bidder pays ₹70 crores to the target, the value of bidder will down to ₹30 crores.

**Illustration 6.**

Acquiring company is considering the acquisition of Target Company in a stock- for- stock transaction in which target Company would receive ₹90 for each share of its common stock. The Acquiring company does not expect any change in its price/ earnings ratio multiple after the merger and chooses to value the target company conservatively by assuming no earnings growth due to synergy.

**Calculate:**

- (i) The purchase price premium
- (ii) The exchange ratio
- (iii) The number of new shares issued by the acquiring company.
- (iv) Post-merger EPS of the combined firms
- (v) Pre-merger EPS of the Acquiring company
- (vi) Pre-merger P/E ratio
- (vii) Post-merger share price
- (viii) Post-merger equity ownership distribution.

**The following additional information is available.**

Particulars	Acquiring	Target
Earnings	₹2,50,000	₹72,500
Number of shares	1,10,000	20,000
Market Price per Share	₹50	₹60

Also, Comment on your results.

**Solution:**

- (i) Purchase price premium = Offer price for Target company stock/Target company Market price per share =  $90/60 = 1.5$
- (ii) Exchange ratio = Price per share offered for Target Company/Market Price per share for the acquiring company =  $90/50 = 1.8$
- Acquiring company issues 1.8 shares of stock for each of Target Company's stock.
- (iii) New shares issued by acquiring company = shares of Target Company x Exchange ratio =  $20,000 \times 1.8 = 36,000$ .
- (iv) Post-merger EPS of the combined companies = Combined earning/ total number of share.
- Combined earnings =  $(2,50,000 + 72,500) = ₹3,22,500$
- Total shares outstanding of the new entity
- =  $1,10,000 + 36,000 = 1,46,000$
- =  $₹3,22,500 \div 1,46,000 = ₹2.209$
- (v) Pre-merger EPS of the acquiring company
- = earnings / Number of shares
- =  $2,50,000 / 1,10,000 = ₹2.273$
- (vi) Pre-merger P/E = Pre-merger market price per share / Pre-merger earnings per share
- =  $50/2.273 = 22.00$
- (vii) Post-merger share price = Post-merger EPS x Pre-merger P/E
- =  $2.209 \times 22.00 = ₹48.60$  (as compared to ₹50 Pre-merger)
- (viii) Post-merger Equity Ownership Distribution
- Target Company = Number of new shares / Total number of shares
- =  $36,000 / 1,46,000 = 0.2466$  or 24.66%
- Acquiring company =  $100 - 24.66 = 75.34\%$

**Comment** – The acquisition results in a ₹1.40 reduction in the market price of the acquiring company due to a 0.064 decline in the EPS of the combined companies. Whether the acquisition is a poor decision depends upon what happens to the earnings would have in the absence of the acquisition, the acquisition may contribute to the market value of the acquiring company.

**Illustration 7.**

R Ltd is intending to acquire S Ltd. (by merger) and the following information are available in respect of both the companies.

Particulars	R Ltd.	S Ltd.
Total current Earnings E	₹2,50,000	₹90,000
No. of Outstanding Shares	50,000	30,000
Market price per share	₹21	₹14

- (i) What is the present EPS of both the companies?
- (ii) If the proposed merger takes place what would be the new earnings per share for R Ltd. (assuming the merger takes place by exchange of equity shares and the exchange ratio is based on the current market price)?
- (iii) What should be the exchange ratio if S Ltd. wants to ensure the same earnings to members as before the merger took place?

**Solution:**

- (i) EPS = total earnings/ No. of equity shares

$$\text{EPS}_{\text{RLTD}} = 2,50,000/50,000 = ₹5$$

$$\text{EPS}_{\text{SLTD}} = 90,000/30,000 = ₹3$$

- (ii) No. of shares S Ltd. shareholders will get in R Ltd. based on market prices of shares is as follows:

$$\text{Exchange Ratio} = \frac{14}{21} = \frac{2}{3} \text{ i. e. for every 3 shares of S Ltd. 2 shares of R Ltd.}$$

$$\text{Total No. of shares of R Ltd. Issued} = \frac{14}{21} \times 30,000 = 20,000 \text{ shares}$$

$$\text{Total number of shares of R Ltd. After merger} = 50,000 + 20,000 = 70,000$$

$$\text{Total earning of R Ltd after merger} = 2,50,000 + 90,000 = 3,40,000 \text{ [Remember no synergy given]}$$

$$\text{The new EPS of R Ltd. After merger} = \frac{₹3,40,000}{70,000} = ₹4.86$$

- (iii) Calculation of exchange ratio to ensure S Ltd to earn the same before the merger took place: Both acquiring and acquired firm can maintain their EPS only if the merger takes place based on respective EPS.

$$\text{Exchange Ratio based on EPS} = 3/5 = 0.6$$

$$\text{Total shares of R Ltd. receivable by S Ltd. shareholders} = 0.6 \times 30,000 = 18,000$$

$$\text{Total No. of shares of R LTD after merger} = 50,000 + 18,000 = 68,000$$

$$\text{EPS after merger} = \text{Total Earnings} / \text{Total no. of shares} = [₹2,50,000 + ₹90,000] / 68,000 = ₹5.00$$

$$\text{Total earnings after merger of S Ltd.} = ₹5 \times 18,000 = ₹90,000$$

**Illustration 8.**

A Ltd. is considering the acquisition of B Ltd. with stock. Relevant financial information is given below.

Particulars	A Ltd.	B Ltd.
Present earnings	₹7.5 lakhs	₹2.5 lakhs
Equity (No. of shares)	4.0 lakhs	2.0 lakhs
EPS	₹ 1.875	₹ 1.25
P/E ratio	10	5

Answer the following question:

- What is the market price of each company?
- What is the market capitalization of each company?
- If the P/E of A Ltd. changes to 7.5, what is the market price of A Ltd?
- Does market value of A Ltd. change?
- What would be the exchange ratio based on Market Price? (Take revised Price of A Ltd.)

**Solution:**

- (i) P/E = Market Price/ EPS. Therefore we have, Market price = P/E × EPS

$$\text{A Ltd.'s Market Price} = 10 \times 1.875 = ₹18.75$$



B Ltd.'s Market Price =  $5 \times 1.25 = ₹6.25$

(ii) Market Capitalization (same as market value or in short referred as market Cap)

= Number of outstanding shares  $\times$  market Price

A Ltd.'s Market cap =  $4.0 \text{ lakhs} \times ₹18.75 = ₹75 \text{ Lakhs}$

B Ltd.'s market cap =  $2.0 \text{ lakhs} \times ₹6.25 = ₹12.5 \text{ Lakhs}$

(iii) If the P/E of A Ltd. changes to 7.5, then the market price is given by

=  $7.5 \times ₹1.875 = ₹14.0625$

(iv) Yes. The market value decreases. i.e. = A Ltd.'s market Value =  $4.0 \text{ lakhs} \times ₹14.0625 = ₹56.25 \text{ Lakhs.}$

(v) General Formula for exchange ratio =  $\frac{\text{MPS of Target Firm}}{\text{MPS of acquiring Firm}} = \frac{6.25}{14.0625} = 0.44$

### Illustration 9.

A Ltd. is considering takeover of B Ltd. and C Ltd. The financial data for the three companies are as follows:

Particulars	A Ltd.	B Ltd.	C Ltd.
Equity Share Capital of ₹10 each (₹ crores)	450	180	90
Earnings (₹ crores)	90	18	18
Market price of each share (₹)	60	37	46

Calculate:

- Price earnings ratios
- Earnings per share of A Ltd. after the acquisition of B Ltd. and C Ltd. separately. Will you recommend the merger of either/both of the companies? Justify your answer.

### Solution :

#### (i) Calculation of Price Earnings ratios

Particulars	A Ltd.	B Ltd.	C Ltd.
Earnings (₹ crores)	90	18	18
No. of shares (crores)	45	18	9
EPS (₹)	2	1	2
Market price of each share (₹)	60	37	46
PE Ratio (MPS $\div$ EPS)	30	37	23

#### (ii) Calculation of EPS of A Ltd. after acquisition of B Ltd. and C Ltd.

Exchange ratio or rate =  $\frac{\text{Buyer's P / E Ratio}}{\text{Seller's P / E Ratio}}$

Particulars	A Ltd.	B Ltd.	C Ltd.
Exchange ratio in A Ltd.	--	0.81	1.30
Value of shares (₹ crores) (MPS $\times$ No. of Eq. Share)	2700	666	414



No. of A Ltd.'s share to be given (crores)	--	666/60	414/60
EPS (₹)	--	11.10	6.9
Total earnings after acquisition (₹ crores)	--	108	108
Total number of shares (crores)	--	56.1	51.9
EPS after acquisition (₹)	--	1.93	2.08

**Analysis:** After merger of C Ltd. with A Ltd.'s. EPS is higher than A Ltd. (₹2.08). Hence merger with only C Ltd. is suggested to increase the value to the shareholders of A Ltd.

### Illustration 10.

XYZ Ltd. is considering merger with ABC Ltd. XYZ Ltd.'s shares are currently traded at ₹25. It has 2,00,000 shares outstanding and its profits after taxes (PAT) amount to ₹4,00,000. ABC Ltd. has 1,00,000 shares outstanding. Its current market price is ₹12.50 and its PAT are ₹1,00,000. The merger will be effected by means of a stock swap (exchange). ABC Ltd. has agreed to a plan under which XYZ Ltd. will offer the current market value of ABC Ltd.'s shares:

- What is the pre-merger earnings per share (EPS) and P/E ratios of both the companies?
- If ABC Ltd.'s P/E ratio is 8, what is its current market price? What is the exchange ratio? What will XYZ Ltd.'s post-merger EPS be?
- What must the exchange ratio be for XYZ Ltd.'s that pre and post-merger EPS to be the same?

**Solution :**

#### (i) Pre-merger EPS and P/E ratios of XYZ Ltd. and ABC Ltd.

Particulars	XYZ Ltd.	ABC Ltd.
Profits after taxes	₹ 4,00,000	₹ 1,00,000
Number of shares outstanding	2,00,000	1,00,000
EPS (Earnings after tax/No. of shares)	₹ 2	₹ 1
Market price per share	₹ 25.00	₹ 12.50
P/E Ratio (times) (MPS ÷ EPS)	12.50	12.50

(ii) **Current market price of ABC Ltd.,** if P/E ratio is 8 = ₹ 1 × 8 = ₹ 8

$$\text{Exchange ratio} = ₹ 25/8 = 3.125$$

$$\text{Post merger EPS of XYZ Ltd.} = \frac{₹4,00,000 + ₹1,00,000}{2,00,000 + (1,00,000 / 3.25)} = \frac{₹5,00,000}{2,32,000} = 2.16$$

#### (iii) Desired exchange ratio

Total number of shares in post-merged company

$$= \frac{\text{Post-merged earnings}}{\text{Pre-merger EPS of XYZ Ltd.}} = 5,00,000/2 = 2,50,000$$

$$\text{Number of shares required to be issued} = 2,50,000 - 200,000 = 50,000$$

$$\text{Therefore, the exchange ratio is} = 50,000/1,00,000 = 0.50$$

**Illustration 11.**

Company X is contemplating the purchase of Company Y, Company X has 3,00,000 shares having a market price of ₹30 per share, while Company Y has 2,00,000 shares selling at ₹20 per share. The EPS are ₹4.00 and ₹2.25 for Company X and Y respectively. Managements of both companies are discussing two alternative proposals for exchange of shares as indicated below:

- (a) in proportion to the relative earnings per share of two Companies.
- (b) 0.5 share of Company X for one share of company Y (0.5 : 1).

You are required:

- (i) to calculate the Earnings Per Share (EPS) after merger under two alternatives; and
- (ii) to show the impact on EPS for the shareholders of two companies under both alternatives.

**Solution:****Working Notes:**

Computation of total earnings after merger

Particulars	Company X	Company Y	Total
Outstanding shares	3,00,000	2,00,000	
EPS (₹)	4	2.25	
Total earnings (₹)	12,00,000	4,50,000	16,50,000

**(i) (a) Calculation of EPS when exchange ratio is in proportion to relative EPS of two companies**

Company X	3,00,000
Company Y $(2,00,000 \times 2.25/4)$	1,12,500
Total number of shares after merger	4,12,500

Company X

EPS before merger = ₹4

EPS after merger = ₹16,50,000/4,12,500 shares = ₹4

**(i) (b) Calculate of EPS when share exchange ratio is 0.5:1**

Total earnings after merger = ₹16,50,000

Total number of shares after merger = 3,00,000 + (2,00,000 × 0.5) = 4,00,000 shares

EPS after merger = ₹16,50,000 / 4,00,000 = ₹4.125

**(ii) Impact of merger on EPS for shareholders of Company X and Company Y**



(a) Merger took place on relative EPS of two companies; therefore both companies maintain their EPS and no impact on EPS of shareholders of both companies.

(b) Impact on Shareholders of Company X

	(₹)
EPS before merger	4.000
EPS after merger	4.125
Increase in EPS	0.125

Impact on shareholders of Company Y

	(₹)
EPS before merger	2.25
Equivalent EPS after merger (4.125×0.5)	2.0625
Decrease in EPS	0.1875

### Illustration 12.

The following information is provided in relation to the acquiring firm Mark limited and the target Mask Limited

Particulars	Firm Mark Limited	Firm Mask Limited
Earnings after tax (₹)	200 lacs	40 lacs
Number of shares outstanding	20 lacs	10 lacs
P/E ratio	10	5

Required:

- What is the swap ratio in terms of current market prices?
- What is the EPS of Mark Limited after acquisition?
- What is the expected market price per share of Mark Limited after acquisition assuming that P/E ratio of Mark limited remains unchanged?
- Determine the market value of the merged firm.
- Calculate gain/loss for shareholders of the two independent companies after acquisition.

**Solution:**

**(i) Calculation of Swap ratio:**

Particulars	Firm Mark Limited	Firm Mask Limited
Earnings after tax (₹)	200 lacs	40 lacs
Number of shares outstanding	20 lacs	10 lacs
P/E ratio	10	5
EPS	$200/20 = 10$	$= 40/10 = 4$
Market Price = (P/E × EPS)	₹100	₹20

Therefore swap ratio in terms of market prices

$$= \text{MPS of target firm} / \text{MPS of acquiring firm} = 20/100 = 0.20$$

**(ii) We have general formula given by:**



$$EPS_{AB} = \frac{(E_A + E_B)}{[S_A + S_B(ER_A)]}$$

Therefore, EPS of Mark Limited after acquisition =  $\frac{200+40}{20+10 \times 0.2} = \frac{240}{22} = ₹10.91$

**(iii) Expected market price per share of Mark Limited with the same P/E of 10 will be**

$$= EPS \times P/E = ₹10.91 \times 10 = ₹109.10$$

**(iv) Market Value of the merged firm**

= Total number of outstanding shares x market price

$$= (20 + 2) \text{ lacs} \times ₹109.10 = ₹ 2400.2 \text{ lacs}$$

**(v) Gain / Loss accruing to the shareholders of both companies**

Particulars	Total	Mark	Mask
Number of shares after acquisition	22 lacs	20 lacs	2 lacs
Market price after acquisition	₹109.10	₹109.10	₹109.10
Total Market value after acquisition	₹2400.2 lacs	₹2182 lacs	₹218.2 lacs
Existing Market Value	₹2200 lacs	₹2000 lacs	₹200 lacs
Gain to shareholders	₹200.2 lacs	₹182	₹18.2 lacs

**Illustration 13.**

ABC Ltd. run and managed by an efficient team that insists on reinvesting 60% of its earnings in projects that provide an ROE (return of equity) of 10%, despite the fact that the firm's capitalization rate (K) is 15%. The firm's current year's earning is ₹10 per share.

At what price the stock of ABC Ltd. sell? What is the present value of growth opportunities? Why would such a firm be a takeover target?

**Solution:**

$$\text{Dividend growth rate } G = ROE \times b$$

$$\text{Where, } b = 1 - \text{payout ratio} \therefore G = 10\% \times 0.60 = 6\%$$

$$\text{Stock price of ABC Ltd.} = \frac{10 \times 0.4}{0.15 - 0.06} = \frac{4}{0.09} = ₹44.44$$

Present value of growth opportunities (PVGO)

= market price per share – No growth value per share

$$= ₹44.44 - (\₹10/0.15)$$

$$= ₹44.44 - ₹66.66$$

$$= ₹(-22.22) \text{ i.e. negative PVGO}$$

Reasons for takeover target – Negative PVGO implies that the net present value of the firm's projects is negative; the rate of return on those assets is less than the opportunity cost of capital. Such a firm would be subject to

takeover target because another firm could buy the firm for the market price of

₹44.44 per share and increase the value of the firm by changing its investment policy. For example, if the new management simply paid out all earning as dividend, the value of the firm would increase up to its no growth value of ₹66.66.

#### Illustration 14.

XY Ltd., a retail florist, is for sale at an asking price of ₹62,00,000. You have been contacted for a potential buyer who has asked you to give him opinion as to whether the asking price is reasonable. The potential buyer has only limited information about XY Ltd. And potential buyer does not know that annual gross sales of XY Ltd. is about ₹82,00,000 and that last year's tax return reported an annual profit of ₹8,40,000 before tax. You have collected the following information from the financial details of several retail florists that were up for sale in the past:

Table 1

Particulars	Price-to-sale(P/S) ratio	Price-to-earnings (P/E) ratio
Number of firms	38.0	33.0
Mean ratio	0.55	3.29
Coefficient of Variation	0.65	1.52
Maximum ratio	2.35	6.29

Table 2 Top 10 players (in descending P/S order)

Firm	1	2	3	4	5	6	7	8	9	10
(P/S) ratio	2.35	1.76	1.32	1.17	1.09	1.01	0.96	0.85	0.72	0.68
(P/E) Multiple	5.65	6.29	5.31	4.60	3.95	3.25	3.10	2.96	2.90	2.75

Offer your opinion on the reasonableness of the asking price.

#### Solution:

Average P/S ratio of Industry = 0.55      Coefficient of variation of P/S ratio = 0.65

Average P/E ratio of Industry = 3.29      Coefficient of variation of P/E ratio = 1.52

The coefficient of variation of P/S ratio is much lower than the coefficient of variation of P/E ratio.

From this we can infer that there is a wider dispersion in case of P/E ratio than in case of P/S ratio.

Therefore, while defining the market, it is preferable to take P/S as guiding factor.

Asking price of XY Ltd.                    ₹62,00,000

Annual sales of XY Ltd.                   ₹82,00,000

Asking P/S ratio of XY Ltd.            =  $62,00,000/82,00,000 = 0.76$

P/S ratio of XY Ltd. 0.76 is much higher than industry average 0.55, it is far below than the maximum P/S ratio of 2.35. The ratio of XY Ltd. is lying between 8th and 9th highest of the top ten players of the industry. In other words, XY Ltd. would need to be among the 22%\* ( $8.5/38 \times 100$ ) most desirable florist business to justify the asking price of ₹62,00,000 with annual gross sales of ₹82,00,000. If the sales are likely to hold in the coming years, the price may be  $(0.85 + 0.72)/2 \times ₹82 \text{ Lakhs} = ₹64.37 \text{ Lakhs}$ .

Provided the buyer believes that XY Ltd. is a superior retail florist (among the top quartile), and the future sales are not likely to fall, the asking price of ₹62 lakhs appears to be reasonable. However, the buyer should make sure that the florist's accounts reflect a true and fair view of the business before he arrives at a final decision.



**Note:**  $22\% = (\text{Average of 8th and 9th year} \div \text{No. of Firms}) \times 100$

$$\text{i.e. } \left\{ \left( \frac{8+9}{2} \right) \div 38 \right\} \times 100 = \frac{8.5}{38} \times 100 = 22\% \text{ Approx.}$$

### Illustration 15.

Following are the financial statement for A Ltd. and B Ltd. for the current financial year. Both the firm operate in the same industry:

Balance Sheet (₹)

Particulars	A Ltd.	B. Ltd.
Total Current assets	14,00,000	10,00,000
Total Fixed assets (net)	10,00,000	5,00,000
	24,00,000	15,00,000
Equity capital (of ₹ 100 each)	10,00,000	8,00,000
Retained earnings	2,00,000	
14% Long-term debt	5,00,000	3,00,000
Total Current liabilities	7,00,000	4,00,000
	24,00,000	15,00,000

Income-Statements (₹)

Particulars	A Ltd.	B. Ltd.
Net sales	34,50,000	17,00,000
Cost of goods sold	27,60,000	13,60,000
Gross profit	6,90,000	3,40,000
Operating expenses	2,00,000	1,00,000
Interest	70,000	42,000
Earnings before taxes	4,20,000	1,98,000
Taxes (50%)	2,10,000	99,000
Earnings after taxes (EAT)	2,10,000	99,000

#### Additional Information

Number of equity shares	10,000,	8,000
Dividend payment ratio (D/P)	40%,	60%
Market price per share (MPS)	₹ 400,	₹ 150

Assume that the two firms are in the process of negotiating a merger through an exchange of equity shares. You have been asked to assist in establishing equitable exchange terms, and are required to –

- (i) Decompose the share prices of both the companies into EPS and P/E components, and also segregate their EPS figures into return on equity (ROE) and book value/intrinsic value per share (BVPS) components.
- (ii) Estimate future EPS growth rates for each firm.
- (iii) Based on expected operating synergies, A Ltd. estimates that the intrinsic value of B's equity share would be



₹ 200 per share on its acquisition. You are required to develop a range of justifiable equity share exchange ratios that can be offered by A Ltd. to B Ltd.'s shareholders. Based on your analysis in parts (i) and (ii) would you expect the negotiated terms to be closer to the upper, or the lower exchange ratio limits? Why?

- (iv) Calculate the post-merger EPS based on an exchange ratio of 0.4:1 being offered by A Ltd. Indicate the immediate EPS accretion or dilution, if any, that will occur for each group of shareholders.
- (v) Based on a 0.4:1 exchange ratio and assuming that A's pre-merger P/E ratio will continue after the merger, estimate the post-merger market price. Show the resulting accretion or dilution in pre-merger market prices.

Market price per share (MPS) = EPS × P/E ratio or P/E Ratio = MPS / EPS.

**Solution:**

**(i) Determination of EPS, P/E ratio, ROE and BVPC of A Ltd. and B Ltd.**

Particulars		A Ltd.	B Ltd.
Profits After Tax	(PAT)	₹ 2,10,000	₹ 99,000
No. of Shares	(N)	10,000	8,000
EPS	(PAT/N)	₹ 21.00	₹ 12.375
Market price share	(MPS)	₹ 400	₹ 150
P/E ratio	(MPS/EPS)	19.05	12.12
Equity funds	(EF)	12,00,000	8,00,000
BVPS	(EF/N)	₹120	₹100
ROE	(PAT/EF)×100	17.5%	12.375%

**(ii) Estimates of Growth rates in EPS for each Firm**

Retention ratio	(1-D/P ratio)	0.6	0.4
Growth rate	(ROE × Retention ratio)	10.5%	4.95%

**(iii) Justifiable equity share exchange ratio**

(a) Market Price based  $\frac{MPS_B}{MPS_A} = \frac{₹150}{₹400} = 0.375 : 1$  (lower limit)

(b) Intrinsic value based =  $\frac{₹200}{₹400} = 0.5 : 1$  (upper limit)

Since A Ltd. has a higher EPS, ROE, P/E ratio, and even higher EPS growth expectations, the negotiated terms would be expected to be closer to the lower limit, based on the existing share prices.

**(iv) Calculation of Post-merger EPS and other effects**

Particulars	A Ltd.	B Ltd.	Combined
PAT (i) (₹)	2,10,000	99,000	3,09,000
Shares outstanding (ii)	10,000	8,000	13,200*
EPS (i)/(ii) (₹)	21.00	12.375	23.41
EPS Accretion (Dilution) (₹)	2.41	3.015**	--

Note:

\* Shares outstanding (combined) = 10,000 shares + (0.40 × 8,000) = 13,200 Shares

\*\* EPS claim per old share = ₹23.41 × 0.40 = ₹9.36

EPS dilution of B Ltd. = ₹12.375 – ₹9.36 = ₹3.015

**(v) Estimate of Post-merger Market Price and other effects**

Particulars	A Ltd.	B Ltd.	Combined
EPS (i) (₹)	21.00	12.375	23.41
P/E Ratio (ii)	19.05	12.12	19.05
MPS (i) × (ii) (₹)	400	150	446.00
MPS Accretion (Dilution) (₹)	46	28.40***	---

**Note: \*\*\***

MPS claim per old share	(₹446 × 0.4)	178.40
Less : MPS per old share		150.00
MPS accretion of B Ltd.		28.40

**Illustration 16.**

Illustrate two main methods of financing an acquisition referred to in Accounting Standard - 14 (AS-14)

**Solution:****Accounting for Amalgamations**

The provisions of Accounting Standard (AS-14) on Accounting for Amalgamations issued by the Institute of Chartered accountants of India need to be referred to in this context.

The two main methods of financing an acquisition are cash and share exchange:

**Method I - Cash:** This method is generally considered suitable for relatively small acquisitions. It has two advantages: (i) the buyer retains total control as the shareholders in the selling company are completely bought out, and (ii) the value of the bid is known and the process is simple.

**Let us consider 2 Companies A & B whose figures are stated below:**

Particulars	Company A	Company B
Market price per share	₹75	₹15
No. of shares	100,000	60,000
Market Value of the company	₹75,00,000	₹900,000

Assume Company A intends to pay ₹12,00,000 cash for Company B. If the share price does not anticipate a merger:

The share price in the market is expected to accurately reflect the true value of the company.

The cost to the bidder Company A = Payment - The market value of Company B

$$= ₹12 \text{ lakhs} - ₹9 \text{ lakhs} = ₹3 \text{ lakhs.}$$

Company A is paying ₹3 lakhs for the identified benefits of the merger.

If the share price includes a speculation element of ₹2 per share:

The cost to Company A = ₹3,00,000 + (60,000 × ₹2)

$$= ₹3,00,000 + ₹1,20,000 = ₹4,20,000$$

Worth of Company B = (₹15 - ₹2) × 60,000

$$= ₹13 \times 60,000$$

$$= ₹7,80,000$$

This can also be expressed as: ₹12,00,000 - ₹4,20,000 = ₹7,80,000



**Method II - Share exchange:** The method of payment in large transactions is predominantly stock for stock.

The advantage of this method is that the acquirer does not part with cash and does not increase the financial risk by raising new debt. The disadvantage is that the acquirer's shareholders will have to share future prosperity with those of the acquired company.

Suppose Company A wished to offer shares in Company A to the shareholders of Company B instead of cash:

Amount to be paid to shareholders of Company B = ₹12,00,000 Market price of shares of Company A = ₹75

No. of shares to be offered = ₹12,00,000 / ₹75 = 16,000

Now, shareholders of Company B will own part of Company A, and will benefit from any future gains of the merged enterprise.

Their share in the merged enterprise =  $16,000 / (1,00,000 + 16,000) = 13.8\%$

Further, now suppose that the benefits of the merger has been identified by Company A to have a present value of ₹ 4,00,000,

The value of the merged entity = ₹75,00,000 + (₹9,00,000 + ₹4,00,000) = ₹88,00,000 True cost of merger to the shareholders of Company A:

Particulars	Company A	Company B
Proportion of ownership in merged enterprise	86.2%	13.8%
Market Value: Total = ₹88,00,000	₹75,85,600	₹12,14,400
No. of shares currently in issue	100,000	60,000
Market price per share	₹75.86	₹20.24

The above gives the value of shares in the company before the merger is completed, based on estimates of what the company will be worth after the merger.

The valuation of each company also recognizes the split of the expected benefits which will accrue to the combined entity once the merger has taken place.

The true cost can be calculated as given below:

Particulars	₹
60,000 shares in Company B @ ₹20.24	12,14,400
Less : Current market value	9,00,000
Benefits being paid to shareholders of Company B	3,14,400

### Illustration 17.

Fat Ltd. wants to acquire Lean Ltd., the balance sheet of Lean Ltd. as on 31.03.2016 is as follows:

Liabilities	₹	Assets	₹
(1) Shareholders Fund:		(1) Non-current Assets:	
(a) Share Capital		(a) Fixed Assets	
(i) 60,000 Equity Shares of ₹10 each	6,00,000	(i) Tangible Assets:	
(b) Reserve & Surplus		— Plant and Equipment	11,00,000
(i) Retained Earnings	2,00,000	(2) Current Assets:	
(2) Non-Current Liabilities:		(a) Inventories	1,70,000
Long Term Borrowings - 12% Debenture	2,00,000	(b) Trade Receivables	



(3) Current Liabilities:		— Sundry Debtors	30,000
(a) Trade Payables - Sundry Creditors	3,20,000	(c) Cash and Cash Equivalents	20,000
Total	13,20,000	Total	13,20,000

Additional information:

- (i) Shareholders of Lean Ltd. will get one share in Fat Ltd. for every two shares. External liabilities are expected to be settled at ₹3,00,000. Shares of Fat Ltd. would be issued at its current price of ₹15 per share. Debenture holders will get 13% convertible debentures in the purchasing companies for the same amount. Debtors and inventories are expected to release ₹1,80,000.
- (ii) Fat Ltd. has decided to operate the business of Lean Ltd. as a separate division. The division is likely to give cash flow (after tax) to the extent of ₹3,00,000 per year for 6 years. Fat Ltd. has planned that after 6 year this division would be damaged and disposed off for ₹1,00,000.
- (iii) Company's cost of capital is 14%

Make a report to the managing director advising him about the financial feasibility of the acquisition.

**Note:** Present value of ₹1 for six years @ 14% interest : 0.8772, 0.7695, 0.6750, 0.5921 and 0.4556.

**Solution :**

Cost of Acquisition	₹
Equity share $\left(\frac{60,000}{2} \times ₹15\right)$	4,50,000
13% convertible debenture	2,00,000
Cash (Payment for external liabilities – Realisation of Cash from Debtors and inventories – Cash of Lean Ltd.) i.e., (₹ 3,00,000 – 1,80,000 – 20,000)	1,00,000
Total Consideration	7,50,000

Calculation of NPV

Year	Cost inflow	PV factor @ 14%	Prevent value
1	3,00,000	0.8772	2,63,160
2	3,00,000	0.7695	2,30,850
3	3,00,000	0.6750	2,02,500
4	3,00,000	0.5921	1,77,630
5	3,00,000	0.5194	1,55,820
6	3,00,000 + 1,00,000	0.4556	1,82,240
	Total PV of cash inflow		12,12,200
	Less : Cost of acquisition		7,50,000
	NPV		4,62,200

Since the NPV is positive it is suggested to acquire Lean Ltd. to maximize the value of shareholders of both the companies.

**Illustration 18.**

Firm A is studying the possible acquisition of firm B by way of merger. The following data are available:

Firm	After tax earnings	No. of Eq. sh.	Market price per share
A	₹ 10,00,000	2,00,000	₹ 75
B	₹ 3,00,000	50,000	₹ 60

- (i) If the merger goes through by exchange of equity shares and the exchange ratio is set according to the current market price, what is the new earnings per share of firm A.
- (ii) Firm B wants to be sure that their earnings per share is not diminished by the merger. What exchange ratio is relevant to achieve the objective?

**Solution :**

- (i) Exchange ratio = 75 : 60

$$\text{No. of shares to be issued by A Ltd.} = \frac{60 \times 50,000}{75} = 40,000 \text{ shares.}$$

- Total number of shares = 2,00,000 + 40,000 = 2,40,000 shares
- Total after tax earnings = ₹(10,00,000 + 3,00,000) = ₹13,00,000

- Earnings per share =  $\frac{₹13,00,000}{2,40,000} = ₹5.42$

- (ii) Calculations of exchange ratio which would not diminish the EPS of B Ltd.:

Current EPS of

$$\text{A Ltd.} = \frac{10,00,000}{2,00,000} = ₹5$$

$$\text{B Ltd.} = \frac{₹3,00,000}{50,000} = ₹6$$

$$\text{Exchange ratio} = \frac{6}{5} = 1.20 : 1$$

No. of shares to be issued by A Ltd. to B Ltd.

$$= 50,000 \times \frac{6}{5} \text{ shares} = 60,000 \text{ shares}$$

Total number of shares of A Ltd. after acquisition = 2,00,000 + 60,000 = 2,60,000 shares

$$\text{EPS (after merger)} = \frac{₹(10,00,000 + 3,00,000)}{2,60,000 \text{ shares}} = ₹5$$

Total earnings in A Ltd. available to new shareholders of B Ltd.

$$= 60,000 \times 5 = ₹ 3,00,000$$

**Illustration 19.**

The following information is provided relating to the acquiring company X Ltd. and the target company Y Ltd.

	X Ltd.	Y Ltd.
No. of shares (F.V. ₹ 10 each)	10.00 lakhs	7.5 lakhs
Market capitalization	500.00 lakhs	750.00 lakhs
P/E ratio (times)	10	5
Reserve and surplus	300.00 lakhs	165.00 lakhs
Promoter's holding (No. of shares)	4.75 lakhs	5.00 lakhs

Board of directors of both the companies have decided to give a fair deal to the shareholders and accordingly for swap ratio the weights are decided as 40%, 25% and 35% respectively for Earnings, Book value and Market price of share of each company:

- Calculate the swap ratio and also calculate Promoters holding percentage after acquisition.
- What is the EPS of X Ltd. after acquisition of Y Ltd?
- What is the expected market price per share and market capitalization of X Ltd. after acquisition, assuming P/E ratio of firm X Ltd. remains unchanged.
- Calculate free float market capitalization of the merged fair.

**Solution :****Calculation of swap ratio**

	X Ltd.	Y Ltd.
Market capitalization	500 lakh	750 lakhs
No. of shares	10 lakhs	7.5 lakhs
Market price per share	₹ 50	₹ 100
P/E ratio	10	5
EPS (MPS ÷ P/E Ratio)	₹ 5	₹ 20
Profit (No. of shares x EPS)	₹ 50 lakhs	₹ 150 lakhs
Share Capital	₹ 100 lakhs	₹ 75 lakhs
Reserve and surplus	₹ 300 lakhs	₹ 165 lakhs
Total (Share Capital + Reserve and Surplus)	₹ 400 lakhs	₹ 240 lakhs
Book value per share (Total ÷ No. of shares)	₹ 40	₹ 32

**(i) Calculation of swap ratio**

EPS	5 : 20 i.e., 1 : 4 i.e., 4 × 40%	= 1.6
Book value	40 : 30 i.e., 1 : 0.8 i.e., 0.8 × 25%	= 0.2
Market price	50 : 100 i.e., 1 : 2 i.e., 2 × 35%	= 0.7
		Total = 2.5

Swap ratio is for every one share of Y Ltd. to issue 2.5 shares of X Ltd. Hence total no. of shares to be issued = 7.5 lakhs × 2.5 = 18.75 lakh shares.

Promoters holding = 4.75 lakh shares + (5 × 2.5) lakh shares = 17.25 lakh shares

So promoters holding percentage =  $\frac{17.25}{28.75} \times 100 = 60\%$

Total no. of shares = 10 lakhs + 18.75 lakhs = 28.75 lakhs

$$(ii) \text{ EPS} = \frac{\text{Total profit}}{\text{No. of shares}} = \frac{50 \text{ lakhs} + 150 \text{ lakh}}{28.75 \text{ lakh}} = ₹6.956$$

$$(iii) \text{ Expected market price} = \text{EPS} \times \text{P/E} = 6.956 \times 10 = ₹ 69.56$$

$$\text{Market capitalization} = ₹ 69.56 \times 28.75 \text{ lakh shares} = ₹ 1999.85 \text{ lakh}$$

$$(iv) \text{ Free float of market capitalization} = ₹ 69.56 \times (28.75 \times 40\%) = ₹ 799.94 \text{ lakh}$$

### Illustration 20.

The following information is relating to Fortune India Ltd. having two division Pharma division and FMCG division. Paid up share capital of Fortune India Ltd. is consisting of 3,000 lakhs equity shares of Re. 1 each. Fortune India Ltd. decided to de-merge Pharma Division as Fortune Pharma Ltd. w.e.f. 1.4.2016. Details of Fortune India Ltd. as on 31.3.2016 and of Fortune Pharma Ltd. as on 1.4.2016 are given below:

Particulars	Fortune Pharma Ltd. (₹) in lakh	Fortune India Ltd. (₹) in lakh
Outside Liabilities		
Secured Loans	400	3,000
Unsecured Loan	2,400	800
Current Liabilities & Provision	1,300	21,200
Assets		
Fixed Assets	7,740	20,400
Investments	7,600	12,300
Current Assets	8,800	30,200
Loan & Advances	900	7,300
Deferred tax / Misc. exp.	60	(200)

Board of directors of the company have decided to issue necessary equity shares of Fortune Pharma Ltd. of ₹1 each, without any consideration to the shareholders of Fortune India Ltd. For that purpose following points are to be considered:

- Transfer of Liabilities and Assets at Book value.
- Estimated profit for the year 2016-17 is ₹11,400 lakh for Fortune India Ltd. and ₹1,470 lakh for Fortune Pharma Ltd.
- Estimated Market price of Fortune Pharma Ltd. is ₹24.50 per share.
- Average P/E ratio of FMCG sector is 42 and Pharma sector is 25, which is to be expected for both the companies.

### Calculate :

- The Ratio in which shares of Fortune Pharma are to be issued to the shareholders of Fortune India Ltd.
- Expected Market price of Fortune India Ltd.
- Book value per share of both the Co's after demerger.

### Solution :

#### Shareholder's fund

	Fortune India Ltd.	Fortune Pharma Ltd.	Fortune India (FMCG) Ltd.
Assets	70,000	25,100	44,900



Outside Liabilities	25,000	4,100	20,900
Net worth	45,000	21,000	24,000

(i) Calculation of shares of Fortune Pharma Ltd. to be issued to shareholders of Fortune India Ltd. :

	Fortune Pharma Ltd.
Estimated Profit (₹ in lakhs)	1470
Estimated market price (₹)	24.50
Estimated P/E	25
Estimated EPS (₹) (24.50 ÷ 25)	0.98
No. of shares (lakhs) (1470 ÷ 0.98)	1500

Hence, Ratio is 1 shares of Fortune Pharma Ltd. for 2 shares of Fortune India Ltd.

(ii) Expected market price of Fortune India Ltd.

	Fortune India (FMCG) Ltd.
Estimated Profit (₹ in lakhs)	11,400
No. of equity share (in lakhs)	3,000
Estimated EPS (₹)	3.8
Estimated P/E	42
Estimated market price (₹)	159.6

(iii) Book value per share

	Fortune Pharma Ltd.	Fortune India (FMCG) Ltd.
Net worth (₹ in lakhs)	21,000	24,000
No. of shares (in lakhs)	1,500	3,000
Book value of shares (₹)	14	8

### Illustration 21.

The chief executive of a Company thinks that shareholders always look for the earnings per share. Therefore, he considers maximization of the earning per share (EPS) as his Company's objective. His company's current net profit is ₹80 lakhs and EPS is ₹4. The current market price is ₹42. He wants to buy another firm which has current income of ₹15.75 lakhs, EPS of ₹10.50 and the market price per share of ₹85. What is the maximum exchange ratio which the chief executive should offer so that he could keep EPS at the current level? If the chief executive borrows funds at 15 per cent rate of interest and buys out the other Company by paying cash, how much should he offer to maintain his EPS? Assume a tax rate of 50%.

**Solution:**

(Amount in ₹)

Current data	Acquiring company	Target company
Net profit	80,00,000	15,75,000
EPS	4	10.50
Market price of share	42	85
Number of equity shares (Net Profit ÷ EPS)	20,00,000	1,50,000

Assume X no. of shares issued.

Calculation of share Exchange Ratio

$$\frac{\text{Combined net profit}}{\text{No. of shares}} = 4$$

$$\frac{80,00,000 + 15,75,000}{20,00,000 + x} = 4$$

$$95,75,000 = 80,00,000 + 4x$$

$$\text{or, } 4x = 95,75,000 - 80,00,000$$

$$\text{or, } X = 15,75,000/4 = 3,93,750 \text{ shares}$$

Share exchange ratio = 3,93,750 shares / 1,50,000 = 2.625

The acquiring company can offer its 2.625 shares against the company's 1 share.

If funds borrowed @ 15% interest and buys out the target company by paying cash, and maintain the same level of EPS as before.

$$\frac{80,00,000 + 15,75,000 - 0.15 \text{ Debt}(1 - 0.50)}{20,00,000 \text{ shares}} = ₹4$$

$$95,75,000 - 0.075 \text{ Debt} = 80,00,000$$

$$0.075 \text{ Debt} = 95,75,000 - 80,00,000$$

$$\text{Debt} = 15,75,000/0.075 = ₹2,10,00,000$$

∴ CFO can offer ₹ 2,10,00,000 to acquire the target company.

Amount payable to each share in target company = ₹2,10,00,000/1,50,000 = ₹140.00 per share.

### Illustration 22.

Reliable Industries Ltd. (RIL) is considering a takeover of Sunflower Industries Ltd. (SIL). The particulars of 2 companies are given below:

Particulars	RIL	SIL
Earnings After Tax (₹)	20,00,000	10,00,000
Equity shares (No.)	10,00,000	10,00,000
EPS (₹)	2	1
P/E ratio (times)	10	5

#### Required:

- What is the market value of each company before merger?
- Assuming that the management of RIL estimates that the shareholders of SIL will accept an offer of one share of RIL for four shares of SIL. If there are no synergic effects, what is the market value of the post-merger RIL? What is the new price for share? Are the shareholders of RIL better or worse off than they were before the merger?
- Due to synergic effects, the management of RIL estimates that the earnings will increase by 20%.



What is the new post-merger EPS and price per share? Will the shareholders be better off or worse off than before the merger?

**Solution:**

**(i) Market value of companies before merger**

Particulars	RIL	SIL
EPS (₹)	2	1
P/E ratio	10	5
Market price per share (₹) (EPS × P/E ratio)	20	5
Equity shares (No.)	10,00,000	10,00,000
Total market value (MPS × No. of Eq. Shared)	2,00,00,000	50,00,000

**(ii) Post merger effect on RIL**

Particulars	₹
Post merger earnings ₹ (20,00,000 + 10,00,000)	30,00,000
Equity shares $\left(10,00,000 + 10,00,000 \times \frac{1}{4}\right)$	12,50,000
As exchange ratio is 1 : 4	
EPS :	2.4
P/E ratio	10.00
Market price per share (₹) (EPS × P/E ratio) i.e., $10 \times 2.4$	24
Total Market Value (MPS × No. of Eq. Shares) i.e., $(12,50,000 \times 24)$	3,00,00,000

**Gains from Merger**

Particulars	₹
Post Merger Market value of the firm	3,00,00,000
Less : Pre-Merger market value	
RIL 2,00,00,000	
SIL 50,00,000	₹2,50,00,000
	₹50,00,000

**Apportionment of Gains between shareholders**

Particulars	RIL	SIL
Post merger market value		
$10,00,000 \times 24$	2,40,00,000	
$2,50,000 \times 24$		60,00,000
Less : Pre merged market value	2,00,00,000	50,00,000
	40,00,000	10,00,000

Thus the shareholders of both the Co. have gained from merger

**(iii) Post Merger Earnings**

Increase in earning by 20%



New earnings: ₹ 30,00,000 × 120% = 36,00,000

No. of equity share = 12,50,000

EPS = ₹ 36,00,000 ÷ 12,50,000 = ₹ 2.88

P/E ratio = 10

Market price per share = ₹ 2.88 × 10 = ₹ 28.80

∴ Hence, shareholders will be better off than before the merger situation.

### Illustration 23.

The following information is provided related to the acquiring firm Sun Ltd. and the target firm Moon Ltd.:

Particulars	Sun Ltd.	Moon Ltd.
Profits after tax	₹ 2,000 lakhs	₹ 4000 lakhs
Number of shares outstanding	200 lakhs	1000 lakhs
P/E ratio (Times)	10	5

#### Required:

- What is the swap ratio based on current market price?
- What is the EPS of Sun Ltd. after acquisition?
- What is the expected market price per share of Sun Ltd. after acquisition, assuming P/E ratio of Sun Ltd. adversely affected by 10%?
- Determine the market value of the merged firm.
- Calculate gain/loss for shareholders of the two independent companies after acquisition.

#### Solution :

EPS before acquisition

Sun Ltd. = ₹2000 lakhs / 200 lakh = ₹10

Moon Ltd. = ₹4000 lakhs / 1000 lakh = ₹4

Market price of shares before acquisition

Sun Ltd. = ₹10 × 10 = ₹100

Moon Ltd. = ₹4 × 5 = ₹20

#### (i) Swap ratio based on current market price

$$\frac{₹20}{₹100} = 0.2 \text{ i. e., } 1 \text{ share of Sun Ltd. for } 5 \text{ shares of Moon Ltd.}$$

Number of shares to be issued = 1000 lakhs × 0.20 lakh = 200 lakhs

#### (ii) EPS after acquisitions

$$= \frac{₹2,000\text{lakhs} + ₹4,000\text{lakhs}}{₹200\text{lakhs} + ₹200\text{lakhs}} = ₹15$$

**(iii) Expected market price per shares of Sun Ltd. after an acquisition assuming P/E ratio of Sun Ltd. is adversely affected by 10%.**

EPS of Sun Ltd.	= ₹15
P/E of Sun Ltd.	= 10 – 10% of 10 = 9 times
∴ Market price per share of Sun Ltd.	= EPS × P/E ratio
	= 15 × 9
	= ₹135

**(iv) Market value of merged firm**

= ₹135 × 400 lakhs shares	= ₹54,000 lakhs
---------------------------	-----------------

**(v) Gain from the Merger**

Post merger market value of merged firm	= ₹ 54,000 lakhs
Less : Pre merger market value	
Sun Ltd. 200 lakhs × ₹ 100 = 20,000 crores Moon Ltd.	
1000 lakhs × ₹ 20 = 20,000 crores	= ₹ 40,000 lakhs
Gain from merger	= ₹ 14,000 lakhs

Gain to shareholders of Sun Ltd. and Moon Ltd.

Particulars	Sun Ltd.	Moon Ltd.
Post merger value (₹ 135 × 200)	27,000	
(₹ 135 × 200)		27,000
Less : Pre merger value	20,000	2,000
Gain to shareholders	7,000	7,000

**Illustration 24.**

The Shareholders of A Co. have voted in favour of a buyout offer from B Co. Information about each firm is given here below. Moreover, A Co.'s shareholders will receive one share of B Co. Stock for every three shares they hold in A Co.

(Amount in ₹)

Particulars	B Co.	A Co.
Present earnings	6.75 lakhs	3.00 lakhs
EPS	3.97	5.00
Number of Share	1.70 lakhs	0.60 lakhs
P/E ratio	20	5

- (i) What will the EPS of B. Co. be after the merger? What will the PE ratio be if the NPV of the acquisition is zero?  
(ii) What must B Co. feel is the value of the synergy between these two firms?

Explain how your answer can be reconciled with the decision to go ahead with the takeover.

**Solution:**

- (i) The EPS of the combined company will be the sum of the earnings of both companies divided by the shares in the combined company. Since the stock offer is one share of the acquiring firm for three shares of the target firm, new shares in the acquiring firm will increase by one- third [ Exchange ratio = 1/3]. So, the new EPS will be:

$$\text{EPS} = (\text{₹}300,000 + 675,000) / [170,000 + (1/3) (60,000)] = \text{₹}5.132.$$

The market price of B Co. will remain unchanged if it is a zero NPV acquisition. Using the PE ratio, we find the current market price of B Co. stock, which is = P/E x EPS = 20 x (6.75 lakhs/ 1.70 lakhs) = ₹79.41

If the acquisition has a zero NPV, the stock price should remain unchanged. Therefore, the new PE will be: P/E = ₹79.41 / ₹5.132 = 15.48

- (ii) If the NPV of the acquisition is zero, it would mean that B Co. would pay just the market value of A Co. i.e. Number of shares x market price of A Co. i.e. = 60000 x 25 [MPS = P/E x EPS = 5 x 5 = 25]. The market value received by B co. = ₹15,00,000.

The cost of the acquisition is the number of shares offered times the share price, so the cost is: Cost = (1/3) (60,000) (₹79.4118) = ₹15,88,236.

The difference is synergy i.e. ₹ 88,236.

### Illustration 25.

AB Ltd. is planning to acquire and absorb the running business of XY Ltd. The valuation is to be based on the recommendation of merchant bankers and the consideration is to be discharged in the form of equity shares to be issued by AB Ltd. As on 31.3.2016, the paid up capital of AB Ltd. consists of 80 lakhs shares of ₹ 10 each. The highest and the lowest market quotation during the last 6 months were ₹ 570 and ₹ 430. For the purpose of the exchange, the price per share is to be reckoned as the average of the highest and lowest market price during the last 6 months ended on 31.3.2016. XY Ltd's Balance Sheet as at 31.3.2016 is summarized below:

	₹ lakhs
Sources :	
Share capital	
20 lakhs equity shares of ₹ 10 each fully paid	200
10 lakhs equity shares of ₹10 each, ₹ 5 paid	50
Loans	100
Total	350
Uses :	
Fixed Assets (Net)	150
Net Current Assets	200
Total	350

An independent firm of merchant bankers engaged for the negotiation have produced the following estimates of cash flows from the business of XY Ltd. :

Year ended	By way of	₹ Lakhs
31.3.17	After tax earnings for equity	105
31.3.18	Do	120
31.3.19	Do	125
31.3.20	Do	120
31.3.21	Do	100
	Terminal value estimate	200

It is the recommendation of the merchant banker that the business of XY Ltd. may be valued on the basis of the average of (a) Aggregate of discounted cash flows at 8% and (b) Net assets value.

Present value factors at 8% for years

1 – 5 :    0.93      0.86      0.79      0.74      0.68



You are required to:

- (i) Calculate the total value of the business of XY Ltd.
- (ii) The number of shares to be issued by AB Ltd. and
- (iii) The basis of allocation of the shares among the shareholders of XY Ltd.

**Solution :**

- (i) Price per share of AB Ltd. for determination of number of shares to be issued:

$$\frac{\text{₹}(570+430)}{2} \quad \text{₹500}$$

Value of XY Ltd. based on future cash flow capitalization

$$(105 \times 0.93) + (120 \times 0.86) + (125 \times 0.79) + (120 \times 0.74) + (300 \times 0.68) \quad \text{₹ 592.40 lakhs}$$

$$\text{Value of XY Ltd. based on net assets } (350 - 100) \quad \text{₹ 250 lakhs}$$

$$\text{Average value } \frac{592.40 + 250}{2} \quad \text{₹ 421.20 lakhs}$$

- (ii) No. Of shares in AB Ltd. To be issued  $\frac{421.2\text{lakhs}}{500}$  84,240 (Approx)

- (iii) Basis of allocation of shares

$$\text{Fully paid equivalent shares in XY Ltd.} \quad 250 \text{ lakhs}$$

$$\text{Distribution to fully paid shareholders } \frac{84,240 \times 20}{25} \quad 67,392$$

$$\text{Distribution to partly paid shareholders } \frac{84,240 \times 5}{25} \quad 16,848$$

**Illustration 26.**

X Ltd. is considering the proposal to acquire Y Ltd. and their financial information is given below:

Particulars	X Ltd.	Y Ltd.
No. of equity shares	5,00,000	3,00,000
Market price per share (₹)	30	18
Market capitalisation (₹)	1,50,00,000	54,00,000

X Ltd. intend to pay ₹70,00,000 in cash for Y Ltd., if Y Ltd's market price reflects only its value as a separate entity. Calculate the cost of merger:

- (i) When merger is financed by cash.
- (ii) When merger is financed by stock and X Ltd. agrees to exchange 2,50,000 shares in exchange of shares in Y Ltd.

**Solution :**

- (i) Cost of merger (when merger is financed by cash)  
= Cash – True / Intrinsic value of Y Ltd.



$$\therefore ₹(70,00,000 - 54,00,000) = ₹16,00,000$$

If cost of merger becomes negative then shareholders of X Ltd. will get benefited by acquiring Y Ltd. in terms of market value.

(ii) Cost of merger (when merger is financed by exchange of shares in X Ltd. to the shareholders of Y Ltd.)

$$\text{Cost of merger} = PV_{xy} - PV_y$$

$PV_{xy}$  = Value of X Ltd. That Y Ltd.'s shareholders get.

$PV_y$  = True/Intrinsic value of Y Ltd.

$$PV_{xy} = PV_x + PV_y$$

$$= ₹(1,50,00,000 + 54,00,000)$$

$$= ₹2,04,00,000$$

Proportion that Y Ltd.'s shareholders get in X Ltd.'s capital structure:

$$= \frac{2,50,000}{(5,00,000 + 2,50,000)} = 0.33 \text{ i. e. } \frac{1}{3}$$

$$\text{True cost of merger} = PV_x + PV_y$$

$$= (204,00,000 \times \frac{1}{3}) - 54,00,000 = ₹14,00,000$$

The cost of merger i.e.,  $(2,50,000 \times 30) - ₹54,00,000$  ₹21,00,000 is much higher than the true cost of merger i.e., ₹14,00,000. So with this proposal the shareholders of Y Ltd. will get benefited.

#### Notes:

- (1) When the cost of merger is calculated on the cash consideration, then cost of merger is unaffected by the merger gains.
- (2) When merger is based on the exchange of shares, then the cost of merger depends on the gains, which has to be shared with the shareholder of Y Ltd.

#### Illustration 27.

Two firms RAJJAN and REKHA Corporation operate independently and have the following financial statements:

Particulars	RAJJAN	REKHA
Revenues	8,00,000	4,00,000
Cost of Goods Sold (COGS)	6,00,000	2,40,000
EBIT	2,00,000	1,60,000
Expected growth rate	6%	8%
Cost of capital	10%	12%

Both firms are in steady state, with capital spending offset by depreciation. No working capital is required, and both firms face a tax rate of 40%. Combining the two firms will create economies of scale in the form of shared distribution and advertising cost, which will reduce the cost of goods sold from 70% of revenues to 65% of revenues. Assume that the firm has no debt capital.

Estimate

- (i) The value of the two firms before the merger
- (ii) The value of the combined firm with synergy effect

**Solution:****(i) Value of the Firms before the Merger**

Calculation of Free Cash Flow to each of the Firm

Free cash flow to RAJJAN = EBIT (1 – tax rate)

= 2,00,000 (1 – 0.4) = ₹1,20,000

Free cash flow to REKHA = EBIT (1 – tax rate)

= 1,60,000 (1 – 0.4) = ₹96,000

Value of the two firms independently

Value of RAJJAN = [1,20,000 (1.06)] / (0.10 – 0.06) = ₹31,80,000

Value of REKHA = [96,000 (1.08)] / (0.12 – 0.08) = ₹25,92,000

In the absence of synergy the combined firm value is:

Combined Firm Value with No Synergy = 31,80,000 + 25,92,000 = ₹57,72,000

**(ii) Value of the Firm with Synergy**

On combining the two firm the cost of goods sold is reduced firm 70% to 65% of revenues. The revenue of the combined firm = 8,00,000 + 4,00,000 = ₹12,00,000

Cost of goods sold = 65% of revenues

= 0.65 × 12,00,000 = ₹7,80,000

Weighted average cost of capital for the combined firm

= 10% [31,80,000 / 57,72,000] + 12% [25,92,000 / 57,72,000]

= 0.0551 + 0.0539 = 0.109

Or 11% approximately

Weighted average expected growth rate for the combined firm

= 6% [31,80,000 / 57,72,000] + 8% [25,92,000 / 57,72,000]

= 0.033 + 0.0359 = 0.0689

Or 7% approximately

Particulars	Firm with no synergy	Firm with synergy
Revenues	12,00,000	12,00,000
Cost of Goods Sold (COGS)	8,40,000	7,80,000
EBIT	3,60,000	4,20,000
Growth rate	7%	7%
Cost of capital	11%	11%
FCF = EBIT (1 – T)	2,16,000	2,52,000

Value of the Firm without Synergy

[2,16,000 (1.07)] / 0.11 – 0.07 = ₹57,78,000

Value of the firm with Synergy

= [2,52,000 (1.07)] / 0.11 – 0.07 = ₹67,41,000.

**Illustration 28.**

Q Ltd. wants to acquire R Ltd. and has offered a swap ratio of 1:2 (0.5 shares for every one share of R Ltd.). Following information is provided:

Particulars	Q Ltd.	R Ltd.
Profit after tax	₹18,00,000	₹3,60,000
Equity shares outstanding (Nos.)	6,00,000	1,80,000
EPS	₹3	₹2
PE Ratio	10 times	7 times
Market price per share	₹30	₹14

Required:

- The number of equity shares to be issued by Q Ltd. for acquisition of R Ltd.
- What is the EPS of Q Ltd. after the acquisition?
- Determine the equivalent earnings per share of R Ltd.
- What is the expected market price per share of Q Ltd. after the acquisition, assuming its PE multiple remains unchanged?
- Determine the market value of the merged firm.

**Solution:****(i) The number of shares to be issued by Q Ltd.:**

The Exchange ratio is 0.5

So, new Shares = 1,80,000 × 0.5 = 90,000 shares.

**(ii) EPS of Q Ltd. after acquisition:**

Total Earnings (18,00,000 + 3,60,000)	₹21,60,000
No. of Shares (6,00,000 + 90,000)	6,90,000
EPS (21,60,000)/6,90,000)	₹3.13

**(iii) Equivalent EPS of R Ltd.:**

No. of new Shares	0.5
EPS	₹3.13
Equivalent EPS (3.13 × .5)	₹1.57

**(iv) New Market Price of Q Ltd. (P/E remaining unchanged):**

Present P/E Ratio of Q Ltd.	10 times
Expected EPS after merger	₹3.13
Expected Market Price (3.13 x 10)	₹31.30

**(v) Market Value of merged firm :**

Total number of Shares	6,90,000
Expected Market Price	₹31.30
Total value (6,90,000 x 31.30)	₹2,15,97,000



**Short Question and Answer:**

**(a) State whether the following statements are true or false:**

- (i) Exchange ratio of equity shares of merging firms is determined by their market price alone.
- (ii) Value gap is the difference between the synergy value and purchase price.
- (iii) In a debt for equity swap, a firm replacing equity with debt decreases its leverage ratio.
- (iv) In a reverse merger a smaller company acquires a larger company.
- (v) In a synergistic merger, the post-merger value exceeds the sum of the separate companies' pre-merger values.

**Answer:**

- (i) False
- (ii) False
- (iii) False
- (iv) True.
- (v) True

**(b) Fill in the blanks by using the words / phrases given in the brackets:**

- (i) \_\_\_\_\_ involves splitting up of a large company such as a conglomerate comprising of different divisions, into separate companies. (Amalgamation/Demerger)
- (ii) Recent acquisition shows that the price paid for an acquired company is almost invariably higher than its book value and the difference is incorporated under conventional accounting practice as \_\_\_\_\_. (capital reserve/goodwill)
- (iii) A theory of Mergers and Acquisitions that explains the result of the winner's curse, causing a bidder to overpay is called \_\_\_\_\_. (Synergy/Hubris/Agency)
- (iv) In the \_\_\_\_\_ Approach, the key relationships are computed for a group of similar companies or transactions as a basis for valuation of companies involved in a merger or takeover. (Comparable companies/Industry/Real Option)
- (v) Premium paid by target company to buy-back its shares from a potential acquirer is called \_\_\_\_\_. (Green Shoe Option/Green Bid/Greenmail)
- (vi) A theory that explains why the total value from the combinations resulted from a merger is a greater than the sum of the values of the component companies operating independently is known as \_\_\_\_\_ theory, (synergy/hubris/agency)
- (vii) Post merger control and the \_\_\_\_\_ are two of the most important issues in agreeing on the terms of merger. (calculated price/negotiated price)
- (viii) A method under which the value of an asset is based on calculating the costs avoided by the acquiring company when obtaining a pre-existing and fully functional asset is known as \_\_\_\_\_ Method. (Sunk Cost/ Marginal Cost/Avoided Cost/Incurred Cost)
- (ix) A type of merger \_\_\_\_\_, takes place when two companies in unrelated lines of business with nothing in common join hands. (Vertical Integration / Horizontal Integration / Conglomerate)
- (x) \_\_\_\_\_ is the present value of expected future cash flows that will result from the combined operations and additional benefits expected to accrue. (Discount Cash Flow Value/Synergy Value/Value Gap/Purchase Price)

**Answer:**



- (i) Demerger
- (ii) Goodwill
- (iii) Hubris
- (iv) Comparable companies
- (v) Greenmail
- (vi) Synergy
- (vii) Negotiated price
- (viii) Avoided Cost
- (ix) Conglomerate
- (x) Synergy Value

**(c) In each of the questions given below one out of the four options is correct. Indicate the correct answer:**

- (i) If value of A Ltd. is 50, B Ltd. is 20 and on merger their combined value is 90 and A Ltd. receives premium on merger 12, the synergy for merger is (all amounts are in ₹Lakhs)

- (A) 8
- (B) 20
- (C) 32
- (D) 38

- (ii) P intends to acquire R (by merger) based on market price of the shares.

The following information is available of the two companies.

	P	R
No. of Equity shares	10,00,000	6,00,000
Earnings after tax (₹)	50,00,000	18,00,000
Market value per share	₹30	₹25
New EPS of P after merger?		

- (A) ₹4.00
- (B) ₹4.05
- (C) ₹4.60
- (D) ₹4.53

- (iii) Which one of the following is not a measure taken by a target firm to avoid acquisition?

- (A) Poison Puts
- (B) Poison Calls
- (C) Golden Parachute
- (D) Flip Over Pill

- (iv) A Ltd. acquires B Ltd. by exchange of shares. EPS of A Ltd. and B Ltd. shares are ₹50 and ₹40 respectively. No. of shares of A Ltd. and B Ltd. are 80,000 and 50,000 respectively. What No. of shares A Ltd. requires to issue to B Ltd. in order to ensure that EPS of A Ltd. would remain same after merger? (Assume that earnings of the merged company would be equal to the aggregate of the earnings of the companies before merger)



- (A) Cannot be computed
  - (B) 25,000
  - (C) 40,000
  - (D) 1,00,000
- (v) In the context of an acquisition of a firm, which one of the following concepts of value is least relevant?
- (A) Market Value
  - (B) Opportunity Cost
  - (C) Synergy Value
  - (D) Value Gap
- (vi) Shareholders of target companies are typically paid in
- (A) Government bonds held by the target company
  - (B) Government bonds held by the acquiring company
  - (C) Cash and / or shares of the acquiring company
  - (D) None of the above
- (vii) Which Accounting Standard is issued by the Institute of Chartered Accountants of India on Accounting for Amalgamation
- (A) AS—9
  - (B) AS—12
  - (C) AS—14
  - (D) AS—18
- (viii) In defending against a hostile takeover, the strategy that involves the target firm creating securities that give their holders certain right that become effective when a takeover is attempted is called \_\_\_\_\_ strategy.
- (A) Shark repellent
  - (B) Green mail
  - (C) Poison pill
  - (D) Golden parachute
- (ix) A theory that explains why the total value from the combination resulted from a merger is greater than the sum of the value of the component companies operating independently is known as ..... theory.
- (A) hubris
  - (B) agency
  - (C) operating
  - (D) synergy
- (x) Reliance Industries Ltd. (RIL) is considering a takeover of Sony Industries Ltd. (SIL). The particulars of 2 companies are given below :

Particulars	RIL	SIL
Earnings After Tax (₹)	20,00,000	10,00,000
Equity shares (No.)	8,00,000	8,00,000



EPS (₹)	2	1
P/E ratio (times)	10	5

Calculate the market value of each company before merger?

- (A) 1,60,00,000 and 8,00,000  
 (B) 1,60,00,000 and 40,00,000  
 (C) 8,00,000 and 8,00,000  
 (D) None of the above

**Answer:**

- (i) (B) 20 [90-(50 + 20)]. Premium on merger is irrelevant.  
 (ii) (D) No. of shares R Ltd. will get in P Ltd. based on market price  
 $= 25/30 \times 6,00,000 = 5,00,000$  Shares  
 Total No. of Equity shares of P. Ltd = 10,00,000 + 5,00,000 = 15,00,000 shares  
 Total earnings = 50,00,000 + 18,00,000 = ₹68,00,000.  
 The new EPS of P. Ltd. after merger = 68,00,000/15,00,000= ₹4.53

- (iii) (B)Poison Calls  
 (iv) (C)40000 (B Ltd. Earnings/EPS of A Ltd. = 40x50000/50 = 40000)  
 (v) (B)Opportunity Cost  
 (vi) (C)Cash and/or shares of the acquiring company.  
 (vii) (C)AS —14  
 (viii) (C)Poison pill  
 (ix) (D)synergy

The idea that the value and performance of two companies combined will be greater than the sum of the separate individual parts is called Synergy. This term is used mostly in the context of mergers and acquisitions. For example, if Company A has an excellent product but lousy distribution whereas Company B has a great distribution system but poor products, the companies could create synergy with a merger.

- (x) (B) 1,60,00,000 and 40,00,000

Market value of companies before merger

Particulars	RIL	SIL
EPS (₹)	2	1
P/E ratio	10	5
Market price per share (₹) (EPS × P/E ratio)	20	5
Equity shares (No.)	8,00,000	8,00,000
Total market value (MPS × No. of Eq. Shared)	1,60,00,000	40,00,000





## FINAL EXAMINATION

June 2019

**P-20 (SPBV)**  
**Syllabus 2016**

### Strategic Performance Management and Business Valuation

Time Allowed: 3 Hours

Full Marks: 100

*The figures in the margin on the right side indicate full marks.  
This paper has been divided into two Sections, viz, Section A and Section B.*

#### SECTION-A

#### Strategic Performance Management

**(50 Marks)**

*Answer Question No. 1 which is compulsory and any two from the rest of this Section.*

1. Choose the correct option from amongst the four alternatives given: 2x5=10
- (i) Which of the following is a cause for corporate distress?
- (A) Fraud by Management
  - (B) Working capital problems
  - (C) Mismanagement
  - (D) All of the above
- (ii) If the average cost function of a firm is given by  $AC = x^2 - 4x + 7$ , in terms of output  $x$ , what will be its marginal cost?
- (A)  $2x^3 - 4x^2 + 7x$
  - (B)  $3x^2 - 8x + 7$
  - (C)  $x^3 - 8x^2 + 7x$
  - (D) None of the above
- (iii) Which one of the following strategies is not for managing risk?
- (A) Risk-Avoidance Strategy
  - (B) Risk-Transferring Strategy
  - (C) Risk-Measurement Strategy
  - (D) Risk-Acceptance Strategy



- (iv) For a monopolist firm, the profit will be maximum when
- (A)  $AR = AC$
  - (B)  $AR > AC$
  - (C)  $MR = MC$
  - (D)  $MR > MC$
- (v) Which one of the following is NOT true about On-Line Analytical Processing (OLAP)?
- (A) OLAP functionality includes trend analysis over sequential time periods.
  - (B) It provides slicing subsets for on-screen viewing.
  - (C) It is a category of hardware technology.
  - (D) It helps the end user to drill-down to deeper levels of consolidation data.
2. (a) 'Performance management and performance appraisal are sometimes used synonymously but they are different'. Do you agree this statement? Support your answer by highlighting bases of difference, if any, between them. 10
- (b) Write down and elaborate the components of Performance Management. 10
3. (a) The total cost function of a firm,  $C = \frac{x^3}{3} - 5x^2 + 28x + 10$  where C is total cost and 'x' is the output. A GST @ ₹2 per unit of output is imposed and the producer adds it to his cost. If the demand function is given by  $D = 2530 - 5x$ , where ₹ D is the price per unit of output.
- Find the profit maximizing output and the price at the level. Also obtain maximum profit. 8+2=10
- (b) (i) What do you understand by corporate distress? List down important factors causing corporate distress. 4
- (ii) The following financial information has been taken from the Annual Report 2019 of Stress Limited.

<b>Balance Sheet of Stress Limited as at March 31,</b>	<b>2019</b>
<b>ASSETS:</b>	(₹ in crores)
<b>Non-Current Assets</b>	
Property, Plant and Equipment	1,654.11
Intangible Assets	375.15
Other Non-Current Assets	388.18
	2,417.44
<b>Current Assets</b>	
Inventories	128.56
Financial Assets excluding Cash and Cash Equivalent	85.36
Cash and Cash Equivalent	6.85
Other Current Assets	568.93
<b>Total Current Assets</b>	<b>789.70</b>
<b>Total Assets</b>	<b>3,207.14</b>



<b>EQUITY AND LIABILITIES:</b>		
<b>Equity</b>		
Equity Share Capital		362.75
Other Equity		(568.94)
<b>Net Worth</b>		<b>(206.19)</b>
<b>Non-Current Liability</b>		
Financial Liabilities		1,203.00
Provisions		112.63
Other Non-Current Liabilities		46.59
<b>Total Non-Current Liabilities</b>		<b>1,362.22</b>
<b>Current Liabilities</b>		
Financial Liabilities		1,721.65
Provisions		95.25
Other Current Liabilities		234.21
<b>Total Current Liabilities</b>		<b>2,051.11</b>
<b>Total Equity and Liabilities</b>		<b>3,207.14</b>

Additional Information:

- Depreciation written off — ₹ 28 crores.
- Preliminary Expenses written off — ₹ 11.60 crores.
- Net Loss during the FY 2018-19 — ₹ 58.70 crores.

Using the NCAER Model for Corporate Distress Prediction, you are required to ascertain the stage of sickness. 6

4. (a) Compare and contrast between Basel I and Basel II norm. 10  
 (b) Define MIS and state the objectives of MIS. 10

**SECTION-B**  
**Business Valuation**  
**(50 Marks)**

*Answer Question No. 5 which is compulsory and any two from the rest of this Section.*

5. Choose the correct option from amongst the four alternatives given, with justification/workings. 1 mark will be for the correct choice and 1 mark will be for the justification/workings. 2x5=10
- (i) A bond of a company is trading at a premium at present. It is expected that in future its price will \_\_\_\_\_ with the passage of time keeping other factors constant.
- (A) decrease  
 (B) increase  
 (C) not change  
 (D) All three above are possible



- (ii) Which of the following is a financial liability for a company?
- (A) X Ltd. has issued 10 crores of ₹ 10 each equity shares.
  - (A) X Ltd. has issued 10 crores of ₹ 10 each cumulative redeemable preference shares.
  - (B) X Ltd. has issued 10 crores of ₹ 10 each non-cumulative compulsorily convertible preference shares.
  - (B) Both (B) and (C)
- (iii) A Company based on up-to-date financial statements has determined that the current Free Cash Flows to Equity (FCFE) per share is ₹ 100. It has outstanding number of shares 100 crores with a face value of ₹ 10 each. Its interest expenses are ₹ 30 crores and tax rate is 30%. Given this information, The Free Cash Flow to the Firm (FCFF) will be
- (A) ₹ 109 crores
  - (B) ₹ 112 crores
  - (C) ₹ 121 crores
  - (D) ₹ 130 crores
- (iv) Estimated fair value of an asset is based on the \_\_\_\_\_ value of operating cash flows.
- (A) current
  - (B) future
  - (C) discounted
  - (D) None of the above
- (v) SBT Ltd. has an issued and paid up Capital of 100000 shares of ₹100 each. The company declared a dividend of ₹25 lakh during the last five years and expects to maintain the same of level of dividends in the future. If the average dividend yield for the listed companies in the same line of business is 16%, then value per share of SBT Ltd. is
- (A) ₹ 150-50
  - (B) ₹ 156-25
  - (C) ₹ 160-50
  - (D) Insufficient information
6. (a) Vipul Ventures Limited has entered the phase of maturity in its life cycle and its cash flows (before interest and taxes) are expected to remain constant at the current level of ₹ 550.25 lakh. Presently it is an all equity finance firm.
- The cost of equity for Vedika Limited, which resembles Vipul Ventures in terms of its risk-return characteristics, is 15.75 per cent. You are expected to find out the value of Vipul Ventures. The tax rate applicable to Vipul Ventures is 38.5% including surcharges and all Cess, if any.
- What will be impact on firms's cost of equity, weighted average cost of capital and its valuation if the firm decides to alter its capital structure to have a 25% debt ratio? The cost of debt for firms with the risk profile similar to Vipul Venture is 10.25 per cent.



- (b) Hajela Private Limited are negotiating to sell their business to a Public Limited Company. The following is summarized extract from the balance sheet as at 31 March, 2019 of the Hajela Private Limited:

	₹
Capital, 1000 shares of ₹ 1000 each	10,00,000
Reserve	2,00,000
	12,00,000
Fixed assets at depreciated cost	6,40,000
Current assets	₹ 7,20,000
Less: Current liabilities	₹ 1,60,000      5,60,000
	12,00,000

The profits of Hajela Private Limited for the five years it has been in existence after eliminating any extraneous or non-recurring debits and credit are ₹1,90,000; ₹ 2,30,000; ₹ 2,15,000; ₹ 3,40,000 and ₹ 3,75,000 respectively. A return of 20 per cent per annum on the capital employed is considered to be reasonable in this particular business and it is expected that future requirements as to capital will not vary materially from the capital employed as at 31st, March.

Ignoring any extraneous factors that may affect the position, suggest the amount that should reasonably be paid to the private company for the goodwill therefore to be acquired by the purchasing company, giving details of how you work out this amount by assuming three years of purchase for valuing the goodwill but capital employed be considered for this purpose. 10

7. (a) Two firm X and Y operating in the cement industry. Both the firms are planning for a merger. Firm X is worth ₹ 200 lakh and Y is worth ₹ 50 lakh. On merging, the two would allow cost savings with a present value of ₹25 lakh. Assume that Y is bought by X for a cash of ₹ 65 lakh.
- Estimate:
- (i) The value of the combined firm
  - (ii) The cost of the merger for firm X
  - (iii) The NPV to Y's shareholders
  - (iv) The NPV to X's shareholders 10

- (b) Deepika Ltd. is a highly successful company and wishes to expand by acquiring other firms. Its expected high growth in earnings and dividends is reflected in its price-earning (P/E) ratio of 17. The Board of Directors of Deepika Ltd. has been advised that if it were to takeover firm with a lower P/E ratio than its own, using a share-for-share exchange, it could increase its reported earnings per share. Alia Ltd. has been suggested as a possible target for takeover, which has a P/E ratio of 10 and 10,00,000 shares in issue with a share price of ₹ 15 each. Deepika Ltd. has 50,00,000 shares in issue with a share price of ₹ 12 each.

Calculate the change in earnings per share of Deepika Ltd., if it acquire Alia Ltd. shares for ₹ 15 per share, assume that the price of Deepika Ltd. shares remains constant. 10



8. (a) The following information is given for three companies that are identical except for their capital structure:

	<b>Orange</b>	<b>Red</b>	<b>Blue</b>
Total Invested Capital	1,00,000	1,00,000	1,00,000
Debt/Assets Ratio	0.8	0.5	0.2
Shares Outstanding	6,100	8,300	10,000
Pre Tax Cost of Debt	16%	13%	15%
Cost of Equity	26%	22%	20%
Operating Income (EBIT)	25,000	25,000	25,000
<b>Net Income</b>	<b>8,970</b>	<b>12,350</b>	<b>14,950</b>

The tax is uniform 35% in all cases.

- Compute the weighted average cost of capital for each company.
- Compute the Economic Value Added (EVA) for each company.
- Based on the EVA, which company would be considered for best investment? Give reasons.
- If the industry P/E ratio is 11 times, estimate the price for the share of each company.
- Calculate the estimated market capitalization for each of the Companies.

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- (b) Rachna Limited is considering a takeover of Mona Limited. The particulars of two companies are given below:

<b>Particulars</b>	<b>Rachna Limited</b>	<b>Mona Limited</b>
Earnings after tax (₹)	20,00,000	10,00,000
Equity shares (Number)	10,00,000	10,00,000
Earnings per share	2	1
Price earnings ratio (times)	10	5

You are required to give following:

- What is the market value of each company before merger?
- Assuming that the management of Rachna Limited estimates that the shareholders of Mona Limited will accept an offer of one share of Rachna Limited for four shares of Mona Limited. What is the market value of the post-merger effect on Rachna Limited? Are the shareholders of Rachna Limited better or worse off than they were before the merger?
- Due to synergic effects, the management of Rachna Limited estimates that the earnings will increase by 25%. What will be the market price per share?

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## FINAL EXAMINATION

December 2018

**P-20 (SPBV)  
Syllabus 2016**

### Strategic Performance Management and Business Valuation

Time Allowed: 3 Hours

Full Marks: 100

*The figures in the margin on the right side indicate full marks.  
This paper has been divided into two Sections, viz, Section A and Section B.*

#### Section – A : Strategic Performance Management (50 Marks)

*Answer Question No. 1 which is compulsory and any two from the rest of this Section.*

1. Choose the correct option from amongst the four alternatives given: 2×5=10
- (i) \_\_\_\_\_ measures overall productivity and efficiency by considering all inputs and all outputs in the production process.
- (A) Total Factor Productivity  
(B) Partial Factor Productivity  
(C) Parametric Index Number Approach  
(D) Non-parametric Index Number Approach
- (ii) The six sigma DMAIC process consists of
- (A) Define, Measure, Analyze, Improve, Control  
(B) Define, Manage, Analyze, Improve, Control  
(C) Define, Measure, Analyze, Improve, Co-ordination  
(D) Deliver, Measure, Analyze, Improve, Control
- (iii) A firm has total cost function:  $C = 1/9 X^3 - 1/2 X^2 - 18 X + 30$ ; C is total cost and X is quantity produced. One is wondering whether MC (marginal cost) can ever be zero. If you believe that the firm's MC can be zero, then it will be when X is equal to
- (A) 2  
(B) 5  
(C) 9  
(D) None of the above is true



- (iv) The supply chain concept originated in what discipline?
- (A) Operations  
(B) Production  
(C) Marketing  
(D) Logistics
- (v) Which one the following is NOT a type of Benchmarking?
- (A) Product Benchmarking  
(B) Competitive Benchmarking  
(C) Process Benchmarking  
(D) Brand Benchmarking
2. (a) (i) What are the components of supply chain management ?  
(ii) What is operative and collaborative customer relationship management ?  
(iii) Describe the benefits and limitations of Balance Score Card. 3+3+4 = 10
- (b) (i) What are the steps in developing Balance Score Card ?  
(ii) Discuss the information to be required for performance measurement under Balance Score Card. 5+5 = 10
3. (a) The total cost function for a monopolist is given by  $TC = 900 + 40 Q^2$ . The demand function for the goods produced by the monopolist is given by  $2Q = 48 - 0.08 P$ . What will be the profit maximizing price? 8
- (b) The following financial data related to the Balance Sheet of XYZ Limited for FY 2017 – 18 has been extracted from the Annual Report 2017 – 18:

BALANCE SHEET of XYZ Limited as at March, 31

(₹ In crores)

<b>ASSETS</b>	<b>2018</b>
Non-Current Assets	
(a) Property, Plant and Equipment	70,942.90
(b) Capital Work-in-Progress	5,641.50
(c) Intangible Assets	786.18
(d) Financial Assets	—
(e) Other Assets	2,140.84
<b>Total Non-Current Assets</b>	<b>79,511.42</b>
Current Assets	
(a) Inventories	11,023.41
(b) Financial Assets	
(i) Investments	14,640.37
(ii) Trade Receivables	1,875.63



(iii)	Cash and Cash Equivalents	4,588.89
(iv)	Other Financial Assets	480.62
(c)	Other Assets	1,822.94
<b>Total Current Assets</b>		<b>34,431.86</b>
<b>TOTAL ASSETS</b>		<b>1,13,943.28</b>
<b>EQUITY AND LIABILITIES</b>		
Equity		
(a)	Equity Share Capital	1,146.12
(b)	Other Equity	60,976.14
<b>Total Equity</b>		<b>62,122.26</b>
Non-Current Liabilities		
(a)	Financial Liabilities	
(i)	Borrowings	24,568.95
(ii)	Other Financial Liabilities	19.78
(b)	Provisions	1,961.21
(c)	Other Liabilities	224.71
<b>Total Non-Current Liabilities</b>		<b>26,774.65</b>
Current Liabilities		
(a)	Financial Liabilities	
(i)	Borrowings	669.88
(ii)	Trade Payables	11,242.75
(iii)	Other Financial Liabilities	6,541.40
(b)	Provisions	735.28
(c)	Other Liabilities	5,857.06
<b>Total Current Liabilities</b>		<b>25,046.37</b>
<b>TOTAL EQUITY AND LIABILITIES</b>		<b>1,13,943.28</b>

*Additional Information :*

- Market Price of XYZ Limited share having a face value of ₹ 10 as on the Balance Sheet date was ₹ 870.
- Operating Profit of the Company for the year was – ₹ 21,640 crores.
- Operating Profit Margin of the Company is 16.25%.

Using the above information and Altman's Multiple Discriminant Function, you are required to calculate Z-score of XYZ Limited as per the revised Z-Score Model of Altman (1983) and comment on the financial position of the Company.

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4. (a) Define the following :

2×4 =8

- Shadow Pricing
- Liquidity Coverage Ratio
- Risk Retention



- (iv) Unsystematic Risk
- (b) (i) Give the statistical methods of Demand Forecasting (*any four*) :
- (ii) A manufacturing company is producing ball bearings. Its production-line is set to produce ball bearings with 8 mm diameter. Past records are showing that the process standard deviation of ball bearing diameter is 0.01 millimetres. Assume that you are working in the Quality Control Center of a company. On a particular day 7 samples of size 5 ( $n = 5$ ) are picked up. You are supposed to draw a suitable control chart with 3-sigma limits and comment whether the process is within control limits or not:

1	2	3	4	5	6	7
7.995	7.963	8.012	7.981	8.032	7.999	8.012

4+8=12

**Section – B**  
**Business Valuation**  
**(50 Marks)**

*Answer Question No. 5 which is compulsory and any two from the rest of this Section.*

5. Choose the correct option from amongst the four alternatives given, with justification/workings. 1 mark will be for the correct choice and 1 mark will be for the justification/workings. 2 × 5=10
- (i) If the expected rate of return on a stock exceeds the required rate,
- (A) the stock is experiencing super normal growth.
  - (B) the stock should be sold.
  - (C) the company is not probably trying to maximize price per share.
  - (D) the stock is a good buy.
- (ii) Which of the following items would not be included in a WACC calculation ?
- (A) Proportion or weight of debt
  - (B) Proportion or weight of equity
  - (C) Personal tax rate on interest payments
  - (D) Cost of equity
- (iii) In calculating Market Value added of the company \_\_\_\_\_ is/are considered.
- (A) Market value of equity
  - (B) Market value of debt
  - (C) Both (A) and (B)
  - (D) Only economic value added



- (iv) An investment is risk free when actual returns are always \_\_\_\_\_ the expected returns.
  - (A) equal to
  - (B) less than
  - (C) more than
  - (D) depends upon circumstances
  
- (v) Duration of a bond will \_\_\_\_\_ when the yield-to-maturity on the bond increases.
  - (A) decrease
  - (B) increase
  - (C) not change
  - (D) all three above are possible

6. (a) Suvo Ltd. plans to expand its operations and estimates the total cost of the expansion to be ₹ 24 crores. The same is proposed to be financed by internal accruals of ₹ 9 crores and the balance through the rights issue. The current share capital of the company is ₹ 2.40 crores. The shares of the company are currently quoting at ₹ 345. The company proposes to price the rights at ₹ 250.

Based on the information

- (i) compute the ratio of the rights.
- (ii) calculate the value of the rights.
- (iii) determine the gain/loss of a shareholder, if he
  - (A) Exercises his rights in the rights issue
  - (B) Allows his rights to expire
  - (C) Sells his rights

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(b) Das Ltd. is having a Machine carrying amount of which is ₹ 100 lakhs as on 31.03.2013. Its balance useful life is 5 years and residual value at the end of 5 years is ₹ 5 lakhs. Estimated future cash flows from the Machine for the next 5 years are :

Years	Estimated cash flows (₹ in lakhs)
2014	52
2015	34
2016	32
2017	28
2018	32

Compute "Value in use" for plant if the discount rate is 15% and also compute the recoverable amount if net selling price of the machine as on 31.12.2013 is ₹ 55 lakhs.

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7. Hard Company Limited is planning to acquire Soft Company Limited and merge it with the Company. The following financial information has been extracted from the respective Annual Reports of 2018 of these companies :



(₹ in crores)

Particulars	Hard Company Limited	Soft Company Limited
Sales	₹ 1,233.00	₹ 270.18
Less : Operating Expenses	₹ 678.15	₹ 148.60
<b>Operating Profit</b>	<b>₹ 554.85</b>	<b>₹ 121.58</b>
Less : Interest	₹ 75.00	₹ 75.00
<b>Profit Before Tax</b>	<b>₹ 479.85</b>	<b>₹ 46.58</b>
Less : Tax @ 30%	₹ 143.96	₹ 13.97
<b>Profit After Tax</b>	<b>₹ 335.90</b>	<b>₹ 32.61</b>
Assets		
Non-Current Assets	₹ 8,560.00	₹ 4,750.00
Current Assets	₹ 5,475.00	₹ 2,560.00
<b>Total Assets</b>	<b>₹ 14,035.00</b>	<b>₹ 7,310.00</b>
Equity and Liabilities		
Equity Capital (Face Value – ₹ 10 per share)	₹ 500.00	₹ 125.00
Other Equities	₹ 6,780.00	₹ 3,545.00
<b>Total Equity</b>	<b>₹ 7,280.00</b>	<b>₹ 3,670.00</b>
Non-Current Liabilities	₹ 4,750.00	₹ 2,450.00
Current Liabilities	₹ 2,005.00	₹ 1,190.00
<b>Total Equity and Liabilities</b>	<b>₹ 14,035.00</b>	<b>₹ 7,310.00</b>
<b>Ratios :</b>		
Net Profit Margin Ratio	27.24%	12.07%
Return on Equity	4.61%	0.89%
Price /Earnings Ratio	14.29	10.35

Required :

- (i) What is the market price of each company's share before merger?
- (ii) Assuming that the management of Hard Company Limited (HCL) estimates that the shareholders of Soft Company Limited (SCL) will accept an offer of one share of HCL for four shares of SCL. If there are no synergic effects and post-merger Price/Earnings Ratio remains unchanged, then what will be the market price of the post-merger HCL share?
- (iii) Will the shareholders of HCL be better or worse off than they were before the merger?
- (iv) Due to synergic effects, the management of HCL estimates that the earnings will increase by 20%. In such a case, what will be the new post-merger EPS and price per share if the new Price/Earnings Ratio of HCL will be 15? Will the shareholders be better off or worse off than before the merger? 20

8. (a) Discuss the relationship between economic value added and market value added. 8
- (b) You are the Director of Ram & Company. One of the projects you are considering is the acquisition of Shyam & Company. Shyam, the owner of Shyam & Company, is willing to consider selling his company to Ram & Company if he is offered an all-cash purchase price of ₹ 5 million. The project estimate that the purchase of Shyam & Company will generate the following profit after-tax cash flow :



Year	Cash Flow (in ₹ )
1	10,00,000
2	15,00,000
3	20,00,000
4	25,00,000
5	30,00,000

If you decide to go ahead with this acquisition, it will be funded with Ram's standard mix of debt and equity at the firm's weighted average (after-tax) cost of capital of 9 per cent. Ram's tax rate is 30 per cent. Should you recommend acquiring Shyam & Company to your CEO ? 12

PVF@ 9 per cent is :

Year	1	2	3	4	5
PVF	0.917	0.842	0.772	0.708	0.650



## FINAL EXAMINATION

June 2018

**P-20 (SPBV)  
Syllabus 2016**

### Strategic Performance Management and Business Valuation

Time Allowed: 3 Hours

Full Marks: 100

*The figures in the margin on the right side indicate full marks.  
This paper has been divided into two Sections, viz, Section A and Section B.*

#### Section – A : Strategic Performance Management

**(50 Marks)**

*Answer Question No. 1 which is compulsory and any two from the rest of this Section.*

1. Choose the Correct Option from amongst the four alternatives given 2×5=10
- (i) An Index number is a statistical measure of \_\_\_\_\_ in a variable arranged in the form of a series and using a base for making comparison.
- (a) productivity
  - (b) inputs
  - (c) efficiency
  - (d) fluctuations
- (ii) Benchmarking focuses on
- (a) Production
  - (b) Profit
  - (c) Best Practices
  - (d) Best performance
- (iii) Project risk does not include
- (a) Institutional risk
  - (b) Turbulence
  - (c) Completion risk
  - (d) Uncertainty



- (iv) Physical risk arising out of Social, Political, Economic and Legal Environments are often identified through
  - (a) the performance of lead indicators
  - (b) the performance of lag indicators
  - (c) the performance of lead and lag indicators
  - (d) None of the above
  
- (v) Which out of the following financial ratios is not in the Altman Model: Z-Score?
  - (a) Market Value to Book Value of equity shares
  - (b) Working Capital to Total Assets
  - (c) Retained Earnings to Total Assets
  - (d) EBIT to Total Assets

2. (a) (i) What is Operative Customer Relationship Management?  
 (ii) Discuss the impact of CRM initiative on an organization, in terms of enhanced risk that it may face.  
 (iii) Describe the issues to be considered for analysing customer profitability. 3+3+4=10

(b) The following financial data for two years has been extracted from the Annual Report 2016-17 of one of the world's largest generic pharmaceutical companies having a strong presence in over 170 countries. Though the company's mission is — 'To be a leading global healthcare company which uses technology and innovation to meet everyday needs of all patients', yet it also wants to keep its shareholders happy by giving them a fair rate of return. For gauging return for shareholders, the company is using Return on Equity (ROE) as one of the metrics of performance evaluation. Because of intense competition, in recent years, its ROE is under pressure and to maintain the level of ROE, the company is changing its business model — in that, it is varying its margins, assets utilization and leverage.

You are required to use suitable DU PONT Analysis using the financial data given below and show how the ROE of the company is changing due to its margins, assets utilization and leverage over a period of two years. You are also required to give your comment on the change on these parameters. 10

(₹ In Lakh)

Statement of Profit and Loss	2016	2017
Relevant financial data		
Total Revenue	7,125.80	8,431.55
Profit before Tax	1,421.46	2,011.86
Profit after Tax	1,123.96	1,507.11
Dividend	160.58	160.58
Tax on Dividend	26.05	27.29
Retained Earnings	937.32	1,319.24



(₹ In Lakh)

Balance Sheet	2016	2017
<b>ASSETS:</b>		
Fixed Assets	3,346.11	3,768.63
Investments (Current and Non-Current)	1,035.15	2,601.82
Other Net Assets (Current and Non-Current)	3,413.67	3,746.08
<b>Total</b>	<b>7,794.93</b>	<b>10,116.53</b>
<b>EQUITY AND LIABILITIES:</b>		
Share Capital	160.58	160.58
Reserves and Surplus	7,389.70	8,708.94
Net Worth	7,550.28	8,869.52
Loan Funds (Current and Non-Current)	12.20	965.81
Other Current Liabilities	232.45	281.20
<b>Total</b>	<b>7,794.93</b>	<b>10,116.53</b>

3. (a) A firm has a demand function:  $p = 12 - x^2$  and the total cost function:  $C = - (4/3) x^3 + 4x^2 + 10$  where  $p =$  Price per unit (₹ '000) and  $x =$  Quantity demanded/produced (units in thousands). On the basis of the information given, answer the following:
- (i) Show that the firm is a monopolist firm.
  - (ii) Determine the quantity the firm should produce to maximize profit. Also, determine the amount of profit. 4+8=12
- (b) Distinguish between the following:
- (i) Risk avoidance and Risk diversification
  - (ii) Interest Rate Risk and Market Risk 4×2=8
4. (a) Explain RBI guideline on implementation of Basel III Capital Regulation in India. 8
- (b) (i) List the main causes of corporate distress. 4
- (ii) Define the following: 2×4=8
- (a) Financial Distress
  - (b) Enterprise Risk Management
  - (c) Risk Retention
  - (d) Value at Risk



**Section – B**  
**Business Valuation**  
**(50 Marks)**

*Answer Question No. 5 which is compulsory and any two from the rest of this Section.*

5. Choose the Correct Option from amongst the four alternatives given, with justification/ workings. 1 mark will be for the correct choice and 1 mark will be for the justification/ workings. 2×5=10
- (i) If a company has a P/E ratio of 12 and a Market to Book Value Ratio 2.10, then its Return on Equity will be
- (a) 14.10%
  - (b) 17.50%
  - (c) 25.20%
  - (d) None of the above
- (ii) A firm has PAT of ₹ 33.6 lakh with extraordinary income of ₹ 6 lakh. Cost of capital is 20% and the applicable tax rate is 40%. The value of the firm is
- (a) ₹ 250 lakh
  - (b) ₹ 150 lakh
  - (c) ₹ 180 lakh
  - (d) ₹ 168 lakh
- (iii) Firms that intend to buy only a small percentage of the outstanding stock can buy them in the market, in a process called
- (a) Repurchase tender offer
  - (b) Open market purchase
  - (c) Privately negotiated repurchase
  - (d) None of the above
- (iv) \_\_\_\_\_ is a measure of value of which tells whether a company is able to generate returns that exceed the costs of capital employed.
- (a) Cost of capital
  - (b) Economic Value Added
  - (c) Market value added
  - (d) Financial profit



- (v) If the divestiture value is greater than the present value of the expected cash flows, the value of the divesting firm will
- increase on the divestiture.
  - decrease on the divestiture.
  - remains same on the divestiture.
  - None of the above

6. (a) There is a privately held company XYZ Pvt. Ltd. that is operating into the retail space, and is now scouting for angel investors. The details pertinent to valuing XYZ Pvt. Ltd. are as follows:

The company has achieved break even this year and has an EBITDA of ₹ 90 crore. The beta based on the industry in which it operates is 1.8, and the average debt to equity ratio is hovering at 40:60. The rate of return provided by liquid bonds is 5%. The EV is to be taken at a multiple of 5 on EBITDA. The accountant has informed that the EBITDA of ₹ 90 crore includes an extraordinary gain of ₹ 10 crore for the year, and a potential write off of preliminary sales promotion costs of ₹ 20 crore are still pending. The internal assessment of rate of market return for the industry is 11%. The FCFs for the next 3 years are as follows:

(₹ In Crore)

	Y1	Y2	Y3
Future cash flows	100	120	150

The cost of debt will be 12%. Assume a tax regime of 30%.

What is the potential value to be placed on XYZ Pvt. Ltd.?

12

- (b) (i) G. Ltd. has announced issue of warrants on 1:1 basis for its equity shareholders. The current price of the stock ₹ 10 and warrants are convertible at an exercise price of ₹ 11.71 per share. Warrants are detachable and are trading at ₹ 3. What is the minimum price of the warrant? What is the warrant premium?
- (ii) Now had the current price been ₹ 16.375, what is the minimum price and warrant premium? (Consider warrants are tradable at ₹ 9.75)

4+4=8

7. (a) Vodafone Ltd. is considering a merger with Idea Ltd. The data below are in the hands of both Board of Directors. The issue at hand is how many shares of Vodafone Ltd. should be exchanged for Idea Ltd. Both boards are considering three possibilities 20000, 25000 and 30000 shares. You are required to construct a table demonstrating the potential impact of each scheme on each set of shareholders.

10

		Vodafone Ltd.	Idea Ltd.	Combined Post merger Firm 'A'
1	Current earnings per year (₹)	2,00,000	1,00,000	3,50,000
2	Shares outstanding	50000	10000	?
3	Earnings per share (₹) (1÷2)	4	10	?
4	Price per share (₹)	40	100	?
5	Price-earnings ratio [4÷3]	10	10	10
6	Value of firm (₹)	20,00,000	10,00,000	35,00,000
7	Expected annual growth rate in earnings in foreseeable future	0	0	0



(b) A company has issued a 12% debentures with a maturity of 5 years having face value of ₹ 1,000 and it is listed on the stock exchange. After 2 years of the issue of bonds, the yields in the market have increased to 15%. Someone suggested to the CFO of the company to buy the debentures from the market as they are trading below par.

- (i) Do you think that the CFO should accept the suggestion of the person?
- (ii) If yes, then determine the fair value of the debentures at which the company should buy the debentures from the stock market.

2+8=10

Discount factors:

Year →	1	2	3
Discounting Factor (12%)	0.8929	0.7972	0.7118
Discounting Factor (15%)	0.8696	0.7561	0.6575

8. (a) PS limited furnishes the following information relating to the previous three years and requests you to compute the value of the brand of the company: 12

(₹ In Lakh)

Particulars	2015	2016	2017
Profit before interest and tax	75.00	85.25	150.00
Loss on sale of assets	3.00	nil	18.00
Non-operating income	12.00	7.25	8.00

Inflation was 9% for 2016 and 15% for 2017. If the capitalization factor considering internal and external value driver to the brand is 14, determine the brand value. Assume an all inclusive future tax rate of 35%.

(b) Pure Drugs Limited is in the Pharmaceutical Industry and has a business strategy of growing inorganically. It is contemplating to acquire Solid Drugs Limited which has a strong hold in cardiac segment. Pure Drugs Limited has 30 crore shares outstanding which are trading on an average price of ₹ 300 while Solid Drugs Limited has outstanding shares 20 crore and are selling at an average price of ₹ 200 per share. The EPS are of ₹ 12 and ₹ 6 for Pure Drugs Limited and Solid Drugs Limited respectively. Recently, the management of both the companies had a meeting wherein number of alternative proposals was considered for exchange of shares. They are —

- (i) Exchange Ratio should be in proportion to the relative EPS of two companies.
- (ii) Exchange Ratio should be in proportion to the relative share prices of two companies.
- (iii) Exchange Ratio should be 3 shares of Pure Drugs Limited for every 5 shares of Solid Drugs Limited.

You are required to estimate EPS and Market Price under the three options, assuming the P/E of Pure Drugs Limited after merger will remain unchanged. Assume that there will not be any synergy gains due the said merger.

4+4=8

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