CMA Students Newsletter (For Foundation Students)

Vol.16A: September 30, 2015

Paper 1: Fundamentals of Economics and Management (FEM)

PRICING AND OUTPUT DECISIONS: MONOPOLISTIC COMPETITION AN OLIGOPOLY

Imperfect competition

- Some market power but not absolute market power
- Non-price competition: firms have the ability to set prices within the limits of certain constraints
- Price competition/mutual interdependence: interaction among competitors when making decisions

	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
Market power?	No	Yes*	Yes	Yes
Mutual interdependence amongg competing firms?	No	No	No	Yes
Non-price competition?	No	Optional	Yes	Yes
Easy market entry or exit ?	Yes	No	Yes	No

* subject to government regulation

Monopolist Competition

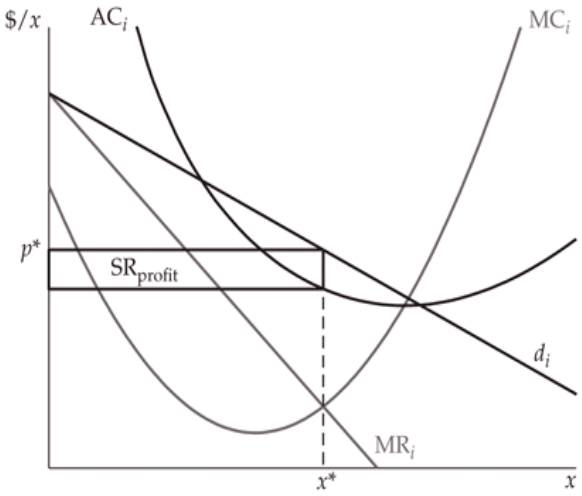
Monopolistic competition characteristics:

- many firms
- relatively easy entry
- product differentiation: can set price at a level higher than the price established by perfect competition
- use MR = MC rule to maximize profit

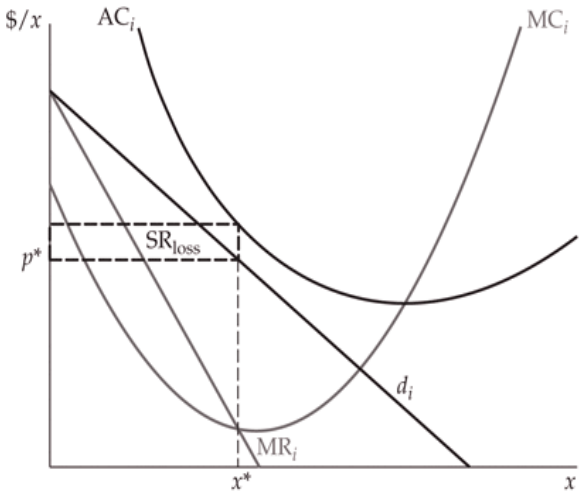
	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
Market power?	No	Yes*	Yes	Yes
Mutual interdependence amongg competing firms?	No	No	No	Yes
Non-price competition?	No	Optional	Yes	Yes
Easy market entry or exit ?	Yes	No	Yes	No

* subject to government regulation

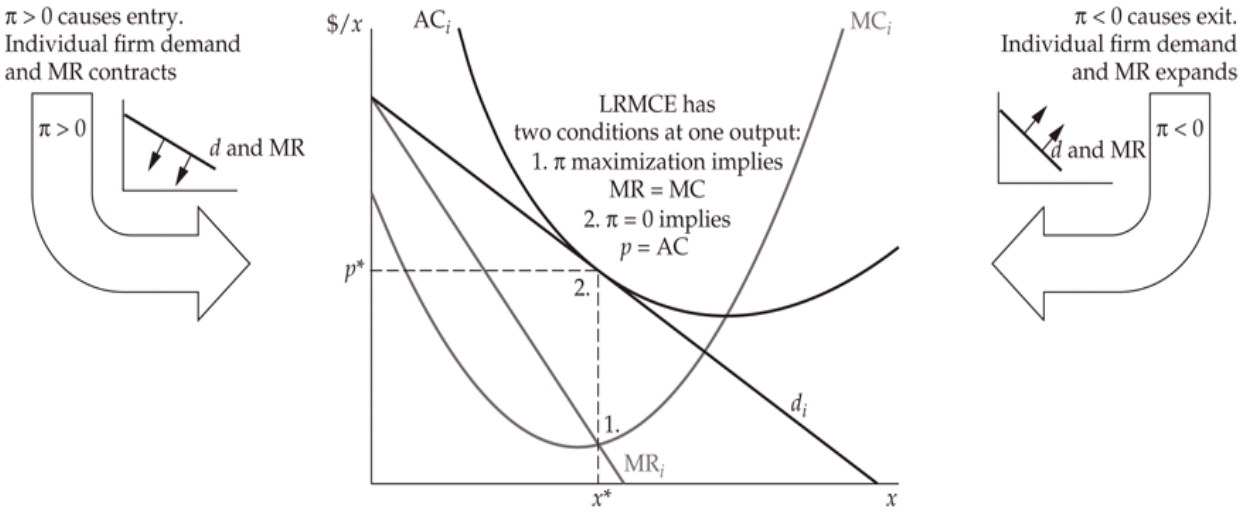
Monopolistic Competition



(a) Short-run profits



(b) Short-run losses



(c) Long-run monopolistic competition equilibrium (LRMCE)

- **If earning above-normal profits, newcomers will enter the market**

  - market supply curve shifts out and to the right
  - firm's demand curve shifts down and to the left
  - ultimately, in the long run, firms earn only normal profit = zero economic profit = long run monopolistic competitive equilibrium (LRMCE)

Oligopoly

- **Oligopoly** is a market dominated by a relatively small number of large firms
- **Herfindahl-Hirschman Index (HHI)** measures market concentration (max HHI = 10,000; unconcentrated markets have HHI < 1,000)

$$HH = \sum_{i=1}^{n} S_i^2$$

Where,
n = number of firms in the industry
S_i = firm's market share

	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
Market power?	No	Yes*	Yes	Yes
Mutual interdependence amongg competing firms?	No	No	No	Yes
Non-price competition?	No	Optional	Yes	Yes
Easy market entry or exit ?	Yes	No	Yes	No

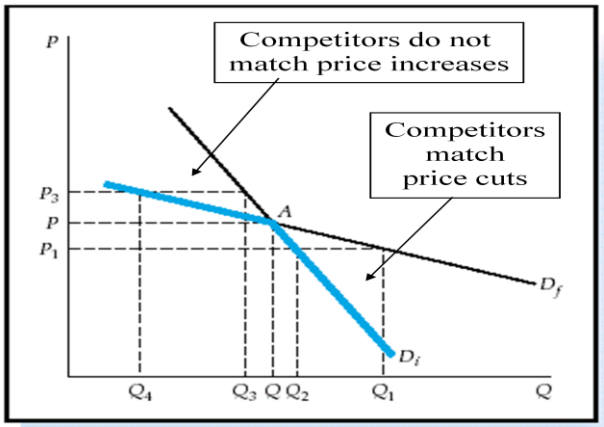
* subject to government regulation

Pricing in an Oligopolistic Market

- **Mutual interdependence:** relatively few sellers create a situation where each is carefully watching the others as it sets its price

If reduce price and competitors match the price cut then move along more inelastic demand segment D_i

If increase price and competitors do not follow then move along the more elastic segment D_f marginal revenue curve has kink (at A)



- **Kinked demand curve model:** Basic assumption is that competitor will follow a price decrease but will not make a change in reaction to a price increase
- **Price leader:** one firm in the industry takes the lead in changing prices, and assumes that other firms will follow a price increase but will not go lower in order to avoid a price war
- **Non-price leader:** firm that leads the differentiation of products on other, non-price attributes

	Perfect Competition	Monopoly	Monopolistic Competition	Oligopoly
Market power?	No	Yes*	Yes	Yes
Mutual interdependence amongg competing firms?	No	No	No	Yes
Non-price competition?	No	Optional	Yes	Yes
Easy market entry or exit ?	Yes	No	Yes	No
				* subject to government regulation

Competing in Imperfectly Competitive Markets

- **Non-price competition:** any effort made by firms in order to change the demand for their product (other than the price)
- **Non-price determinants of demand:**
  - tastes and preferences
  - income
  - prices of substitutes and complements
  - number of buyers
  - future expectations of buyers
  - financing terms

  Examples: of efforts by managers to influence non-price demand influences:
  - advertising and promotion
  - location and distribution channels
  - market segmentation
  - loyalty programs
  - product extensions and new products
  - special customer services
  - product 'lock-in' or 'tie-in'
  - pre-emptive new product announcements

  Examples: the reality of 'imperfect competition'
  - auto industry
  - small retailers
  - global credit card issuers

Strategy for Firms in Imperfect Competition

How does industry concentration affect the behavior of firms competing in the industry?

Strategy: the means by which an organization uses its scarce resources to relate to the competitive environment in a manner that is expected to achieve superior business performance over the long run

Strategy is important when firms are price makers and are faced with price and non-price competition as well as threats from new entrants into the market

More important for firms in imperfectly competitive markets than those in perfectly competitive markets or monopoly markets

- **Managerial economics:** the use of economic analysis to make business decisions involving the best use of an organization's scarce resources
  - **Industrial organization:** studies the way that firms and markets are organized and how this organization affects the economy from the viewpoint of social welfare

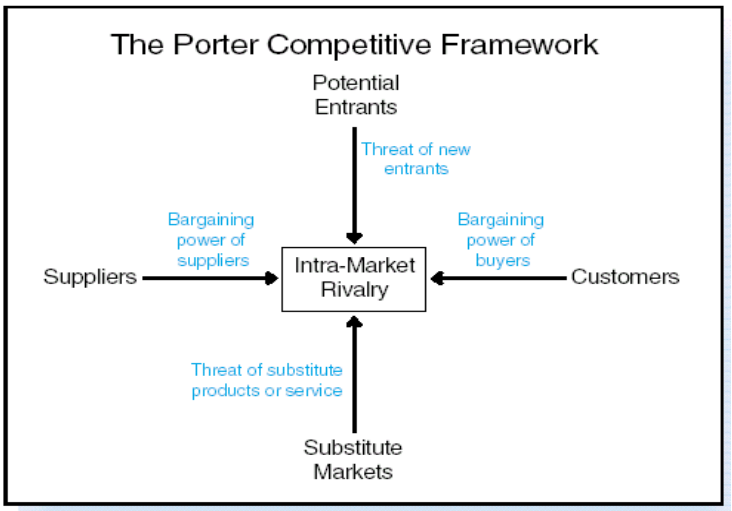
Questions that firms must consider in the determination of their strategy:

- ✓ What businesses should we be in?
- ✓ How should we compete in these businesses: product differentiator or cost leader?
- ✓ What are our long-run strategic objectives? How do these relate to our short-run tactics?
- ✓ Strategy for Firms in Imperfect Competition
- ✓ What geographic segments of the market should we focus on?
- ✓ What demographic segments of the market should we focus on?
- ✓ What will be the reaction of our competitors to our decisions?
- ✓ Is there a particular advantage to being a first mover in the market?
- ✓ Strategy for Firms in Imperfect Competition
- ✓ What are our core competencies and how can we use this to our competitive advantage?
- ✓ In making our strategic decisions, how can we best incorporate the changes that are taking place in the total business environment around the world?

- **Structure-Conduct-Performance (S-C-P) paradigm:** The theory, developed in the 1940's, says structure affects conduct which affects performance
  - **structure:** number of firms in industry, conditions of entry, product differentiation
  - **conduct:** pricing strategies, advertising, product development, legal tactics, collusion
  - **performance:** maximization of society's welfare

- **'New' Theory of Industrial Organization:** says there is no necessary connection between observed industry structure and performance that uniquely leads to maximum social welfare
  - Theory of contestable markets: performance by firms is ultimately influenced not by actual competition, but by the threat of potential competition

- **Porter's Five Forces model:** illustrates the various factors that affect the ability of any firm in the industry to earn a profit



- **Porter's generic strategies for earning above-average return on investment**
  - **Differentiation approach:** for a monopoly or monopolistically competitive market following MR = MC rule, firm sets a price on the demand line that is above AC
  - **Cost leadership approach:** for perfect competition
    - maintain cost structure low enough so when P = MC, there is a positive difference between P and AC

- **Pricing in Imperfect Competition**

MR and *P* are related according to this formula: **MR=P * (1+1/elasticity)**

This is the inverse elasticity rule.

Example: world beer market
- neither pure monopoly nor pure competition
- US market leader Anheuser Busch controls 50% of market
- mature market, with merger activity

- **Summary**
  - A critical part of the success of a firm's operations in imperfectly competitive markets is the development and implementation of an effective business strategy.
  - Non-price decisions are an important part of the environment of imperfect competition.
  - Monopolistic competition is characterized by product differentiation.
  - Oligopoly market exhibit interdependence.

Paper 2: Fundamentals of Accounting (FOA)

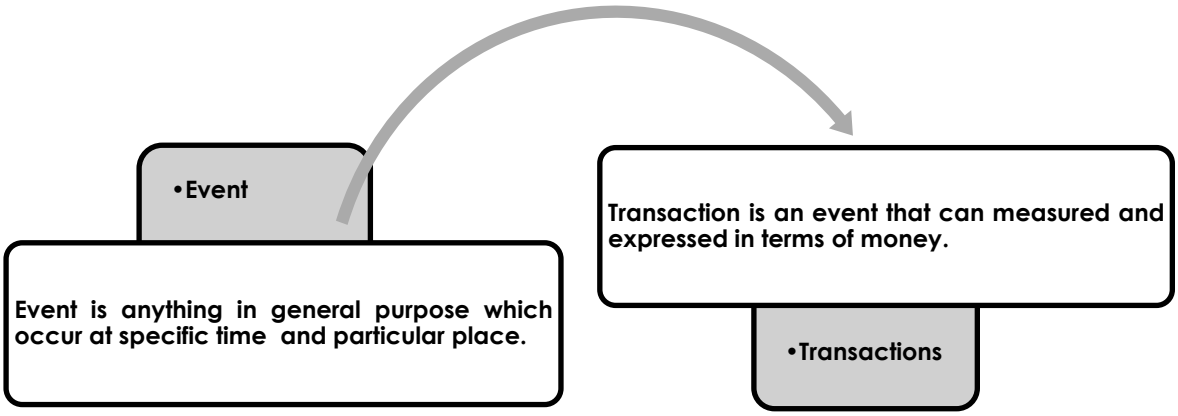
ACCOUNTING CONCEPT

Accounting Concepts define the assumptions on the basis of which financial statements of an entity are prepared. Some of the concepts are perceived, assumed and accepted in accounting to provide a uniformity and internal logic to the accounting process. These have universal application.

The following concepts ensure recording of financial facts on sound bases and logical considerations.

Money Measurement Concept	All the transactions must be measured in terms of money otherwise the transaction will not come in accounts.
Dual Aspect Concept	According to concept every transactions has two aspects i.e. benefit giving aspect and benefit receiving aspect. Both of the aspects are to be recorded in the accounts
Periodicity Concept	• It is a time starting form 1st April to 31st March • All material things that happened in these 12 months and measurable in terms of money must be recorded in accounts
Entity Concept	This concept explains that the business is independent and distinct from the proprietor. Profit earned during the year is shown as liability and the owner is treated as the creditor of the business.
Matching Concept	It is referred to as matching of expenses against incomes. It means that all incomes and expenditures relating to the financial period to which the accounts relate should be taken in to account.
Cost Concept	All the assets must appear in the balance sheet at their historical cost.
Realization Concept	This concept speaks about recording of only those transactions which are actually realized. For example Sale or Profit on sales will be taken into account only when money is realized i.e. either cash is received or legal ownership is transferred.
Materiality Concept	• All important items have to be mentioned in account • These are sufficient to influence the decisions of reader or/ user of financial statement.

Events and Transactions



Let's learn!!..... Features of Transactions

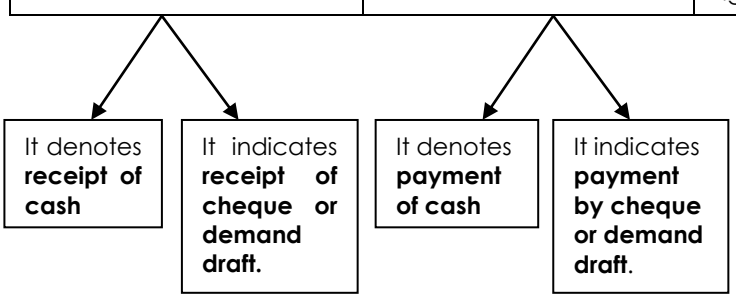
- Can be Measured in terms of Money
- Changes the Financial Position
- Can be recorded in Accounts

Example: Goods sold for ₹70,000 for cash.

Implications —

- Value of goods can be measured in terms of money
- There is an inflow of money
- Stocks is decreasing

Voucher			
➡ It is a written instrument that serves to confirm or witness (vouch) for some fact such as a transaction; ➡ It is a document that shows goods have bought or services have been rendered, authorizes payment; ➡ It indicates the ledger account(s) in which these transactions have to be recorded.			
Receipt	**Payment**	**Non Cash or Transfer**	**Supporting**
Receipt voucher is used to record **cash or bank receipt.**	Payment voucher is used to record a **payment of cash or cheque**	These vouchers are used for non-cash transactions as **documentary evidence.** E.g. Goods sent on credit	These vouchers are the documentary evidence of **transactions that have happened.** It is a supportive evidence.



Double Entry System was first advocated it in 1494 by Luca Pacioli. The Italian mathematician first published his comprehensive treatise on the principles of Double Entry System. The use of principles of double entry system made it possible to record not only cash but also all sorts of mercantile transactions.

Features
➡ The Double Entry System of Accounting establishes that each and every transaction has two sides — One is the giving side and the other is the receiving side. ➡ Every transaction is divided into two aspects, Debit or giving and Credit or receiving. ➡ One account is to be debited and the other account is to be credited. ➡ Every debit must have its corresponding and equal credit.
Advantages
➡ Since personal and impersonal accounts are maintained under the double entry system, both the effects of the transactions are recorded. ➡ It ensures arithmetical ➡ It prevents , minimizes and detects frauds. ➡ Errors can be checked and rectified easily. ➡ The balances of receivables and payables are determined easily. ➡ The current year's financial position of the business can be compared with that of the past years. ➡ Helps in decision making. ➡ Helps in determining the net operating results by preparing the Trading and Profit and Loss A/c. ➡ The financial position can be ascertained by the preparation of the Balance Sheet. ➡ Helps the Government to decide the tax and to decide sickness of business units and extend help accordingly. ➡ The other stakeholders like suppliers, banks, etc. take a proper decision regarding grant of credit or loans.
Limitations
➡ The system does not disclose all the errors committed in the books accounts. ➡ The trial balance prepared under this system does not disclose certain types of errors. ➡ It is costly to maintain numbers of books of accounts.

An **account** is defined as a summarized record of transactions related to a person or an activity e.g. when the business deals with customers and suppliers, each of the customers and supplier will be having a separate account.

....Traditional Classification of Accounts

Accounts

Personal Account: These accounts are related to **persons.**

Nominal Account: These accounts are **related to expenses or losses and incomes or gains**.

Real Accounts: These are related to **assets or properties or possessions**.

These persons could be **natural persons** like Suresh's A/c, Anil's a/c etc.

The persons could also be **artificial persons** like companies, bodies corporate etc. Such as Charitable Trust A/c, Ali and Sons trading A/c, ABC Bank A/c, etc

There could be **representative** personal accounts. Such as Outstanding Salary A/c

Tangible Real Account – Assets that have physical existence and can be seen, and touched.. Such as Machinery A/c, Stock A/c

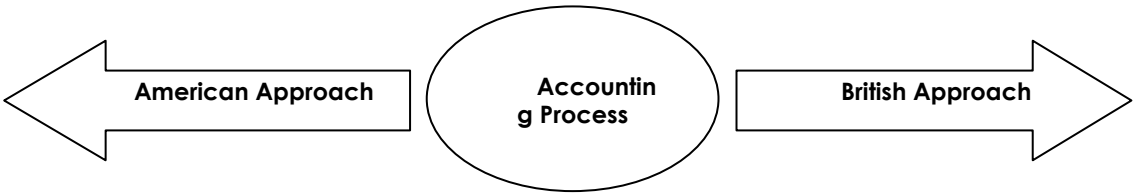
Intangible Real Account – These represent possession of properties that have no physical existence but can be measured in terms of money and have value attached to them. e.g. Goodwill A/c, Patent A/c

Let's learn!!..... The Concept of 'DEBIT' and 'CREDIT'

Debit	**Dr.**	**Debitum**	**Destination**
Credit	**Cr.**	**Creder**	**Source**

- Each and every transaction has two aspects – Debit and Credit.
- In double entry book-keeping, debits and credits (abbreviated Dr. and Cr. respectively) are entries made in account ledgers to record changes in value due to business transactions.
- Debit is derived from the latin word **"debitum"**, which means 'what we will receive'.
- Credit is derived from the latin word **"credre"** which means 'what we will have to pay'.
- The source account for the transaction is credited (an entry is made on the right side of the account's ledger)
- The destination account is debited (an entry is made on the left).
- Each transaction's debit entries must equal its credit entries.
- The difference between the total debits and total credits in a single account is the account's balance. If debits exceed credits, the account has a debit balance; if credits exceed debits, the account has a credit balance.

There are two approaches for deciding an account is debited or credit.



Mostly the British Rule is followed.

American Approach: In order to understand the rules of debit and credit according to this approach transactions are divided into the following five categories:

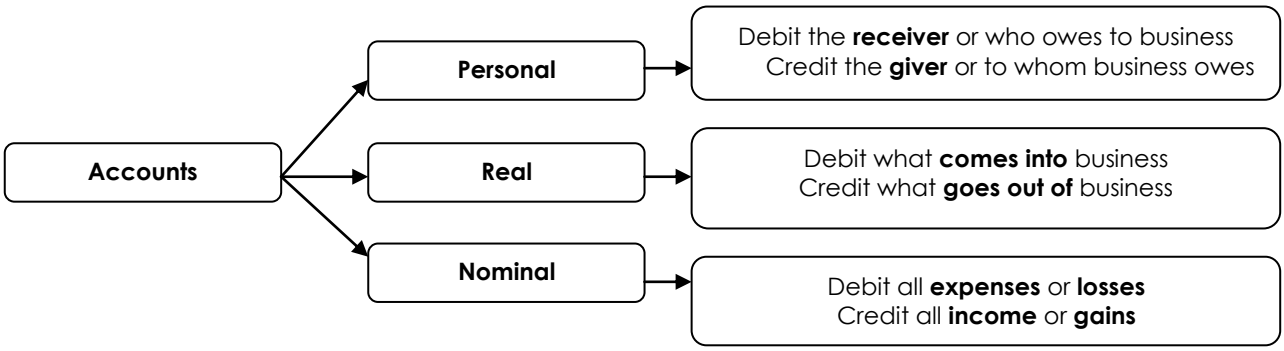
(i) Transactions relating to owner, e.g., Capital – These are personal accounts
(ii) Transactions relating to other liabilities, e.g., suppliers of goods – These are mostly personal accounts
(iii) Transactions relating to assets, e.g., land, building, cash, bank, stock-in-trade, bills receivable – These are basically all real accounts
(iv) Transactions relating to expenses, e.g., rent, salary, commission, wages, cartage – These are nominal accounts
(v) Transactions relating to revenues, e.g., interest received, dividend received, sale of goods – These are nominal accounts

To Sum up

For Assets	Increase in Assets Decrease in Assets	Dr. Cr.
For Liabilities	Decrease in Liabilities Increase in Liabilities	Dr. Cr.
For Capital	Decrease in Capital Increase in Capital	Dr. Cr.
For Incomes	Decrease in Income Increase in Income	Dr. Cr.
For Expense	Increase in Expense Decrease in Expense	Dr. Cr.
For Stock	Increase in Stock Decrease in Stock	Dr. Cr.

British Approach or Double Entry System:

When one identifies the account that is getting affected by a transaction and type of that account, the next step is to apply the rules to decide whether the accounting treatment is to debit or credit that account. The Golden Rules will guide us whether the account is to be debited or credited.



Accounting Equation is an equality between the **Resources** and the **Sources** which finance the resources and is expressed as —

Resources = Sources of Finance

Here, **"Resources"** means assets i.e. the tangible objects and intangible rights owned by a business and carrying probable future benefits and **" Sources of Finance"** means Equities and includes Internal Sources and External Sources.

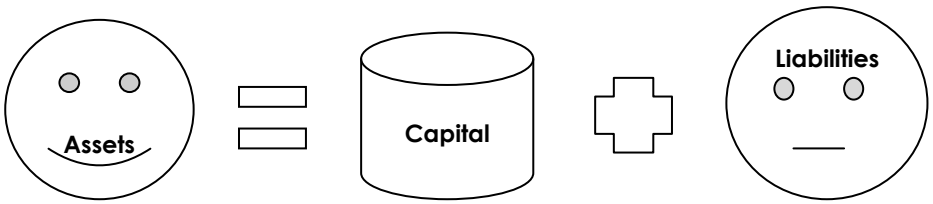
Thus, the equation can be expressed as —

Total Asset = Total Equities

Or

Assets = Internal Equity + External Equity

The whole Financial Accounting depends on **Accounting Equation** which is also known as **Balance Sheet Equation**. The basic Accounting Equation is:



....Types of Transactions:

Transaction

Capital

Transactions having long-term effect are known as capital transactions.

Capital Expenditure is an expenditure intended to benefit future periods.

Features

- Acquisition of Assets, special right
- Improvement of Fixed Assets
- Restoration of operating activity of an asset
- Increase of earning capacity or reduction of cost of operation.

Example

- Purchase of Machinery, Land, Furniture etc. not for re-sale etc.

Capital Receipts are non-recurring receipts from the owner/owners of the business or lenders of money creating a liability to either of them, may also include proceeds out of sale of assets

Features

- Non-recurring in nature.
- Contribution of capital by owner/ owners.
- Money obtained through loans
- Creating a liability or reducing the value of an asset.

Example

- Proprietor's or partners capitals or share capital.
- Bank loan, debentures issued etc.

Revenue

Transactions having short-term effect are known as revenue transactions.

Revenue Expenditure is an expenditure charged against operation.

Features

- Cost of goods and services meant for sale.
- Expenses for maintaining the working condition of assets.
- Expenses for production of goods and services to be sold.
- periodical cost and expenses for earning revenue.

Example

- Repairs or Renewals of Assets.
- Wages, cost of materials Salaries, rents, Salesman's commission, carriage outward etc. Depreciation on fixed assets.

Revenue Receipts is a recurring receipt against sale of goods or services rendered in the normal course of the business, generally the result of the trading activities of a business or non-trading income of regular or recurring nature

Features

- A regular receipt.
- Related to trading activities of the current accounting period. Non-trading receipt of recurring nature is also considered here.

Example

- Sales,
- rent received from property,
- commission or fees received,
- discount received, interest received on investments etc.

Paper 3: Fundamentals of Laws and Ethics (FLE)

THE RELATIONSHIP BETWEEN ETHICS AND LAW

Introduction

A relationship exists between law and ethics. In some instances, law and ethics overlap and what is perceived as unethical is also illegal. In other situations, they do not overlap. In some cases, what is perceived as unethical is still legal, and in others, what is illegal is perceived as ethical. A behavior may be perceived as ethical to one person or group but might not be perceived as ethical by another. Further complicating this dichotomy of behavior, laws may have been legislated, effectively stating the government's position, and presumably the majority opinion, on the behavior. As a result, in today's diverse business environment, one must consider that law and ethics are not necessarily the same thing.

Definitions

Law can be defined as a *consistent* set of *universal* rules that are widely *published*, generally *accepted*, and usually *enforced*. These rules describe the ways in which people are required to act in their relationships with others in a society. They are requirements to act in a given way, not just expectations or suggestions to act in that way. Since the government establishes law, the government can use police powers to enforce laws. The following chart defines the terms in the definition of law above.

- **Consistent –** If two requirements contradict each other, both cannot be termed a law, because people cannot obey both.
- **Universal –** The requirements must be applicable to every one with similar characteristics facing the same set of circumstances.
- **Published –** The requirements have to be published, in written form, so that they are accessible to everyone within the society.
- **Accepted –** The requirements have to be generally obeyed.
- **Enforced –** Members of society must be compelled to obey the law if they do not choose to do so voluntarily.

The word ethics is derived from the Greek word *ethos* (character), and from the Latin word *mores* (customs). Together they combine to define how individuals choose to interact with one another. In philosophy, ethics defines what is good for the individual and for society and establishes the nature of duties that people owe themselves and one another. The following items are characteristics of ethics:

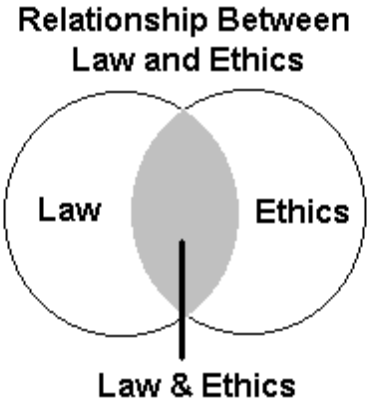
- Ethics involves learning what is right and wrong, and then doing the right thing.
- Most ethical decisions have extended consequences.
- Most ethical decisions have multiple alternatives.
- Most ethical decisions have mixed outcomes.
- Most ethical decisions have uncertain consequences.
- Most ethical decisions have personal implications.

It is important to note that there is also a difference between ethics and morality. Morality refers both to the standards of behavior by which individuals are judged, and to the standards of behavior by which people in general are judged in their relationships with others. Ethics, on the other hand, encompasses the system of beliefs that supports a particular view of morality.

The Relation between Law and Ethics

Ethical values and legal principles are usually closely related, but ethical obligations typically exceed legal duties. In some cases, the law mandates ethical conduct. Examples of the application of law or policy to ethics include employment law, federal regulations, and codes of ethics.

Though law often embodies ethical principles, law and ethics are far from co-extensive. The law does not prohibit many acts that would be widely condemned as unethical. And the contrary is true as well. The law also prohibits acts that some groups would perceive as ethical. For example lying or betraying the confidence of a friend is not illegal, but most people would consider it unethical. Yet, speeding is illegal, but many people do not have an ethical conflict with exceeding the speed limit. Law is more than simply codifying ethical norms.
The following diagram shows the relationship between law and ethics.



Establishing a set of ethical guidelines for detecting, resolving, and forestalling ethical breaches often prevents a company from getting into subsequent legal conflicts. Having demonstrated a more positive approach to the problem may also ensure that punishment for legal violations will be less severe. Federal sentencing guidelines passed in 1991 permit judges to reduce fines and jail time for executives proportionate to the ethical measures a company has taken.

The Legislation of Ethics

Numerous laws have been enacted to protect employees against what society perceives as unethical behavior in the workplace. These laws are administered by the United States Department of Labor. Generally, these laws reflect the ethical standards of the majority of society. An example is the Americans With Disabilities Act of 1990 (ADA). According to the ADA:

> *"No covered entity shall discriminate against a qualified individual with a disability because of the disability of such individual in regard to job application procedures, the hiring, advancement, or discharge of employees, employee compensation, job training, and other terms, conditions, and privileges of employment."*

Most citizens would agree that it would be unethical to deny employment or promotion to a disabled applicant, solely on the basis of that disability, especially when that disability would not affect their work performance. Legislators reacted and have enacted the ADA in order to make it illegal to engage in such discrimination. Yet even with this legislation, the Supreme Court continues to evaluate provisions of the ADA and its definition of disability.

Ethics Regulations for Federal Employees

Executive branch employees are subject to statutes and regulations commonly referred to as "ethics" standards. Through these statutes, the government has established legally enforceable rules on ethical behavior. The two basic sources of these standards are the criminal conflict of interest statutes and the administrative standards of ethical conduct.

Chapter 11 of Title 18, United States Code is an example of a Criminal Conflict of Interest Statute. The conflict of interest statutes prohibit a Federal employee from engaging in certain types of activities that would place the employee's own personal interests above the Federal Government's interests. According to this Statute, a Federal employee:

- Is prohibited from acting in an official capacity on a matter in which the employee (or certain others) has a financial interest;
- May not represent the interests of private parties in matters in which the United States is a party or has an interest;
- Is prohibited after leaving the Government from engaging in certain activities on behalf of other persons or entities;
- May not accept private compensation for performing official duties.

The Code of Federal Regulations Part 2635 is an example of Administrative Standards of Ethical Conduct Regulation. The standards of conduct regulation establish principles of ethical conduct for employees within the executive branch. The regulation not only identifies the principles but also provides easy to understand examples of how the principles apply. The standards of conduct cover such topics as:

- gifts from outside sources
- gifts between employees
- conflicting financial interests
- impartiality in performing official duties
- seeking other employment
- misuse of position
- outside activities

Codes of Ethics

Private Companies, organizations, and associations frequently establish their own Codes of Ethics. These may be formally written or understood. Although the government does not enforce these Codes, they are enforced internally. Violation of the Codes alone can, in some instances, be grounds for termination. The following tables show examples of such Codes.

The Jet Propulsion Laboratory Ethics Program

- I will conduct all business dealings with fairness, honesty and integrity.
- I will protect all information and resources available to me from loss, theft, and misuse.
- I will avoid even the appearance of conflict of interest or any other impropriety.
- I will treat my fellow employees fairly and with dignity and respect.
- I will help create and sustain an atmosphere conducive to the spirit of this code.

AMA Principles of Medical Ethics

- A physician shall be dedicated to providing competent medical service with compassion and respect for human dignity.
- A physician shall deal honestly with patients and colleagues, and strive to expose those physicians deficient in character or competence, or who engage in fraud or deception.
- A physician shall respect the law and recognize a responsibility to seek changes in those requirements which are contrary to the best interests of the patient.
- A physician shall respect the rights of patients, of colleagues, and of other health professionals, and shall safeguard patient confidences within the constraints of the law.
- A physician shall continue to study, apply, and advance scientific knowledge, make relevant information available to patients, colleagues, and the public, obtain consultation, and use the talents of other health professionals when indicated.
- A physician shall, in provision of appropriate patient care, except in emergencies, be free to choose whom to serve, with whom to associate, and the environment in which to provide medical services.
- A physician shall recognize a responsibility to participate in activities contributing to an improved community.

Potential Conflicts

Some activities and beliefs may be legal, but not perceived as ethical. Marriott Corporation maintains very comprehensive ethics standards to which their employees must abide. Their Corporate Dress Code is an example. Several years ago, the orientation program at Marriott Corporate Headquarters included a presentation on what was and was not considered acceptable appearance in the company. Some requirements included:

- Women could not wear skirts any shorter than 4 inches above the knee.
- Women could show no bare leg. Either long pants or hose were required at all times.
- Women's shoulders could not be exposed.
- Men's hair could not reach their collar, except for religious reasons.
- Men could not wear earrings.

Although these rules were part of company policy, there is nothing illegal about any one of these items. However, in the Marriott Corporate culture, each was considered unethical.

Another example is the manufacturing practices of Nike, one of the largest manufacturers of athletics sportswear in the world. Nike produces the majority of its goods in South East Asia. Despite the profits of the Nike organization, its foreign workers are paid substandard wages and work long hours in appalling conditions. In 1996, the entry-level wage at one of these factories was $2.20 a day. Labor groups estimate that a livable wage in Indonesia is about $4.25 a day. Compare this with the pay of one of Nike's celebrity promoters, Michael Jordan, who gets $20 million a year to promote Nike sneakers. Jordan's compensation alone is more than the annual income of 20,000 workers who make Nike shoes.

Nike's manufacturing practices are not illegal. There is nothing that says a company cannot take its manufacturing operations outside the United States. And as long as the company is meeting the minimum wage standards of the host country, there is nothing illegal about paying low wages. However, most Americans would look at these practices as unethical, especially considering the profits of Nike and their spending on celebrity promoters.

On the other hand, there are some behaviors which are illegal, but widely perceived as ethical. One example is taking office supplies from the company supply cabinet for personal use. Legally, this is considered theft, but many people see no moral or ethical problem and do it anyway.
Another example is buying a copyrighted software program and installing it on multiple computers. Technically, this violates Federal copyright laws. Yet, the piracy of software is widespread, even in corporations that consider themselves ethical.

Federal copyright law protects software from the moment of its creation. This is stated in the Copyright Act, Title 17 of the US Code. The Act gives the owner of the copyright "the exclusive rights" to "reproduce the copyrighted work" and "to distribute copies ... of the copyrighted work". It also states that "anyone who violates any of the exclusive rights of the copyright owner ... is an infringer of the copyright", and sets forth several penalties for violation of a copyright. Those who purchase a license for a copy of software do not have the right to make additional copies without the permission of the copyright owner, except to:

- copy the software onto a single computer, or
- make another copy for archival purposes

Although many people would write off the impact of software piracy in order to justify their belief that it is ethical, an annual study on global software piracy shows that the impact is great. The study estimates that, of the 615 million new business software applications installed worldwide during 1998, 231 million, or 38%, were pirated. They estimate that this resulted in an $11 billion loss to software companies.

Clearly, there is a relationship between law and ethics, and this relationship is important in management. Managers must evaluate not only what is legal, but what they, their employees, and society consider ethical as well. Important here is that companies must also consider what behaviors their customers will and will not accept. The news is full of stories regarding the ethical issues with which companies are being confronted, such as the practices of Nike, as outlined above. No company wants to be forced to defend itself over ethical issues involving wages, the environment, working issues, or human relations.

Managers play a vital role in a company's legal and ethical performance. It is in part their responsibility to ensure that their employees are abiding by Federal, State, and Local laws, as well as any ethical codes established at the company. But most importantly, the managers must provide a positive example to their employees of proper behavior in light of laws and ethical codes.

Certainly, policies and procedures will never be developed to satisfy everyone, but the establishment of Codes of Ethics will at least provide a framework for ethical behavior, and allow customers to evaluate the type of company with whom they are doing business. With this knowledge, employees and customers must decide whether or not they are willing and able to conform to these Codes, as well as to the laws that have been enacted. Managers cannot simply limit their decisions to following the law. They must also consider the ethics of their employees and customers.

Paper 4: Fundamentals of Business Mathematics and Statistics (FBMS)

THEORETICAL DISTRIBUTIONS

Theoretical distributions are

1. Binomial distribution } Discrete distribution
2. Poisson distribution } Discrete distribution
3. Normal distribution → Continuous distribution

Discrete Probability distribution

Bernoulli distribution

A random variable x takes two values 0 and 1, with probabilities q and p i.e., p(x = 1) = p and p(x = 0) = q, q – 1 – p is called a Bernoulli variate and is said to be Bernoulli distribution where p and q are probability of success and failure. It was given by Swiss mathematician James Bernoulli (1654 – 1705)

Example 1

- Tossing a coin (head or tail)
- Germination of seed (germinate or not)

Binomial distribution

Binomial distribution was discovered by James Bernoulli (1654 – 1705). Let a random experiment be performed repeatedly and the occurrence of an event in a trial be called as success and its non-occurrence is failure. Consider a set of n independent trails (n being finite), in which the probability p of success in any trail is constant for each trial. Then q = 1 – p is the probability of failure in any trail.

The probability of x success and consequently n = x failures in n independent trails. But x successes in n trails can occur in ne_x ways. Probability for each of these ways is p^xq^{n-x}.

P(sss…ff…fsf…f) = p(s)p(s)….p(f)p(f)…..

= p,p…q,q…

= (p,p…p)(q,q…q)

(x times) (n – x times)

Hence the probability of x success in a trials is given by

$Nc_x\ p^xq^{n-x}$

Definition

A random variable x is said to follow binomial distribution if it assumes non-negative values and its probability mass function is given by

$$P(X = x) = p(x) = \begin{cases} {}^{N}C_x\, p^x q^{n-x}, & x = 0, 1, 2 \ldots n \\ & q = 1 - p \\ 0, & \text{otherwise} \end{cases}$$

The two independent constants n and p in the distribution are known as the parameters of the distribution.

Conditions for Binomial distribution

We get the binomial distribution under the following experimentation conditions

1. The number of trial n is finite
2. The trials are independent of each other.
3. The probability of success p is constant for each trial.
4. Each trial must result in a success or failure.
5. The events are discrete events.

Properties

1. If p and q are equal, the given binomial distribution will be symmetrical. If p and q are not equal, the distribution will be skewed distribution.
2. Mean = E(x) = np
3. Variance = V(x) = npq (mean > variance)

Application

1. Quality control measures and sampling process in industries to classify items as defectives or non-defective.
2. Medical application such as success or failure, cure or non-cure.

Example 2

Eight coins are tossed simultaneously. Find the probability of getting atleast six heads.

Solution:

Here number of trials, n = 8, p denotes the probability of getting a head.

$\therefore p = ½$ and $q = ½$

If the random variable X denotes the number of heads, then the probability of a success in n trials is given by

$P(X = x) = {}^{n}C_x\, p^x\, q^{n-x}$, x = 0, 1, 2, …., n

$= {}^8C_x(½)^x\ (½)^{8-x} = {}^8C_x\ (½)^8$

$= \frac{1}{2^8}\ {}^8C_x$

Probability of getting atleast six heads is given by

$P(x \geq 6) = P(x = 6) + P(x = 7) + P(x = 8)$

$= \frac{1}{2^8}\ {}^8C_6 + \frac{1}{2^8}\ {}^8C_7 + \frac{1}{2^8}\ {}^8C_8$

$= \frac{1}{2^8}\ [{}^8C_6 + {}^8C_7 + {}^8C_8]$

$= \frac{1}{2^8}\ [28 + 8 + 1] = \frac{37}{256}$

Poisson distribution

The Poisson distribution, names after Simeon Denis Poisson (1781 – 1840). Poisson distribution is a discrete distribution. It describes random events that occurs rarely over a unit of time or space.

It differs from the binomial distribution in the sense that we count the number of success and number of failures, while in Poisson distribution, the average number of success in given unit of time or space.

Definition

The probability that exactly x events will occur in a given time is as follows

$P(x) = \frac{e^{-\lambda}\lambda^x}{x!}$, x = 0, 1, 2....

Called as probability mass function of Poisson distribution.

Where λ is the average number of occurrences per unit of time

λ = np

Condition for Poisson distribution

Poisson distribution is the limiting case of binomial distribution under the following assumptions.

1. The number of trails n should be indefinitely large i.e., n - > ∞
2. The probability of success p for each trial is indefinitely small.
3. np = λ, should be finite where λ is constant.

Properties

1. Poisson distribution is defined by single parameter λ.
2. Mean = λ
3. Variance = λ. Mean and Variance are equal.

Application

1. It is used in quality control statistics to count the number of defects of an item.
2. In biology, to count the number of bacteria.
3. In determining the number of deaths is a district in a given period, by rate disease.
4. The number of error per page is typed material.
5. The number of plants infected with a particular disease in a plot of field.
6. Number of weeds in particular species in different plots of a field.

Example 3

Suppose on an average 1 house in 1000 in a certain district has a fire during a year. If there are 200 houses in that district, what is the probability that exactly 5 houses will have a fire during the year? [given that $e^{-2} = 0.13534$]

Solution:

Mean, $\bar{x} = np$, $n = 2000$ and $p = \frac{1}{1000}$

$$= 2000 \times \frac{1}{1000}$$

$$\lambda = 2$$

The Poisson distribution is

$$P(X = x) = \frac{e^{-\lambda}\lambda^x}{x!}$$

$$P(X = 5) = \frac{e^{-2}2^5}{5!}$$

$$= \frac{(0.13534)\times 32}{120}$$

$$= 0.036$$

Normal distribution

Continuous Probability distribution is normal distribution. It is also known as error law or Normal Law or Laplacian law or Gaussian distribution. Many of the sampling distribution like student – t, f distribution and x^2 distribution.

Definition

A continuous random variable x is said to be a normal distribution with parameters μ and σ^2, if the density function is given by the probability law

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \; ; \; -\infty < x < \infty, -\infty < \mu < \infty, \sigma > 0$$

Note

The mean m and standard deviations are called the parameters of Normal distribution.

The normal distribution is expressed by $X \sim N(m, s^2)$

Condition of Normal Distribution

(i) Normal distribution is a limiting form of the binomial distribution under the following conditions.

(a) n, the number of trials is indefinitely large i.e., na¥ and

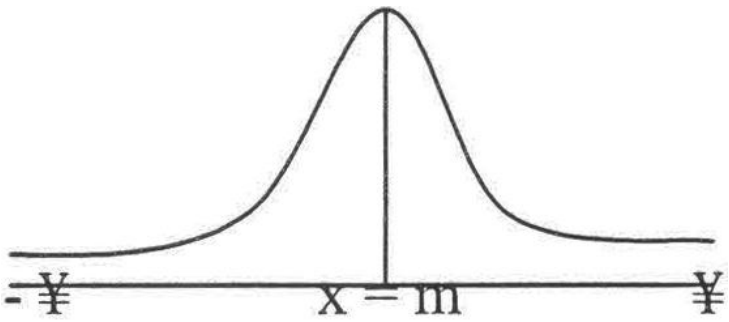
(b) Neither p nor q is very small.

(ii) Normal distribution can also be obtained as a limiting form of Poisson distribution with parameter ma¥

(iii) Constants of normal distribution are mean = m, variation = s^2, Standard deviation = s.

Normal probability curve

The curve representing the normal distribution is called the normal probability curve. The curve is symmetrical about the mean (m), bell-shaped and the two tails on the right and lift sides of the mean extends to the infinity. The shape of the curve is shown in the following figure.



Properties of normal distribution

1. The normal curve is bell shaped and is symmetric at x = m.
2. Mean, median, and mode of the distribution are coincide.
   i.e., Mean = Median = Mode = m
3. It has only one mode at x = m (i.e., unimodal)
4. The point so inflection are at x = m ± s
5. The maximum ordinate occurs at x = m and its value is = $\frac{1}{\sigma\sqrt{2\Pi}}$
6. Area Property P(m – s < ' < m + s) = 0.6826

   P(m – 2s < ' < m +2s) = 0.9544

   P(m – 3s < ' < m +3s) = 0.9973

Standard Normal Distribution

Let X be random variable which follows normal distribution with mean m and variance s2. The standard normal variate is defined as $Z = \frac{X - \mu}{\sigma}$ which follows standard normal distribution with mean 0 and standard deviation 1 is, Z ~ N (0, 1). The standard normal distribution is given by $\phi(Z) = \frac{1}{\sqrt{2\pi}} e^{\frac{-1}{2}z^2}$; - ¥ < z < ¥

The advantage of the above function is that it doesn't contain any parameter. This enable us to compute the area under the normal probability curve.

Note

Property of Φ(Z)

1. Φ(- Z) = 1 - Φ(Z)
2. P(a ≤ Z ≤ b) = Φ(b) – Φ(a)

Example 4

In a normal distribution whose mean is 12 and standard deviation is 2. Find the probability for the interval from x = 9.6 to x = 13.8

Solution:

Given that Z ~ N (12, 4)

$P(1.6 \le Z \le 13.8) = P(\frac{9.6 - 12}{2} \le Z \le \frac{13.8 - 12}{2})$

= P(-1.2 ≤ Z ≤ 0) + P (0 ≤ Z ≤ 0.9)

= P(0 ≤ Z ≤ 1.2) + P (0 ≤ Z ≤ 0.9) [by using symmetric property]

= 0.3849 + 0.3159

= 0.7008

When it is converted to percentage (i.e.,) 70% of the observations are covered between 9.6 to 13.8.

Questions:

1. For a Poisson distribution

(a) mean > variance

(b) mean = variance

(c) mean < variance

(d) mean < variance

Answer: mean = variance

2. In normal distribution, skewness is

(a) One

(b) Zero

(c) Greater than one

(d) Less than one

Answer: zero

3. Poisson distribution is a distribution for rate events

Answer: True

4. The total area under normal probability curve is one.

Answer: True

5. Poisson distribution is for continuous variable.

Answer: False

6. In a symmetrical curve mean, median and mode will coincide.

Answer: True

7. Give any two examples of Poisson distribution

8. The variance of a Poisson distribution is 0.5. Find P(x = 3).

[$e^{-0.5}$ = 0.6065]

9. The customer accounts of a certain departmental store have an average balance of ₹ 1200 and a standard deviation of ₹ 400. Assuming that the account balances are normally distributed. (i) What percentage of the accounts is over ₹ 1500? (ii) What percentage of the accounts is between ₹ 1000 and ₹ 1500? (iii) What percentage of the accounts is below ₹ 1500?

10. State the Properties of normal distribution.

Thank You