

BBA IInd SEMESTER

BUSINESS RESEARCH METHODS

Module: IVth and Vth NOTES

Module: 4

Data Collection and Analysis

The task of data collection begins after a research problem has been defined and research design/plan chalked out. While deciding about the method of data collection to be used for the study, the researcher should keep in mind two types of data viz., primary and secondary. The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process. The researcher would have to decide which sort of data he would be using (thus collecting) for his study and accordingly he will have to select one or the other method of data collection.

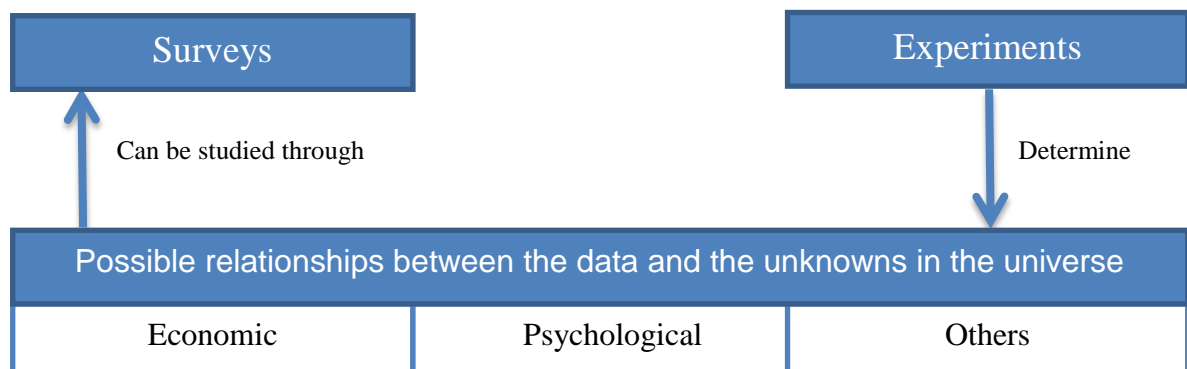
The primary data are those which are collected afresh and for the first time, and thus happen to be original in character.

The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process.

We collect primary data during the course of doing experiments in an experimental research but in case we do research of the descriptive type and perform surveys, whether sample surveys or census surveys, then we can obtain primary data either through observation or through direct communication with respondents in one form or another or through personal interviews.

This, in other words, means An experiment refers to an investigation in which a factor or variable under test is isolated and its effect(s) measured.

In an experiment the investigator measures the effects of an experiment which he conducts intentionally. Survey refers to the method of securing information concerning a phenomena under study from all or a selected number of respondents of the concerned universe. In a survey, the investigator examines those phenomena which exist in the universe independent of his action. The difference between an experiment and a survey can be depicted as under:



that there are several methods of collecting primary data, particularly in surveys and descriptive researches. Important ones are:

- (i) Observation method,
- (ii) Interview method,
- (iii) Through questionnaires,
- (iv) Through schedules, and

Other methods which include

- a) Warranty Cards;
- b) Distributor Audits;
- c) Pantry Audits;
- d) Consumer Panels;
- e) Using Mechanical Devices;
- f) Through Projective Techniques;
- g) Depth Interviews, And
- h) Content Analysis.

Observation Method

The observation method is the most commonly used method specially in studies relating to behavioural sciences. In a way we all observe things around us, but this sort of observation is not scientific observation. Observation becomes a scientific tool and the method of data collection for the researcher, when it serves a formulated research purpose, is systematically planned and recorded and is subjected to checks and controls on validity and reliability. Under the observation method, the information is sought by way of investigator's own direct observation without asking from the respondent. For instance, in a study relating to consumer behaviour, the investigator instead of asking the brand of wrist watch used by the respondent, may himself look at the watch. The main advantage of this method is that subjective bias is eliminated, if observation is done accurately. Secondly, the information obtained under this method relates to what is currently happening; it is not complicated by either the past behaviour or future intentions or attitudes. Thirdly, this method is independent of respondents' willingness to respond and as such is relatively less demanding of active cooperation on the part of respondents as happens to be the case in the interview or the questionnaire method. This method is particularly suitable in studies which deal with subjects (i.e., respondents) who are not capable of giving verbal reports of their feelings for one reason or the other.

However, observation method has various limitations. Firstly, it is an expensive method. Secondly, the information provided by this method is very limited. Thirdly, sometimes unforeseen factors may interfere with the observational task. At times, the fact that some people are rarely accessible to direct observation creates obstacle for this method to collect data effectively.

While using this method, the researcher should keep in mind things like: What should be observed? How the observations should be recorded? Or how the accuracy of observation can be ensured? In case the observation is characterised by a careful definition of the units to be

observed, the style of recording the observed information, standardised conditions of observation and the selection of pertinent data of observation, then the observation is called as structured observation. But when observation is to take place without these characteristics to be thought of in advance, the same is termed as unstructured observation. Structured observation is considered appropriate in descriptive studies, whereas in an exploratory study the observational procedure is most likely to be relatively unstructured.

We often talk about participant and non-participant types of observation in the context of studies, particularly of social sciences. This distinction depends upon the observer's sharing or not sharing the life of the group he is observing. If the observer observes by making himself, more or less, a member of the group he is observing so that he can experience what the members of the group experience, the observation is called as the participant observation. But when the observer observes as a detached emissary without any attempt on his part to experience through participation what others feel, the observation of this type is often termed as non-participant observation. (When the observer is observing in such a manner that his presence may be unknown to the people he is observing, such an observation is described as disguised observation.)

There are several merits of the participant type of observation: (i) The researcher is enabled to record the natural behaviour of the group. (ii) The researcher can even gather information which could not easily be obtained if he observes in a disinterested fashion. (iii) The researcher can even verify the truth of statements made by informants in the context of a questionnaire or a schedule. But there are also certain demerits of this type of observation viz., the observer may lose the objectivity to the extent he participates emotionally; the problem of observation-control is not solved; and it may narrow-down the researcher's range of experience.

Sometimes we talk of controlled and uncontrolled observation. If the observation takes place in the natural setting, it may be termed as uncontrolled observation, but when observation takes place according to definite pre-arranged plans, involving experimental procedure, the same is then termed controlled observation. In non-controlled observation, no attempt is made to use precision instruments. The major aim of this type of observation is to get a spontaneous picture of life and persons. It has a tendency to supply naturalness and completeness of behaviour, allowing sufficient time for observing it. But in controlled observation, we use mechanical (or precision) instruments as aids to accuracy and standardisation. Such observation has a tendency to supply formalised data upon which generalisations can be built with some degree of assurance. The main pitfall of non-controlled observation is that of subjective interpretation. There is also the danger of having the feeling that we know more about the observed phenomena than we actually do. Generally, controlled observation takes place in various experiments that are carried out in a laboratory or under controlled conditions, whereas uncontrolled observation is resorted to in case of exploratory researches.

Interview Method

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews and, if possible, through telephone interviews.

(a) Personal interviews: Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person or persons. (At times the interviewee may also ask certain questions and the interviewer responds to these, but usually the interviewer initiates the interview and collects the information.) This sort of interview may be in the form of direct personal investigation or it may be indirect oral investigation. In the case of direct personal investigation the interviewer has to collect the information personally from the sources concerned. He has to be on the spot and has to meet people from whom data have to be collected. This method is particularly suitable for intensive investigations. But in certain cases it may not be possible or worthwhile to contact directly the persons concerned or on account of the extensive scope of enquiry, the direct personal investigation technique may not be used. In such cases an indirect oral examination can be conducted under which the interviewer has to cross-examine other persons who are supposed to have knowledge about the problem under investigation and the information, obtained is recorded. Most of the commissions and committees appointed by government to carry on investigations make use of this method.

The method of collecting information through personal interviews is usually carried out in a structured way. As such we call the interviews as structured interviews. Such interviews involve the use of a set of predetermined questions and of highly standardised techniques of recording. Thus, the interviewer in a structured interview follows a rigid procedure laid down, asking questions in a form and order prescribed. As against it, the unstructured interviews are characterised by a flexibility of approach to questioning. Unstructured interviews do not follow a system of pre-determined questions and standardised techniques of recording information. In a non-structured interview, the interviewer is allowed much greater freedom to ask, in case of need, supplementary questions or at times he may omit certain questions if the situation so requires. He may even change the sequence of questions. He has relatively greater freedom while recording the responses to include some aspects and exclude others. But this sort of flexibility results in lack of comparability of one interview with another and the analysis of unstructured responses becomes much more difficult and time-consuming than that of the structured responses obtained in case of structured interviews. Unstructured interviews also demand deep knowledge and greater skill on the part of the interviewer. Unstructured interview, however, happens to be the central technique of collecting information in case of exploratory or formulative research studies. But in case of descriptive studies, we quite often use the technique of structured interview because of its being more economical, providing a safe basis for generalisation and requiring relatively lesser skill on the part of the interviewer.

We may as well talk about focussed interview, clinical interview and the non-directive interview. Focussed interview is meant to focus attention on the given experience of the respondent and its effects. Under it the interviewer has the freedom to decide the manner and sequence in which the questions would be asked and has also the freedom to explore reasons and motives. The main task of the interviewer in case of a focussed interview is to confine the respondent to a discussion of issues with which he seeks conversance. Such interviews are used generally in the development of hypotheses and constitute a major type of unstructured interviews. The clinical interview is concerned with broad underlying feelings or motivations or with the course of individual's life experience. The method of eliciting information under it is generally left to the interviewer's discretion. In case of non-directive interview, the interviewer's function is simply to encourage the respondent to talk about the given topic with a bare minimum of direct questioning. The interviewer often acts as a catalyst to a

comprehensive expression of the respondents' feelings and beliefs and of the frame of reference within which such feelings and beliefs take on personal significance.

Despite the variations in interview-techniques, the major advantages and weaknesses of personal interviews can be enumerated in a general way. The chief merits of the interview method are as follows:

- i. More information and that too in greater depth can be obtained.
- ii. Interviewer by his own skill can overcome the resistance, if any, of the respondents; the interview method can be made to yield an almost perfect sample of the general population.
- iii. There is greater flexibility under this method as the opportunity to restructure questions is always there, specially in case of unstructured interviews.
- iv. Observation method can as well be applied to recording verbal answers to various questions.
- v. Personal information can as well be obtained easily under this method.
- vi. Samples can be controlled more effectively as there arises no difficulty of the missing returns; non-response generally remains very low.
- vii. The interviewer can usually control which person(s) will answer the questions. This is not possible in mailed questionnaire approach. If so desired, group discussions may also be held.
- viii. The interviewer may catch the informant off-guard and thus may secure the most spontaneous reactions than would be the case if mailed questionnaire is used.
- ix. The language of the interview can be adopted to the ability or educational level of the person interviewed and as such misinterpretations concerning questions can be avoided.
- x. The interviewer can collect supplementary information about the respondent's personal characteristics and environment which is often of great value in interpreting results.

But there are also certain weaknesses of the interview method. Among the important weaknesses, mention may be made of the following:

- i. It is a very expensive method, specially when large and widely spread geographical sample is taken.
- ii. There remains the possibility of the bias of interviewer as well as that of the respondent; there also remains the headache of supervision and control of interviewers.
- iii. Certain types of respondents such as important officials or executives or people in high income groups may not be easily approachable under this method and to that extent the data may prove inadequate.
- iv. This method is relatively more-time-consuming, specially when the sample is large and recalls upon the respondents are necessary.
- v. The presence of the interviewer on the spot may over-stimulate the respondent, sometimes even to the extent that he may give imaginary information just to make the interview interesting.
- vi. Under the interview method the organisation required for selecting, training and supervising the field-staff is more complex with formidable problems.
- vii. Interviewing at times may also introduce systematic errors.

- viii. Effective interview presupposes proper rapport with respondents that would facilitate free and frank responses. This is often a very difficult requirement.

Pre-requisites and basic tenets of interviewing: For successful implementation of the interview method, interviewers should be carefully selected, trained and briefed. They should be honest, sincere, hardworking, impartial and must possess the technical competence and necessary practical experience. Occasional field checks should be made to ensure that interviewers are neither cheating, nor deviating from instructions given to them for performing their job efficiently. In addition, some provision should also be made in advance so that appropriate action may be taken if some of the selected respondents refuse to cooperate or are not available when an interviewer calls upon them.

In fact, interviewing is an art governed by certain scientific principles. Every effort should be made to create friendly atmosphere of trust and confidence, so that respondents may feel at ease while talking to and discussing with the interviewer. The interviewer must ask questions properly and intelligently and must record the responses accurately and completely. At the same time, the interviewer must answer legitimate question(s), if any, asked by the respondent and must clear any doubt that the latter has. The interviewer's approach must be friendly, courteous, conversational and unbiased. The interviewer should not show surprise or disapproval of a respondent's answer but he must keep the direction of interview in his own hand, discouraging irrelevant conversation and must make all possible effort to keep the respondent on the track.

(b) Telephone interviews: This method of collecting information consists in contacting respondents on telephone itself. It is not a very widely used method, but plays important part in industrial surveys, particularly in developed regions. The chief merits of such a system are:

1. It is more flexible in comparison to mailing method.
2. It is faster than other methods i.e., a quick way of obtaining information.
3. It is cheaper than personal interviewing method; here the cost per response is relatively low.
4. Recall is easy; call backs are simple and economical.
5. There is a higher rate of response than what we have in mailing method; the non-response is generally very low.
6. Replies can be recorded without causing embarrassment to respondents.
7. Interviewer can explain requirements more easily.
8. At times, access can be gained to respondents who otherwise cannot be contacted for one reason or the other.
9. No field staff is required.
10. Representative and wider distribution of sample is possible.

But this system of collecting information is not free from demerits. Some of these may be highlighted.

1. Little time is given to respondents for considered answers; interview period is not likely to exceed five minutes in most cases.
2. Surveys are restricted to respondents who have telephone facilities.
3. Extensive geographical coverage may get restricted by cost considerations.
4. It is not suitable for intensive surveys where comprehensive answers are required to various questions.
5. Possibility of the bias of the interviewer is relatively more.

6. Questions have to be short and to the point; probes are difficult to handle.

COLLECTION OF DATA THROUGH QUESTIONNAIRES

This method of data collection is quite popular, particularly in case of big enquiries. It is being adopted by private individuals, research workers, private and public organisations and even by governments. In this method a questionnaire is sent (usually by post) to the persons concerned with a request to answer the questions and return the questionnaire. A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. The questionnaire is mailed to respondents who are expected to read and understand the questions and write down the reply in the space meant for the purpose in the questionnaire itself. The respondents have to answer the questions on their own.

The method of collecting data by mailing the questionnaires to respondents is most extensively employed in various economic and business surveys. The merits claimed on behalf of this method are as follows:

1. There is low cost even when the universe is large and is widely spread geographically.
2. It is free from the bias of the interviewer; answers are in respondents' own words.
3. Respondents have adequate time to give well thought out answers.
4. Respondents, who are not easily approachable, can also be reached conveniently.
5. Large samples can be made use of and thus the results can be made more dependable and reliable.

The main demerits of this system can also be listed here:

1. Low rate of return of the duly filled in questionnaires; bias due to no-response is often indeterminate.
2. It can be used only when respondents are educated and cooperating.
3. The control over questionnaire may be lost once it is sent.
4. There is inbuilt inflexibility because of the difficulty of amending the approach once questionnaires have been despatched.
5. There is also the possibility of ambiguous replies or omission of replies altogether to certain questions; interpretation of omissions is difficult.
6. It is difficult to know whether willing respondents are truly representative.
7. This method is likely to be the slowest of all.

Before using this method, it is always advisable to conduct 'pilot study' (Pilot Survey) for testing the questionnaires. In a big enquiry the significance of pilot survey is felt very much. Pilot survey is in fact the replica and rehearsal of the main survey. Such a survey, being conducted by experts, brings to the light the weaknesses (if any) of the questionnaires and also of the survey techniques. From the experience gained in this way, improvement can be effected.

Main aspects of a questionnaire: Quite often questionnaire is considered as the heart of a survey operation. Hence it should be very carefully constructed. If it is not properly set up, then the survey is bound to fail. This fact requires us to study the main aspects of a questionnaire viz., the general form, question sequence and question formulation and wording. Researcher should note the following with regard to these three main aspects of a questionnaire:

1. General form: So far as the general form of a questionnaire is concerned, it can either be structured or unstructured questionnaire. Structured questionnaires are those questionnaires in which there are definite, concrete and pre-determined questions. The questions are presented with exactly the same wording and in the same order to all respondents. Resort is taken to this sort of standardisation to ensure that all respondents reply to the same set of questions. The form of the question may be either closed (i.e., of the type ‘_yes’ or ‘_no’) or open (i.e., inviting free response) but should be stated in advance and not constructed during questioning. Structured questionnaires may also have fixed alternative questions in which responses of the informants are limited to the stated alternatives. Thus a highly structured questionnaire is one in which all questions and answers are specified and comments in the respondent’s own words are held to the minimum. When these characteristics are not present in a questionnaire, it can be termed as unstructured or non-structured questionnaire. More specifically, we can say that in an unstructured questionnaire, the interviewer is provided with a general guide on the type of information to be obtained, but the exact question formulation is largely his own responsibility and the replies are to be taken down in the respondent’s own words to the extent possible; in some situations tape recorders may be used to achieve this goal.

Structured questionnaires are simple to administer and relatively inexpensive to analyse. The provision of alternative replies, at times, helps to understand the meaning of the question clearly. But such questionnaires have limitations too. For instance, wide range of data and that too in respondent’s own words cannot be obtained with structured questionnaires. They are usually considered inappropriate in investigations where the aim happens to be to probe for attitudes and reasons for certain actions or feelings. They are equally not suitable when a problem is being first explored and working hypotheses sought. In such situations, unstructured questionnaires may be used effectively. Then on the basis of the results obtained in pre-test (testing before final use) operations from the use of unstructured questionnaires, one can construct a structured questionnaire for use in the main study.

2. Question sequence: In order to make the questionnaire effective and to ensure quality to the replies received, a researcher should pay attention to the question-sequence in preparing the questionnaire. A proper sequence of questions reduces considerably the chances of individual questions being misunderstood. The question-sequence must be clear and smoothly-moving, meaning thereby that the relation of one question to another should be readily apparent to the respondent, with questions that are easiest to answer being put in the beginning. The first few questions are particularly important because they are likely to influence the attitude of the respondent and in seeking his desired cooperation. The opening questions should be such as to arouse human interest. The following type of questions should generally be avoided as opening questions in a questionnaire:
 - i. Questions that put too great a strain on the memory or intellect of the respondent;
 - ii. Questions of a personal character;
 - iii. Questions related to personal wealth, etc.

Following the opening questions, we should have questions that are really vital to the research problem and a connecting thread should run through successive questions. Ideally, the question sequence should conform to the respondent's way of thinking. Knowing what information is desired, the researcher can rearrange the order of the questions (this is possible in case of unstructured questionnaire) to fit the discussion in each particular case. But in a structured questionnaire the best that can be done is to determine the question-sequence with the help of a Pilot Survey which is likely to produce good rapport with most respondents. Relatively difficult questions must be relegated towards the end so that even if the respondent decides not to answer such questions, considerable information would have already been obtained. Thus, question-sequence should usually go from the general to the more specific and the researcher must always remember that the answer to a given question is a function not only of the question itself, but of all previous questions as well. For instance, if one question deals with the price usually paid for coffee and the next with reason for preferring that particular brand, the answer to this latter question may be couched largely in terms of price differences.

- 3 Question formulation and wording: With regard to this aspect of questionnaire, the researcher should note that each question must be very clear for any sort of misunderstanding can do irreparable harm to a survey. Question should also be impartial in order not to give a biased picture of the true state of affairs. Questions should be constructed with a view to their forming a logical part of a well thought out tabulation plan. In general, all questions should meet the following standards—(a) should be easily understood; (b) should be simple i.e., should convey only one thought at a time; (c) should be concrete and should conform as much as possible to the respondent's way of thinking. (For instance, instead of asking, -How many razor blades do you use annually?|| The more realistic question would be to ask, -How many razor blades did you use last week?|

Concerning the form of questions, we can talk about two principal forms, viz., multiple choice question and the open-end question. In the former the respondent selects one of the alternative possible answers put to him, whereas in the latter he has to supply the answer in his own words. The question with only two possible answers (usually 'Yes' or 'No') can be taken as a special case of the multiple choice question, or can be named as a 'closed question.' There are some advantages and disadvantages of each possible form of question. Multiple choice or closed questions have the advantages of easy handling, simple to answer, quick and relatively inexpensive to analyse. They are most amenable to statistical analysis. Sometimes, the provision of alternative replies helps to make clear the meaning of the question. But the main drawback of fixed alternative questions is that of —putting answers in people's mouths|| i.e., they may force a statement of opinion on an issue about which the respondent does not in fact have any opinion. They are not appropriate when the issue under consideration happens to be a complex one and also when the interest of the researcher is in the exploration of a process. In such situations, open-ended questions which are designed to permit a free response from the respondent rather than one limited to certain stated alternatives are considered appropriate. Such questions give the respondent considerable latitude in phrasing a reply. Getting the replies in respondent's own words is, thus, the major advantage of open-ended questions. But one should not forget that, from an analytical point of view, open-ended questions are more difficult to handle, raising problems of interpretation, comparability and interviewer bias.*

In practice, one rarely comes across a case when one questionnaire relies on one form of questions alone. The various forms complement each other. As such questions of different forms are included in one single questionnaire. For instance, multiple-choice questions constitute the basis of a structured questionnaire, particularly in a mail survey. But even there, various open-ended questions are generally inserted to provide a more complete picture of the respondent's feelings and attitudes.

Researcher must pay proper attention to the wordings of questions since reliable and meaningful returns depend on it to a large extent. Since words are likely to affect responses, they should be properly chosen. Simple words, which are familiar to all respondents should be employed. Words with ambiguous meanings must be avoided. Similarly, danger words, catch-words or words with emotional connotations should be avoided. Caution must also be exercised in the use of phrases which reflect upon the prestige of the respondent. Question wording, in no case, should bias the answer. In fact, question wording and formulation is an art and can only be learnt by practice.

Essentials of a good questionnaire: To be successful, questionnaire should be comparatively short and simple i.e., the size of the questionnaire should be kept to the minimum. Questions should proceed in logical sequence moving from easy to more difficult questions. Personal and intimate questions should be left to the end. Technical terms and vague expressions capable of different interpretations should be avoided in a questionnaire. Questions may be dichotomous (yes or no answers), multiple choice (alternative answers listed) or open-ended. The latter type of questions are often difficult to analyse and hence should be avoided in a questionnaire to the extent possible. There should be some control questions in the questionnaire which indicate the reliability of the respondent.

For instance, a question designed to determine the consumption of particular material may be asked first in terms of financial expenditure and later in terms of weight. The control questions, thus, introduce a cross-check to see whether the information collected is correct or not. Questions affecting the sentiments of respondents should be avoided. Adequate space for answers should be provided in the questionnaire to help editing and tabulation. There should always be provision for indications of uncertainty, e.g., -do not know, -no preference and so on. Brief directions with regard to filling up the questionnaire should invariably be given in the questionnaire itself. Finally, the physical appearance of the questionnaire affects the cooperation the researcher receives from the recipients and as such an attractive looking questionnaire, particularly in mail surveys, is a plus point for enlisting cooperation. The quality of the paper, along with its colour, must be good so that it may attract the attention of recipients.

COLLECTION OF DATA THROUGH SCHEDULES

This method of data collection is very much like the collection of data through questionnaire, with little difference which lies in the fact that schedules (proforma containing a set of questions) are being filled in by the enumerators who are specially appointed for the purpose. These enumerators along with schedules, go to respondents, put to them the questions from the proforma in the order the questions are listed and record the replies in the space meant for the same in the proforma. In certain situations, schedules may be handed over to respondents and enumerators may help them in recording their answers to various questions in the said schedules. Enumerators explain the aims and objects of the investigation and also remove the

difficulties which any respondent may feel in understanding the implications of a particular question or the definition or concept of difficult terms.

This method requires the selection of enumerators for filling up schedules or assisting respondents to fill up schedules and as such enumerators should be very carefully selected. The enumerators should be trained to perform their job well and the nature and scope of the investigation should be explained to them thoroughly so that they may well understand the implications of different questions put in the schedule. Enumerators should be intelligent and must possess the capacity of cross examination in order to find out the truth. Above all, they should be honest, sincere, hardworking and should have patience and perseverance.

This method of data collection is very useful in extensive enquiries and can lead to fairly reliable results. It is, however, very expensive and is usually adopted in investigations conducted by governmental agencies or by some big organisations. Population census all over the world is conducted through this method.

DIFFERENCE BETWEEN QUESTIONNAIRES AND SCHEDULES

Both questionnaire and schedule are popularly used methods of collecting data in research surveys. There is much resemblance in the nature of these two methods and this fact has made many people to remark that from a practical point of view, the two methods can be taken to be the same. But from the technical point of view there is difference between the two. The important points of difference are as under:

1. The questionnaire is generally sent through mail to informants to be answered as specified in a covering letter, but otherwise without further assistance from the sender. The schedule is generally filled out by the research worker or the enumerator, who can interpret questions when necessary.
2. To collect data through questionnaire is relatively cheap and economical since we have to spend money only in preparing the questionnaire and in mailing the same to respondents. Here no field staff required. To collect data through schedules is relatively more expensive since considerable amount of money has to be spent in appointing enumerators and in importing training to them. Money is also spent in preparing schedules.
3. Non-response is usually high in case of questionnaire as many people do not respond and many return the questionnaire without answering all questions. Bias due to non-response often remains indeterminate. As against this, non-response is generally very low in case of schedules because these are filled by enumerators who are able to get answers to all questions. But there remains the danger of interviewer bias and cheating.
4. In case of questionnaire, it is not always clear as to who replies, but in case of schedule the identity of respondent is known.
5. The questionnaire method is likely to be very slow since many respondents do not return the questionnaire in time despite several reminders, but in case of schedules the information is collected well in time as they are filled in by enumerators.
6. Personal contact is generally not possible in case of the questionnaire method as questionnaires are sent to respondents by post who also in turn return the same by post. But in case of schedules direct personal contact is established with respondents.
7. Questionnaire method can be used only when respondents are literate and cooperative, but in case of schedules the information can be gathered even when the respondents happen to be illiterate.

8. Wider and more representative distribution of sample is possible under the questionnaire method, but in respect of schedules there usually remains the difficulty in sending enumerators over a relatively wider area
9. Risk of collecting incomplete and wrong information is relatively more under the questionnaire method, particularly when people are unable to understand questions properly. But in case of schedules, the information collected is generally complete and accurate as enumerators can remove the difficulties, if any, faced by respondents in correctly understanding the questions. As a result, the information collected through schedules is relatively more accurate than that obtained through questionnaires.
10. The success of questionnaire method lies more on the quality of the questionnaire itself, but in the case of schedules much depends upon the honesty and competence of enumerators.
11. In order to attract the attention of respondents, the physical appearance of questionnaire must be quite attractive, but this may not be so in case of schedules as they are to be filled in by enumerators and not by respondents.
12. Along with schedules, observation method can also be used but such a thing is not possible while collecting data through questionnaires.

COLLECTION OF SECONDARY DATA

Secondary data means data that are already available i.e., they refer to the data which have already been collected and analysed by someone else. When the researcher utilises secondary data, then he has to look into various sources from where he can obtain them. In this case he is certainly not confronted with the problems that are usually associated with the collection of original data. Secondary data may either be published data or unpublished data. Usually published data are available in: (a) various publications of the central, state and local governments; (b) various publications of foreign governments or of international bodies and their subsidiary organisations; (c) technical and trade journals; (d) books, magazines and newspapers; (e) reports and publications of various associations connected with business and industry, banks, stock exchanges, etc.; (f) reports prepared by research scholars, universities, economists, etc. in different fields; and (g) public records and statistics, historical documents, and other sources of published information. The sources of unpublished data are many; they may be found in diaries, letters, unpublished biographies and autobiographies and also may be available with scholars and research workers, trade associations, labour bureaus and other public/private individuals and organisations.

Researcher must be very careful in using secondary data. He must make a minute scrutiny because it is just possible that the secondary data may be unsuitable or may be inadequate in the context of the problem which the researcher wants to study. In this connection Dr. A.L. Bowley very aptly observes that it is never safe to take published statistics at their face value without knowing their meaning and limitations and it is always necessary to criticise arguments that can be based on them.

By way of caution, the researcher, before using secondary data, must see that they possess following characteristics:

1. **Reliability of data:** The reliability can be tested by finding out such things about the said data: (a) Who collected the data? (b) What were the sources of data? (c) Were they collected by using proper methods (d) At what time were they collected? (e) Was

there any bias of the compiler? (t) What level of accuracy was desired? Was it achieved ?

2. **Suitability of data:** The data that are suitable for one enquiry may not necessarily be found suitable in another enquiry. Hence, if the available data are found to be unsuitable, they should not be used by the researcher. In this context, the researcher must very carefully scrutinise the definition of various terms and units of collection used at the time of collecting the data from the primary source originally. Similarly, the object, scope and nature of the original enquiry must also be studied. If the researcher finds differences in these, the data will remain unsuitable for the present enquiry and should not be used.
3. **Adequacy of data:** If the level of accuracy achieved in data is found inadequate for the purpose of the present enquiry, they will be considered as inadequate and should not be used by the researcher. The data will also be considered inadequate, if they are related to an area which may be either narrower or wider than the area of the present enquiry.

From all this we can say that it is very risky to use the already available data. The already available data should be used by the researcher only when he finds them reliable, suitable and adequate. But he should not blindly discard the use of such data if they are readily available from authentic sources and are also suitable and adequate for in that case it will not be economical to spend time and energy in field surveys for collecting information. At times, there may be wealth of usable information in the already available data which must be used by an intelligent researcher but with due precaution.

Review of Basic Statistical measures and scales used in Research

Statistical methods involved in carrying out a study include planning, designing, collecting data, analysing, drawing meaningful interpretation and reporting of the research findings. The statistical analysis gives meaning to the meaningless numbers, thereby breathing life into a lifeless data. The results and inferences are precise only if proper statistical tests are used. This article will try to acquaint the reader with the basic research tools that are utilised while conducting various studies. The article covers a brief outline of the variables, an understanding of quantitative and qualitative variables and the measures of central tendency. An idea of the sample size estimation, power analysis and the statistical errors is given. Finally, there is a summary of parametric and non-parametric tests used for data analysis.

Statistics is a branch of science that deals with the collection, organisation, analysis of data and drawing of inferences from the samples to the whole population. This requires a proper design of the study, an appropriate selection of the study sample and choice of a suitable statistical test. An adequate knowledge of statistics is necessary for proper designing of an epidemiological study or a clinical trial. Improper statistical methods may result in erroneous conclusions which may lead to unethical practice.

Variables

Variable is a characteristic that varies from one individual member of population to another individual. Variables such as height and weight are measured by some type of scale, convey quantitative information and are called as quantitative variables. Sex and eye colour give qualitative information and are called as qualitative variables.

Quantitative Variables

Quantitative or numerical data are subdivided into discrete and continuous measurements. Discrete numerical data are recorded as a whole number such as 0, 1, 2, 3,... (integer), whereas continuous data can assume any value. Observations that can be counted constitute the discrete data and observations that can be measured constitute the continuous data. Examples of discrete data are number of episodes of respiratory arrests or the number of re-intubations in an intensive care unit. Similarly, examples of continuous data are the serial serum glucose levels, partial pressure of oxygen in arterial blood and the oesophageal temperature.

A hierarchical scale of increasing precision can be used for observing and recording the data which is based on categorical, ordinal, interval and ratio scales. (**Fig 1**)

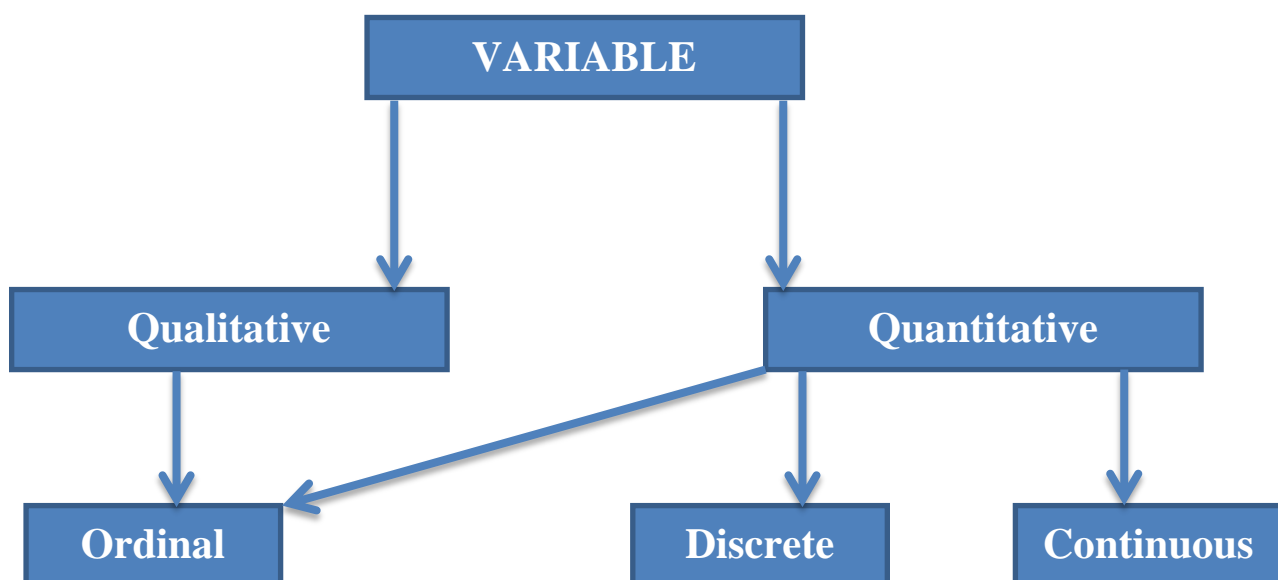
Categorical or nominal variables are unordered. The data are merely classified into categories and cannot be arranged in any particular order. If only two categories exist (as in gender male and female), it is called as a dichotomous (or binary) data. The various causes of re-intubation in an intensive care unit due to upper airway obstruction, impaired clearance of secretions, hypoxemia, hypercapnia, pulmonary oedema and neurological impairment are examples of categorical variables.

Ordinal variables have a clear ordering between the variables. However, the ordered data may not have equal intervals. Examples are the American Society of Anaesthesiologists status or Richmond agitation-sedation scale.

Interval variables are similar to an ordinal variable, except that the intervals between the values of the interval variable are equally spaced. A good example of an interval scale is the Fahrenheit degree scale used to measure temperature. With the Fahrenheit scale, the difference between 70° and 75° is equal to the difference between 80° and 85°: The units of measurement are equal throughout the full range of the scale.

Ratio scales are similar to interval scales, in that equal differences between scale values have equal quantitative meaning. However, ratio scales also have a true zero point, which gives them an additional property. For example, the system of centimetres is an example of a ratio scale. There is a true zero point and the value of 0 cm means a complete absence of length. The thyromental distance of 6 cm in an adult may be twice that of a child in whom it may be 3 cm.

Fig 1



Statistics: Descriptive and Inferential Statistics

Descriptive statistics try to describe the relationship between variables in a sample or population. Descriptive statistics provide a summary of data in the form of mean, median and mode. Inferential statistics use a random sample of data taken from a population to describe and make inferences about the whole population. It is valuable when it is not possible to examine each member of an entire population. The examples of descriptive and inferential statistics are illustrated in **Table 1**.

Table 1

Example of descriptive and inferential statistics

Descriptive statistics

The intracranial pressures (mmHg) of 10 patients admitted with severe head injury in Intensive Care Unit are 13, 32, 35, 42, 30, 19, 32, 27, 36 and 31. These data can be summarised to best represent the observations. We can rank the observations from lowest to highest: 13, 19, 27, 30, 31, 32, 32, 35, 36 and 42. We get now a clearer idea of the intracranial pressures in severe head injury. The idea about the commonly observed values 9 (the smaller and larger values less represent our sample)

The sample mode (most commonly observed value) is 32

Mean value is 29.7 mmHg

The median is the middle value. If there is an even number of observations, then the median is calculated as the average of the two middle values. The median is $31+32/2=31.5$ mm Hg

Inferential statistics

If one plans to study the association of learning disabilities^[5] after exposure to anaesthesia before the age of 4 years, it will be feasible to compare the learning disabilities between children who have received anaesthesia and those who have not received anaesthesia

It is impossible to measure the learning disability in all children of an entire population. However, it is possible to measure the learning disability in a representative random sample in different schools and draw inferences that could be applicable to the whole population

Descriptive statistics

The extent to which the observations cluster around a central location is described by the central tendency and the spread towards the extremes is described by the degree of dispersion.

Measures of central tendency

The measures of central tendency are mean, median and mode. Mean (or the arithmetic average) is the sum of all the scores divided by the number of scores. Mean may be influenced profoundly by the extreme variables. For example, the average stay of organophosphorus poisoning patients in ICU may be influenced by a single patient who stays in ICU for around 5 months because of septicemia. The extreme values are called outliers. The formula for the mean is

$$\text{Mean, } \bar{x} = \frac{\sum x}{n}$$

where x = each observation and n = number of observations. Median is defined as the middle of a distribution in a ranked data (with half of the variables in the sample above and half below the median value) while mode is the most frequently occurring variable in a distribution. Range defines the spread, or variability, of a sample. It is described by the minimum and maximum values of the variables. If we rank the data and after ranking, group the observations into percentiles, we can get better information of the pattern of spread of the variables. In percentiles, we rank the observations into 100 equal parts. We can then describe 25%, 50%, 75% or any other percentile amount. The median is the 50th percentile. The interquartile range will be the observations in the middle 50% of the observations about the median (25th-75th percentile). Variance is a measure of how spread out is the distribution. It gives an indication of how close an individual observation clusters about the mean value. The variance of a population is defined by the following formula:

$$\sigma^2 = \frac{\sum (X_i - X)^2}{N}$$

Where σ^2 is the population variance, X is the population mean, X_i is the i^{th} element from the population and N is the number of elements in the population. The variance of a sample is defined by slightly different formula:

$$s^2 = \frac{\sum (X_i - X)^2}{n - 1}$$

Where s^2 is the sample variance, x is the sample mean, x_i is the i^{th} element from the sample and n is the number of elements in the sample. The formula for the variance of a population has the value \underline{n} as the denominator. The expression $\underline{n-1}$ is known as the degrees of freedom and is one less than the number of parameters. Each observation is free to vary, except the last one which must be a defined value. The variance is measured in squared units. To make the interpretation of the data simple and to retain the basic unit of observation, the square root of variance is used. The square root of the variance is the standard deviation (SD). The SD of a population is defined by the following formula:

$$\sigma = \sqrt{\left(\frac{\sum [X_i - X]^2}{N}\right)}$$

where σ is the population SD, X is the population mean, X_i is the i^{th} element from the population and N is the number of elements in the population. The SD of a sample is defined by slightly different formula:

$$s = \sqrt{\left(\frac{\sum [X_i - x]^2}{n-1}\right)}$$

where s is the sample SD, x is the sample mean, x_i is the i^{th} element from the sample and n is the number of elements in the sample. An example for calculation of variation and SD is illustrated in **Table 2**.

Table 2

Example of mean, variance, standard deviation

Example: The weight of five patients undergoing laparoscopic cholecystectomy was 90, 90, 70, 70, 80

$$\text{Mean weight} = \frac{90 + 90 + 70 + 70 + 80}{4} = 80$$

$$\begin{aligned} \text{Variance} &= \frac{(90 - 80)^2 + (90 - 80)^2 + (70 - 80)^2 + (70 - 80)^2 + (80 - 80)^2}{5 - 1} \\ &= \frac{100 + 100 + 100 + 100 + 0}{5 - 1} \\ &= \frac{400}{5 - 1} \\ &= 100 \end{aligned}$$

$$\text{SD} = \sqrt{100} = 10$$

SD – Standard deviation

Normal distribution or Gaussian distribution

Most of the biological variables usually cluster around a central value, with symmetrical positive and negative deviations about this point. The standard normal distribution curve is a symmetrical bell-shaped. In a normal distribution curve, about 68% of the scores are within 1 SD of the mean. Around 95% of the scores are within 2 SDs of the mean and 99% within 3 SDs of the mean [Figure 2].

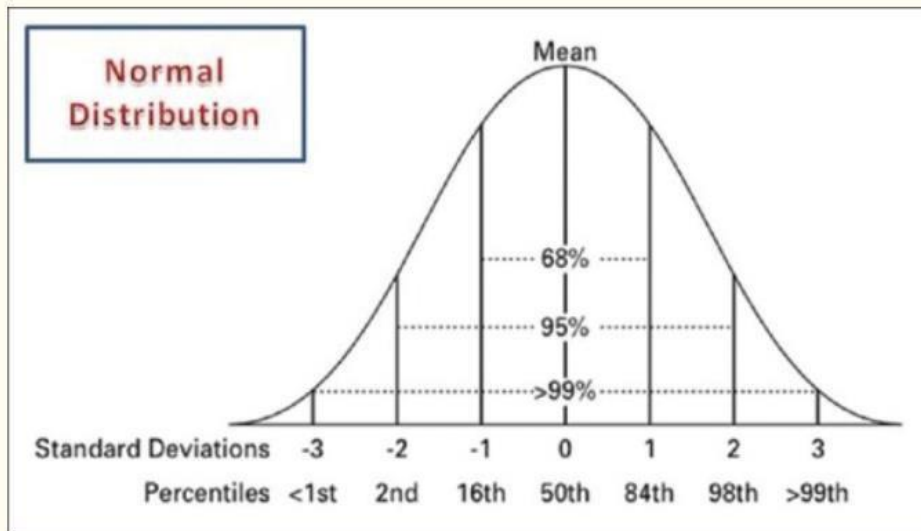


Figure 2

Normal distribution curve

Skewed distribution

It is a distribution with an asymmetry of the variables about its mean. In a negatively skewed distribution [Figure 3], the mass of the distribution is concentrated on the right of Figure 1. In a positively skewed distribution [Figure 3], the mass of the distribution is concentrated on the left of the figure leading to a longer right tail.

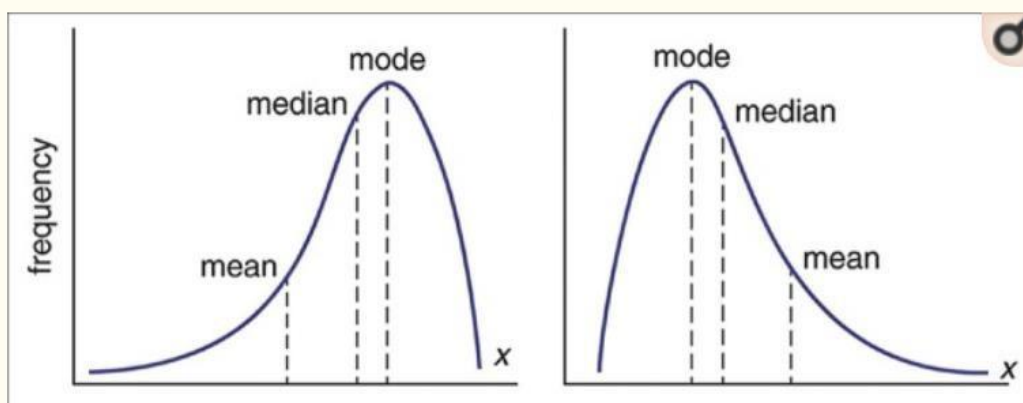


Figure 3

Curves showing negatively skewed and positively skewed distribution

Inferential statistics

In inferential statistics, data are analysed from a sample to make inferences in the larger collection of the population. The purpose is to answer or test the hypotheses. A hypothesis (plural hypotheses) is a proposed explanation for a phenomenon. Hypothesis tests are thus procedures for making rational decisions about the reality of observed effects.

Probability is the measure of the likelihood that an event will occur. Probability is quantified as a number between 0 and 1 (where 0 indicates impossibility and 1 indicates certainty).

In inferential statistics, the term 'null hypothesis' (H_0 'H-naught', 'H-null') denotes that there is no relationship (difference) between the population variables in question.

Alternative hypothesis (H_1 and H_a) denotes that a statement between the variables is expected to be true.

The P value (or the calculated probability) is the probability of the event occurring by chance if the null hypothesis is true. The P value is a numerical between 0 and 1 and is interpreted by researchers in deciding whether to reject or retain the null hypothesis [Table 3].

Table 3

P values with interpretation

P	Result	Null hypothesis
<0.01	Result is highly significant	Reject (null hypothesis) H_0
≥ 0.01 but <0.05	Result is significant	Reject (null hypothesis) H_0
Value ≥ 0.05	Result is not significant	Do not reject (null hypothesis) H_0

If P value is less than the arbitrarily chosen value (known as α or the significance level), the null hypothesis (H_0) is rejected [Table 4]. However, if null hypotheses (H_0) is incorrectly rejected, this is known as a Type I error. Further details regarding alpha error, beta error and sample size calculation and factors influencing them are dealt with in another section of this issue by Das S *et al.*

Table 4

Illustration for null hypothesis

A study was planned to evaluate if the use of intravenous dexmedetomidine attenuated the haemodynamic and neuroendocrine responses to fixation of skull pin head Holder in patients undergoing craniotomy.^[10] Sixty patients were randomly assigned, half in each group, to receive a single bolus dose of dexmedetomidine (1 $\mu\text{g}/\text{kg}$) intravenously over 10 min before induction of anaesthesia or normal saline (placebo) in the control group

It is possible for this study to be framed in a particular way that indicates competing beliefs about the drug to be studied in the patient population

First, we assume that dexmedetomidine makes no difference - has no effect. This is called the null hypothesis - the no change hypothesis. The symbol used is H_0 - 'H' for hypothesis and '0' for zero change (the word 'null' is another way of saying 'zero')

Second, we set up an alternate hypothesis H_a , which takes the opposite point of view - namely use of dexmedetomidine does make a difference (blunts the haemodynamic response)

The data are used to produce a test value - a test statistic - in this case, it measures the heart rate, arterial blood pressure and serial levels of cortisol, prolactin, insulin and blood glucose in each group (dexmedetomidine group and control group)

Then, the process evaluates whether the difference in these parameters between the two groups is significantly large

PARAMETRIC AND NON-PARAMETRIC TESTS

Numerical data (quantitative variables) that are normally distributed are analysed with parametric tests.

Two most basic prerequisites for parametric statistical analysis are:

- The assumption of normality which specifies that the means of the sample group are normally distributed

- The assumption of equal variance which specifies that the variances of the samples and of their corresponding population are equal.

However, if the distribution of the sample is skewed towards one side or the distribution is unknown due to the small sample size, non-parametric statistical techniques are used. Non-parametric tests are used to analyse ordinal and categorical data.

Parametric tests

The parametric tests assume that the data are on a quantitative (numerical) scale, with a normal distribution of the underlying population. The samples have the same variance (homogeneity of variances). The samples are randomly drawn from the population, and the observations within a group are independent of each other. The commonly used parametric tests are the Student's t -test, analysis of variance (ANOVA) and repeated measures ANOVA.

Student's t -test

Student's t -test is used to test the null hypothesis that there is no difference between the means of the two groups. It is used in three circumstances:

1. To test if a sample mean (as an estimate of a population mean) differs significantly from a given population mean (this is a one-sample t -test)

The formula for one sample t -test is $t = \frac{X - u}{SE}$

where X = sample mean, u = population mean and SE = standard error of mean

2. To test if the population means estimated by *two independent samples* differ significantly (the unpaired t -test). The formula for unpaired t -test is:

$$t = \frac{X_1 - X_2}{SE_{x_1 - x_2}}$$

Where $X_1 - X_2$ is the difference between the means of the two groups and SE denotes the standard error of the difference.

3. To test if the population means estimated by *two dependent samples* differ significantly (the paired t -test). A usual setting for paired t -test is when measurements are made on the same subjects before and after a treatment.

The formula for paired t -test is: $t = \frac{d}{SE_d}$

Where d is the mean difference and SE denotes the standard error of this difference.

The group variances can be compared using the F -test. The F -test is the ratio of variances (var 1/var 2). If F differs significantly from 1.0, then it is concluded that the group variances differ significantly.

Analysis of variance

The Student's *t*-test cannot be used for comparison of three or more groups. The purpose of ANOVA is to test if there is any significant difference between the means of two or more groups.

In ANOVA, we study two variances – (a) between-group variability and (b) within-group variability. The within-group variability (error variance) is the variation that cannot be accounted for in the study design. It is based on random differences present in our samples.

However, the between-group (or effect variance) is the result of our treatment. These two estimates of variances are compared using the F-test.

A simplified formula for the *F* statistic is:
$$F = \frac{MS_b}{MS_w}$$

Where MS_b is the mean squares between the groups and MS_w is the mean squares within groups.

Repeated measures analysis of variance

As with ANOVA, repeated measures ANOVA analyses the equality of means of three or more groups. However, a repeated measure ANOVA is used when all variables of a sample are measured under different conditions or at different points in time.

As the variables are measured from a sample at different points of time, the measurement of the dependent variable is repeated. Using a standard ANOVA in this case is not appropriate because it fails to model the correlation between the repeated measures: The data violate the ANOVA assumption of independence. Hence, in the measurement of repeated dependent variables, repeated measures ANOVA should be used.

Non-parametric tests

When the assumptions of normality are not met, and the sample means are not normally distributed parametric tests can lead to erroneous results. Non-parametric tests (distribution-free test) are used in such situation as they do not require the normality assumption. Non-parametric tests may fail to detect a significant difference when compared with a parametric test. That is, they usually have less power.

As is done for the parametric tests, the test statistic is compared with known values for the sampling distribution of that statistic and the null hypothesis is accepted or rejected. The types of non-parametric analysis techniques and the corresponding parametric analysis techniques are delineated in [Table 5](#).

Table 5

Analogue of parametric and non-parametric tests

Parametric tests	Non-parametric tests
One sample	
One sample <i>t</i> -test	Sign test Wilcoxon's signed rank test
Two-sample	
Paired <i>t</i> -test	Sign test
Unpaired <i>t</i> -test	Kolmogorov-Smirnov test
K-sample	
ANOVA	Kruskal-Wallis test Jonckheere test Friedman test
Two-way ANOVA (repeated measure ANOVA)	
Pearson correlation coefficient (<i>r</i>)	Spearman rank order (ρ)

ANOVA – Analysis of variance

Median test for one sample: The sign test and Wilcoxon's signed rank test

The sign test and Wilcoxon's signed rank test are used for median tests of one sample. These tests examine whether one instance of sample data is greater or smaller than the median reference value.

Sign test

This test examines the hypothesis about the median θ_0 of a population. It tests the null hypothesis $H_0 = \theta_0$. When the observed value (X_i) is greater than the reference value (θ_0), it is marked as+. If the observed value is smaller than the reference value, it is marked as – sign. If the observed value is equal to the reference value (θ_0), it is eliminated from the sample.

If the null hypothesis is true, there will be an equal number of + signs and – signs.

The sign test ignores the actual values of the data and only uses + or – signs. Therefore, it is useful when it is difficult to measure the values.

Wilcoxon's signed rank test

There is a major limitation of sign test as we lose the quantitative information of the given data and merely use the + or – signs. Wilcoxon's signed rank test not only examines the observed values in comparison with θ_0 but also takes into consideration the relative sizes, adding more statistical power to the test. As in the sign test, if there is an observed value that is equal to the reference value θ_0 , this observed value is eliminated from the sample.

Wilcoxon's rank sum test ranks all data points in order, calculates the rank sum of each sample and compares the difference in the rank sums.

Mann-Whitney test

It is used to test the null hypothesis that two samples have the same median or, alternatively, whether observations in one sample tend to be larger than observations in the other.

Mann–Whitney test compares all data (x_i) belonging to the X group and all data (y_i) belonging to the Y group and calculates the probability of x_i being greater than y_i : $P(x_i > y_i)$. The null hypothesis states that $P(x_i > y_i) = P(x_i < y_i) = 1/2$ while the alternative hypothesis states that $P(x_i > y_i) \neq 1/2$.

Kolmogorov-Smirnov test

The two-sample Kolmogorov-Smirnov (KS) test was designed as a generic method to test whether two random samples are drawn from the same distribution. The null hypothesis of the KS test is that both distributions are identical. The statistic of the KS test is a distance between the two empirical distributions, computed as the maximum absolute difference between their cumulative curves.

Kruskal-Wallis test

The Kruskal–Wallis test is a non-parametric test to analyse the variance. It analyses if there is any difference in the median values of three or more independent samples. The data values are ranked in an increasing order, and the rank sums calculated followed by calculation of the test statistic.

Jonckheere test

In contrast to Kruskal–Wallis test, in Jonckheere test, there is an a priori ordering that gives it a more statistical power than the Kruskal–Wallis test.

Friedman test

The Friedman test is a non-parametric test for testing the difference between several related samples. The Friedman test is an alternative for repeated measures ANOVAs which is used when the same parameter has been measured under different conditions on the same subjects.

Tests to analyse the categorical data

Chi-square test, Fischer's exact test and McNemar's test are used to analyse the categorical or nominal variables. The Chi-square test compares the frequencies and tests whether the observed data differ significantly from that of the expected data if there were no differences between groups (i.e., the null hypothesis). It is calculated by the sum of the squared difference between observed (O) and the expected (E) data (or the deviation, d) divided by the expected data by the following formula:

$$\chi^2 = \sum \frac{(O - E)^2}{O}$$

A Yates correction factor is used when the sample size is small. Fischer's exact test is used to determine if there are non-random associations between two categorical variables. It does not assume random sampling, and instead of referring a calculated statistic to a sampling distribution, it calculates an exact probability. McNemar's test is used for paired nominal data. It is applied to 2×2 table with paired-dependent samples. It is used to determine whether the row and column frequencies are equal (that is, whether there is no marginal

homogeneity'). The null hypothesis is that the paired proportions are equal. The Mantel-Haenszel Chi-square test is a multivariate test as it analyses multiple grouping variables. It stratifies according to the nominated confounding variables and identifies any that affects the primary outcome variable. If the outcome variable is dichotomous, then logistic regression is used.

SPSS (Statistical package for the social sciences) is the set of software programs that are combined together in a single package. The basic application of this program is to analyze scientific data related with the social science. This data can be used for market research, surveys, data mining, etc.

What Is SPSS and Its Importance in Research & Data Analysis?

SPSS (Statistical package for the social sciences) is the set of software programs that are combined together in a single package. The basic application of this program is to analyse scientific data related with the social science. This data can be used for market research, surveys, data mining, etc.

With the help of the obtained statistical information, researchers can easily understand the demand for a product in the market, and can change their strategy accordingly. Basically, SPSS first store and organize the provided data, then it compiles the data set to produce suitable output. SPSS is designed in such a way that it can handle a large set of variable data formats.

How SPSS Helps in Research & Data Analysis Programs:

SPSS is revolutionary software mainly used by research scientists which help them process critical data in simple steps. Working on data is a complex and time consuming process, but this software can easily handle and operate information with the help of some techniques. These techniques are used to analyze, transform, and produce a characteristic pattern between different data variables. In addition to it, the output can be obtained through graphical representation so that a user can easily understand the result. Read below to understand the factors that are responsible in the process of data handling and its execution.

1. **Data Transformation:** This technique is used to convert the format of the data. After changing the data type, it integrates same type of data in one place and it becomes easy to manage it. You can insert the different kind of data into SPSS and it will change its structure as per the system specification and requirement. It means that even if you change the operating system, SPSS can still work on old data.
2. **Regression Analysis:** It is used to understand the relation between dependent and interdependent variables that are stored in a data file. It also explains how a change in the value of an interdependent variable can affect the dependent data. The primary need of regression analysis is to understand the type of relationship between different variables.
3. **ANOVA (Analysis of variance):** It is a statistical approach to compare events, groups or processes, and find out the difference between them. It can help you understand

which method is more suitable for executing a task. By looking at the result, you can find the feasibility and effectiveness of the particular method.

4. MANOVA (Multivariate analysis of variance): This method is used to compare data of random variables whose value is unknown. MANOVA technique can also be used to analyse different types of population and what factors can affect their choices.
5. T-tests: It is used to understand the difference between two sample types, and researchers apply this method to find out the difference in the interest of two kinds of groups. This test can also understand if the produced output is meaningless or useful.

This software was developed in 1960, but later in 2009, IBM acquired it. They have made some significant changes in the programming of SPSS and now it can perform many types of research task in various fields. Due to this, the use of this software is extended to many industries and organizations, such as marketing, health care, education, surveys, etc.

Module: 4

Methods of Report writing: Oral, Written.

Introduction:

Research report: Research report is a written document or oral presentation based on a written document.

What is an oral report?

Presentation of one's research work in seminar, conference, workshop etc..

Importance of oral report:

- i. Save time and energy.
- ii. To assess/evaluate experienced, knowledge, skill etc. of a learner.
- iii. Learner can request opinions, suggestions from the audience.
- iv. For effective feedback from facilitators.
- v. For a better relationship between learner and facilitator.
- vi. Improvement for future oral report.

Preparation of the oral report

Duration for report: An outline can be drawn based on duration of the report. Time management is the main important part in oral report.

The audience: Basic questions to ask about an audience are: - Why should the audience listen to your report? - Is the report match with the standard of the audience?

-What you want to say about your topic may be much less important than what your audience wants to hear about it!

Report Planning:

- i. Content :
 - Audience may lose interest if your report contain too much information.
 - Key Points; examples and illustrations for key point.
- ii. Structure:
 - Most report consists of an introduction, the body and conclusion.
- iii. Introduction:
 - A good introduction attracts and focuses the attention of the audience.
 - Begin a talk with question, a short story, an interesting facts about your topic.
- iv. Body:
 - Body of a report must be presented in a logical order.
- v. Conclusions
 - Good conclusion reminds the audience key-points
 - Reinforces message

vi. Questions:

- Questions are important to judge the interesting and understanding level of audience.

Report Delivery

- i. Voice quality
- ii. Volume
 - Adjust your volume to the size of the room.
 - In a big room; project your voice rather than shout.
- iii. Speed and fluency
 - Don't speak too fast or slow.
 - Repeat and rephrase difficult or important points.
- iv. Clarity
 - Speak Clearly.
 - Face the audience and hold your head up.
- v. Pronunciation
- vi. Engaging the audience
- vii. Maintain eye contact
 - Speak to the audience by making eye-contact
 - Don't stare or glare
- viii. Look confident
 - It is natural to feel nervous in front of the audience
 - Take a deep breath, speak slowly, avoiding unnecessary movements.

Notes:

- i. Speaking without notes
 - Looking natural, knowledgeable and confident.
 - Easier to get attention from audience. (If you are not an experienced speaker it is not a good idea to speak without notes)
- ii. Reading from a script
 - Easier to manage time and content.
 - Without reading skill, difficult to take audience full attention.
- iii. Note Cards
 - Headings and key points on cards or paper for reminder.
 - Sound natural than reading script.
 - Time management is difficult and it needs knowledge and skill.
- iv. Overhead transparency (OHT)
PowerPoint presentation is one of the popular method.
 - Sharing notes with audience.
 - Sound natural and report will seem well – organised.
 - Do not talk to overhead projector rather than the audience.

Report Aids

- i. Audio aid.
- ii. Visual aid
 - Most common visual aid are overhead and PowerPoint.
 - If your talk is poor no amount of fancy graphic will save it.
- iii. Audio-visual aid.

Conclusion.

1. Presentation in seminar, conference, workshop etc.,
2. Save time and energy, for assessment and evaluation of experienced, knowledge, skill etc. of a learner, better feedback from audience.
3. Duration and audience are important in designing a report.
4. Content, structure, introduction, body, conclusion and question are important to consider in making a report.
5. There are many skill in delivering a report viz. voice, body language, method, skills etc.
6. You can report orally with and without note etc.
7. You can present by using different aids. Now a day all seminar room are enhanced with ICT we can use modern technology.

COST CURVES

A decorative graphic consisting of a solid teal horizontal bar that spans the width of the slide. Below this bar, on the right side, there are three thin, parallel white horizontal lines that extend to the right edge of the slide.

Introduction

- The amount spent on the use of factor and non factor inputs, inputs is called cost of production.
- **Cost Function.** The relation between output and cost is cost function. Cost functions are derived functions. These are derived from the production function. Enables the firm to determine its profit maximizing or loss minimizing output. Helps a firm in deciding whether it is profitable for it to continue production. Aids in estimating its profit – both per unit as well as total.

Concepts of Cost/Types of Cost.

- **Money cost.** The amount spent in terms of money for production of a commodity is called money cost. Money cost includes the following expenses. (i) Wages paid to labourers (ii) Interest on Loans (iii) Rent paid for premises (iv) Expenditure on raw materials and machinery (v) Insurance (vi) Taxes (vii) Payments for power, light, fuel. (viii) Transportation charges.

Real Cost

- The mental and physical efforts and sacrifices undergone with a view to producing commodity are its real cost. Concept of real cost is a subjective concept (changing from person to person)

Accounting Cost or Business cost

- Accounting cost refer to cash payments which firms make for factor (land, labour, Capital) and non-factor inputs (Advertising), Depreciation and other booking entries.

Opportunity cost

Cost of next best alternative use.
Opportunity cost is the cost of any activity measured in terms of the value of the next best alternative forgone (that is not chosen).

Economic Cost.

- Economic cost includes both accounting costs and opportunity costs of self owned and self employed resources. Economic cost differs from accounting cost because it includes opportunity cost.

Ex:- If attending college has a direct cost of Rs.20,000 a year for four years, and the lost wages from not working during that period equals Rs.25,000 a year, then the total economic cost of going to college would be Rs.180,000 (Rs.20,000 x 4 years + the interest of Rs.20,000 for 4 years + Rs.25,000 x 4 years). The accounting cost of attending college includes tuition, room and board, books, food, and other incidental expenditures while there. The opportunity cost of college also includes the salary or wage that otherwise could be earning during the period

Social Cost.

- Social cost is the total cost to society for an economic activity (Pollution) Spend more on laundry, health, medical treatment.

- **Private Cost.** Private cost is the cost incurred by an individual firm for producing a commodity. It includes both the explicit cost as well as implicit cost.

- **Explicit Cost.** The monetary payment which a firm makes to those outsiders who supply labour, services, material, fuel, transportation services. Also called “absolute costs or outlay costs or actual costs”

- **Implicit Cost.** Many inputs are self owned and self employed by the firm, the firm does not have to make any payment for them to anyone. It gives up the opportunity to receive payment from someone else to whom it could rent the building.

- **Incremental Costs and Sunk Costs.** Incremental costs are the added costs of a change in the level of production by adding a new product/machinery/system.

Sunk Cost are those which are once incurred and will not be altered by the change in business activity. Cost incurred in constructing a factory.

- **Historical Costs and Replacement Costs.** Is the cost of an asset purchased in the past at the then prevailing price.

Replacement cost is defined as the cost to be incurred for replacing the same asset at current level.

Theory Of Cost

- Traditional Theory
 - Short Run
 - Total Cost
 - Total Fixed Cost
 - Total Variable Cost
 - Average Cost
 - Average Fixed Cost
 - Average Variable Cost
 - Marginal Cost
 - Long Run
 - Long run Total Cost
 - Long Run Average Cost
 - Long Run Marginal Cost
- Modern Theory
 - Short Run
 - Long Run

SHORT RUN COST FUNCTION

- In the short-run the firm cannot change or modify fixed factors such as plant, equipment and scale of its organization. In the short-run output can be increased or decreased by changing the variable inputs like labour, raw material, etc.

Short-Run Costs to the Firm

- **Total Costs**
 - The sum of total fixed costs and total variable costs
- **Fixed Costs**
 - Costs that do not vary with output
- **Variable Costs**
 - Costs that vary with the rate of production

$$\text{Total costs (TC)} = \text{TFC} + \text{TVC}$$

Short-Run Costs to the Firm

- Average Total Costs (ATC)

$$\text{Average total costs (ATC)} = \frac{\text{Total costs (TC)}}{\text{Output (Q)}}$$

Short-Run Costs to the Firm

- **Average Variable Costs (AVC)**

$$\text{Average variable costs (AVC)} = \frac{\text{Total variable costs (TVC)}}{\text{Output (Q)}}$$

Short-Run Costs to the Firm

- Average Fixed Costs (AFC)

$$\text{Average fixed costs (AFC)} = \frac{\text{Total fixed costs (TFC)}}{\text{Output (Q)}}$$

Short-Run Costs to the Firm

- **Marginal Cost**
 - The change in total costs due to a one-unit change in production rate

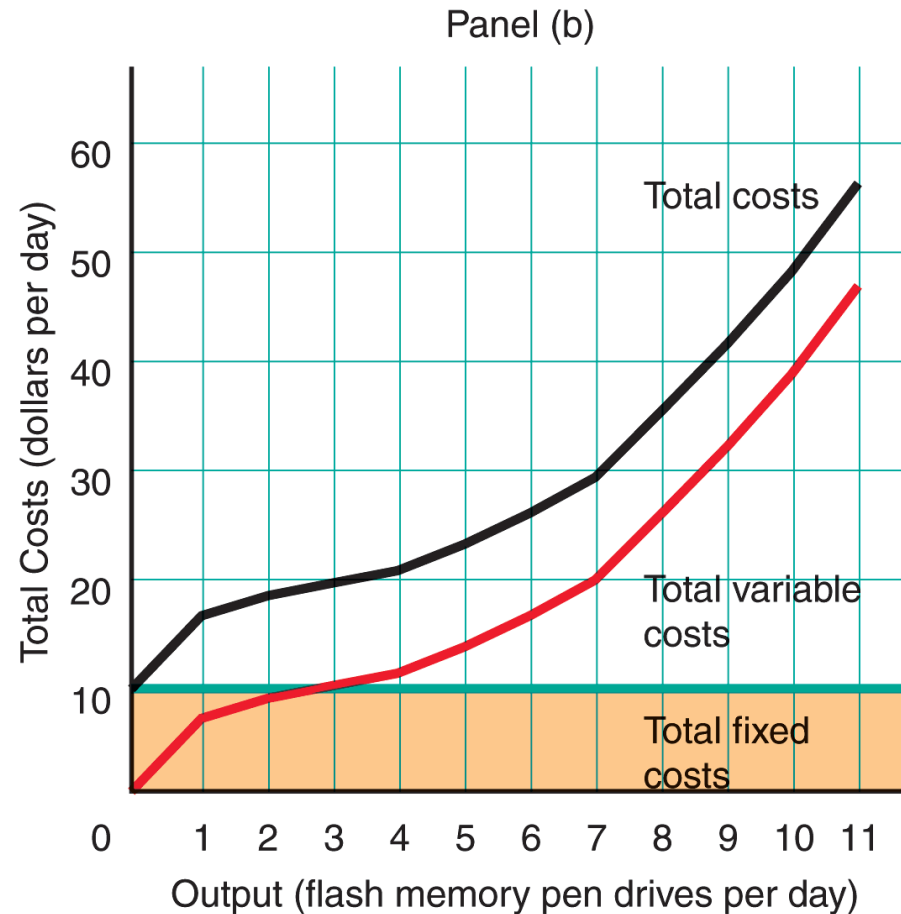
$$\text{Marginal costs (MC)} = \frac{\text{Change in total cost}}{\text{Change in output}}$$

Cost of Production: An Example

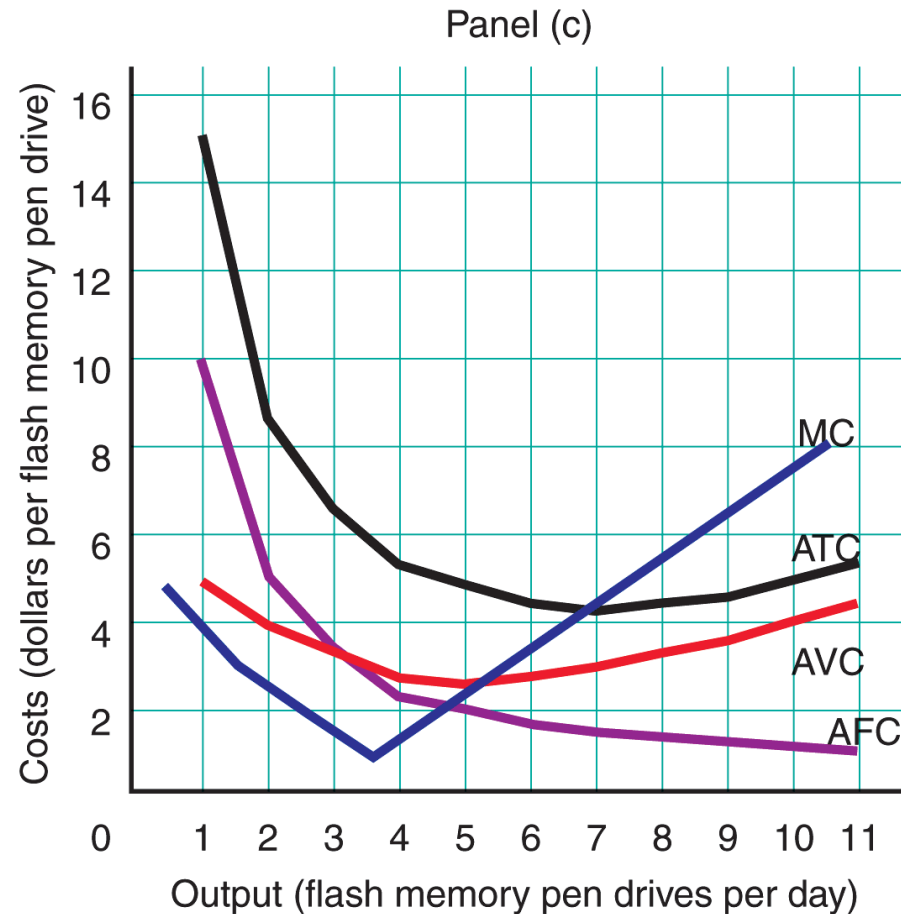
Panel (a)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total Output (Q/day)	Total Fixed Costs (TFC)	Total Variable Costs (TVC)	Total Costs (TC) (4) = (2) + (3)	Average Fixed Costs (AFC) (5) = (2) ÷ (1)	Average Variable Costs (AVC) (6) = (3) ÷ (1)	Average Total Costs (ATC) (7) = (4) ÷ (1)	Total Costs (TC) (4)	Marginal Cost (MC) (9) = $\frac{\text{Change in (8)}}{\text{Change in (1)}}$
0	\$10	\$ 0	\$10	—	—	—	\$10	
1	10	5	15	\$10.00	\$5.00	\$15.00	15	\$5
2	10	8	18	5.00	4.00	9.00	18	3
3	10	10	20	3.33	3.33	6.67	20	2
4	10	11	21	2.50	2.75	5.25	21	1
5	10	13	23	2.00	2.60	4.60	23	2
6	10	16	26	1.67	2.67	4.33	26	3
7	10	20	30	1.43	2.86	4.28	30	4
8	10	25	35	1.25	3.12	4.38	35	5
9	10	31	41	1.11	3.44	4.56	41	6
10	10	38	48	1.00	3.80	4.80	48	7
11	10	46	56	.91	4.18	5.09	56	8

Cost of Production: An Example



Cost of Production: An Example



The Relationship Between Average and Marginal Costs

- When AC Falls MC also falls but MC is lower than AC
- When AC increase MC also increase but MC is higher than AC
- MC will cut the AC from below that is point of equilibrium.

Why Short Run Average Cost is U Shaped

- Interaction of Average Fixed Cost & Average Variable Cost
- Application of Law of Variable Proportion

Long run cost output relationship

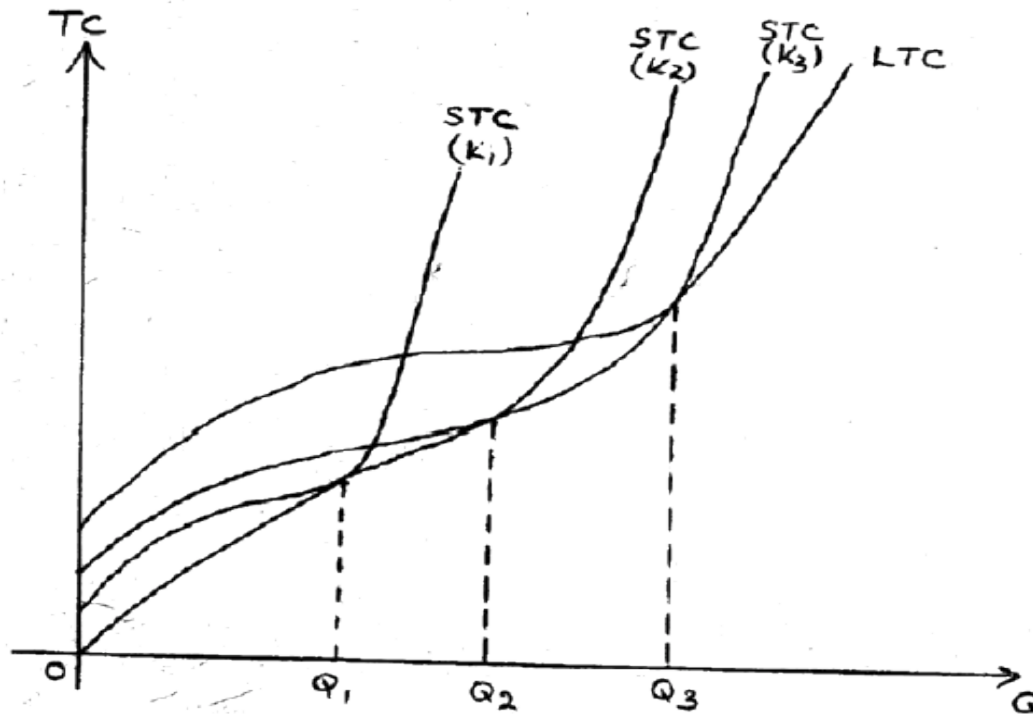
- In the long run there is no fixed factor of production & hence there is no fixed cost
- The long run, during which all inputs are variable.
- In short, run variations in output are possible up to extent plant size permit. In long term plant size can change but no employer will do it. Therefore, the concept of long term is only hypothetical

- Long Run Total Cost

- It can be defined as the minimum cost of producing different level of output in a long run.

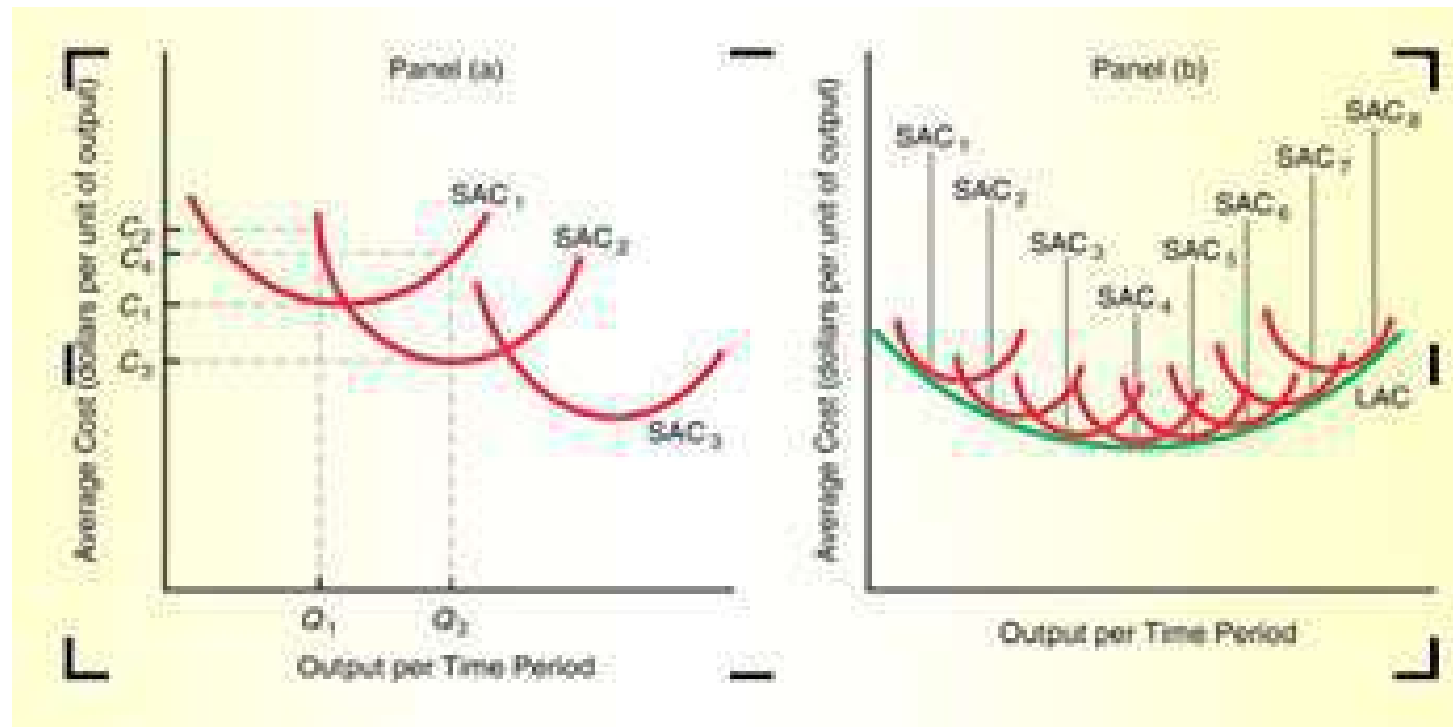
Figure 10.11:

Long-run total cost curve



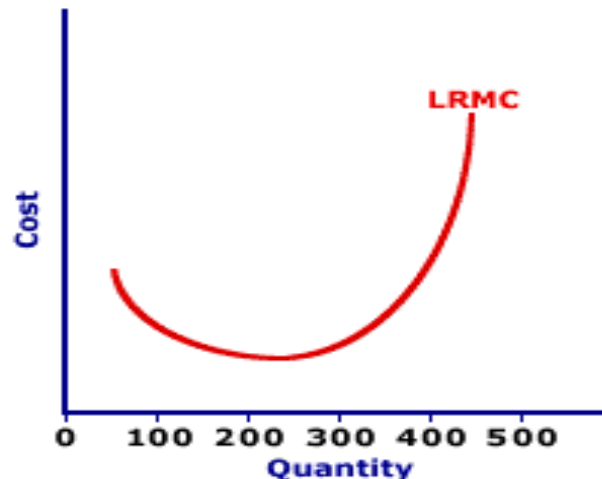
- Long Run Average total Cost

- It can be defined as the minimum per unit cost of producing different level of output in a long run.



- Long Run Marginal Cost


- The change in the long-run total cost of producing a good or service resulting from a change in the quantity of output produced.
- Unlike the short run, in which at least one input is fixed, there are no fixed inputs in the long run. As such, there is only variable cost. This means that long-run marginal cost is the result of changes in the cost of all inputs.



Why the Long-Run Average Cost Curve is U-Shaped

- Economies of scale
 - Labor Economies
 - Technical Economies
 - Inventory Economies
- Explaining diseconomies of scale
 - Unwieldy Management
 - Coordination and communication is more of a challenge as firm size increases

MANAGERIAL ECONOMICS
COST CONTROL AND COST
REDUCTION



Cost Control



Def:- The process of monitoring and regulating the expenditure of funds is known as cost control.

In other words, it means to regulate/control the operating costs in a business firm.



Features of Cost control



- Cost control process involves setting targets and standards, ascertaining the actual performance, comparing the actual performance with standard, investigating the variances and taking corrective action.
- It aims at achieving the standard.
- It is a preventive function.
- In cost control, costs are optimized before they are incurred.
- It is generally applicable to items which have standards.
- It contains guidelines and directive management such as, how to do a thing.

Aspects Of Cost Control



- 1) **Planning**:- Initially a plan or set of targets is established in the form of budgets and standards.
- 2) **Communication**:- The next step is to communicate the plan to those whose responsibility is to implement the plan.
- 3) **Motivation**:- Motivation is defined as the process that initiates, guides and maintains goal-oriented behaviors.

4) Appraisal and Reporting:- comparison has to be made with the predetermined targets and actual performance. Deficiencies are noted and discussion is started to overcome deficiencies.

5) Decision-making:- Finally, corrective actions and remedial measures are taken or the set of targets are revised, depending upon the administration's understanding of the problem.

Main Areas of cost control

- Materials



- Labor



- Overheads



- Sales



- Energy

**CRUDE OIL
PRICE TO JUMP
31%**



Advantages cost control



- It helps the firm to improve its profitability and competitiveness.
- It helps the firm in reducing its costs and thus reduce its prices.
- It is indispensable for achieving greater productivity.
- If the price of the product is stable and reasonable, it can maintain higher sales and thus employment of work force.

Disadvantages of cost control

- Reduces the flexibility and process improvement in a company.
- Restriction on innovation.
- Requirement of skillful personnel to set standards.

Factors hampering cost control in India

- Cost of raw materials and other intermediate products is high.
- High foreign commodity prices, particularly oil.
- Power shortages and underutilization of capacity.
- Delay in the issue of licenses.
- High rates of taxes tend to raise the overall costs of production in India.



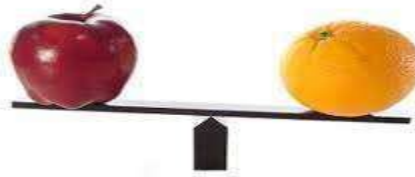
General techniques of Cost cutting



- Use Skype to make domestic and international phone calls.
- Establish presence on social media sites such as Facebook and Twitter instead of newspaper, magazine, mail.
- Use electronic communication, cut down on print and paper communication.
- Outsource computer maintenance.
- Lease equipments.
- Share office or building space with another business.

Techniques of cost control

- Budgetary control
- Standard costing
- Inventory control
- Ratio analysis
- Variance analysis



Ratio Analysis



Def:- A 'Ratio: is defined as an arithmetical/quantitative/numerical relationship between two numbers. Ratio analysis is a very important and age old technique of financial analysis.

A tool used by individuals to conduct a quantitative analysis of information in a company's financial statements.

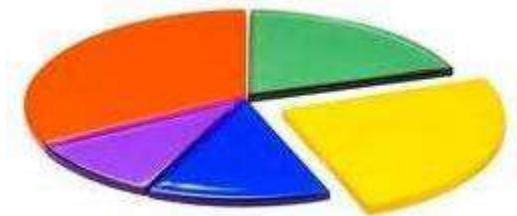
Features of Ratio Analysis



- It is mainly used as an external standard, that is, for comparing performance with the other organization in the industry.
- Statistical yardstick that provides a measure of the relationship between two figures.
- It may be expressed in percentage terms as a proportion or as a rate.

Some of the most commonly used ratios for cost comparison are as follows:-

- Sales / total assets
- Production costs / cost of sales
- Administration costs / cost of sales
- Sales / inventory



Variance analysis



Def:-Variance is defined as the difference between the expected amount and the actual amount of costs or revenues.

Variance analysis is the investigation of the difference between actual and planned behavior. For example, if you budget, for sales to be Rs.10,000/- and actual sales are Rs.8,000/-, variance analysis yields a difference of Rs.2,000/-.

Causes for Variance

If variance exist, their causes have to be determined for taking the corrective actions.

There are many causes for variations which are listed below:

- Changes in productivity can alter the cost levels.
- Change in product design will alter the cost levels.
- Investment in new capital and replacement of old equipments can have immediate effects on both operating costs and overhead costs.
- Changes in hours of working time will have its influence on costs.

Cost Reduction



dreamstime.com

Def:-The process of identifying and eliminating unnecessary costs to improve the profitability of a business is known as cost reduction.



Features of Cost reduction

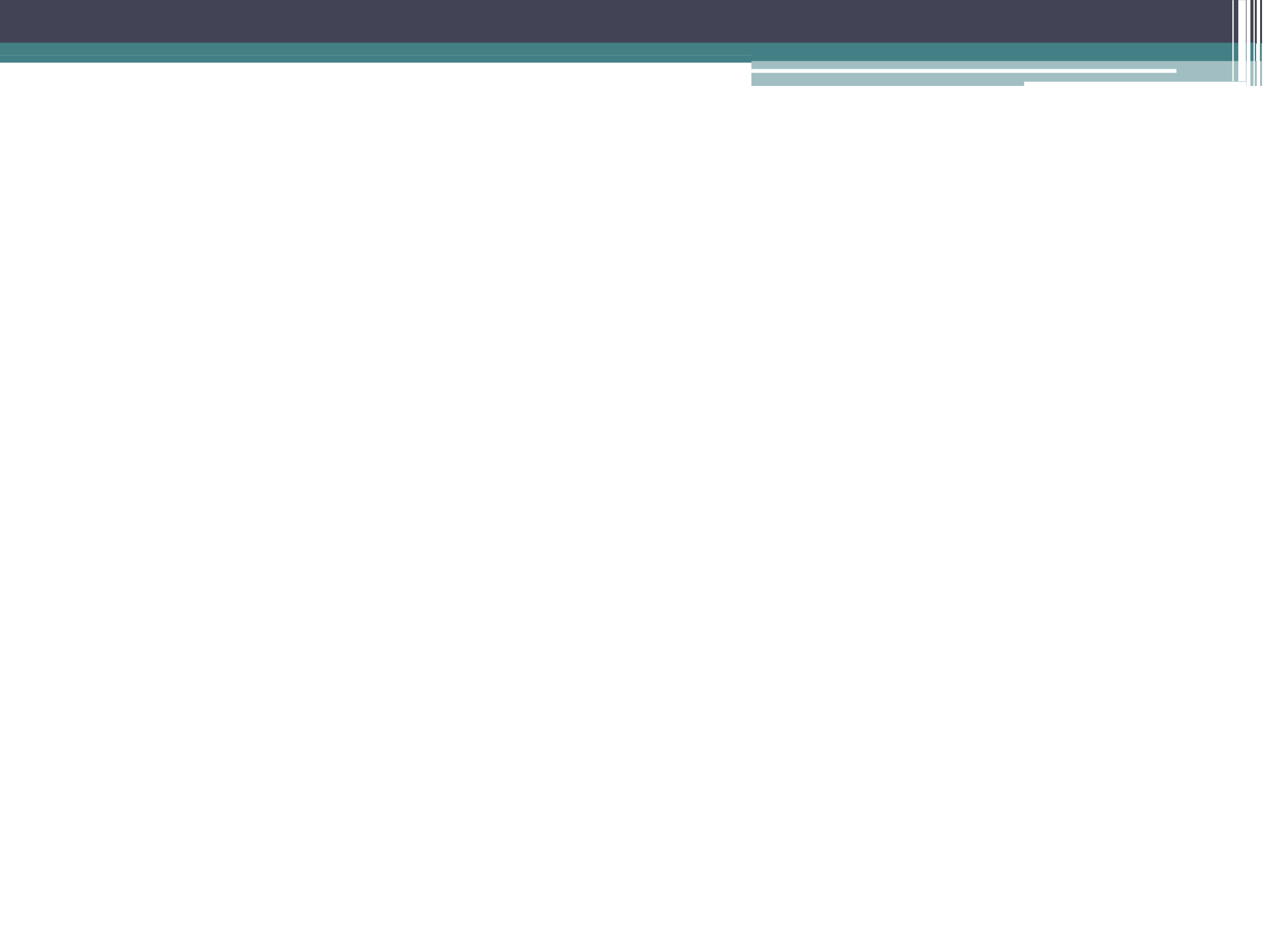


- Cost reduction is not concerned with setting targets and standards. Cost reduction is the final result in the cost control process.
- Cost reduction aims at improving the standards.
- It is continuous, dynamic and innovative in nature, looking always for measures and alternative to reduce costs.
- It is a corrective function.
- This is applicable to every activity of the business.
- It adds thinking and analysis to action at all levels of management.

Techniques of cost reduction

- Organization and methods
- Work study
- Material handling
- Automation
- Value analysis
- Variety reduction
- Production control
- Design
- Materials control
- Quality control






imperfect cost perfect market
economic asymmetry interactive
product operators
differentiated
subfields
conditions
partial producers
dominate regulation
homogeneous consumers
short run curve
pressure abstract firm
absence differentiation interests number

market structure

induced monopolists
theoretical distinguish
objectives
accounting side bar entry
size edit demand traded
monopoly revealed include
competition
approaches small
align adopted imperfectly
economy control

Market Structure

➤ What is a Market?

- Place where there are many buyers and sellers .
 - Actively engaged in buying and selling acts.
 - Contact through different means of communication like letters, telephone etc.
 - Thus, It does not mean a particular place but the entire area where buyers and sellers of a commodity are in close contact and they have one price of same commodity.
- 

Market Structure

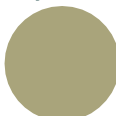
➤ What is Market Structure?

It is therefore understood as those characteristics of a market that influence the behavior and results of the firms working in that market.

According to **J.C. Edwards**, “ A market is that mechanism by which buyers and sellers are brought together. It is not necessarily a fixed place.”



Characteristics

- **Area:** A market does not mean a particular place but the whole region where sellers and buyers of a product are spread. Modern modes of communication and transport have made the market area for a product very wide.
 - **Buyers & Sellers:** For exchange at least 1 buyer and 1 seller are needed. In the modern age, the physical presence of buyers and sellers is not necessary in the market because they can do transactions of goods through letters, telephones, internet, etc.
- 

Characteristics

- **One Commodity:** A market is not related to a place but to a particular product. Hence, there are separate markets for various commodities.
 - **Free Competition:** There should be free competition among buyers and sellers in the market. It is in relation to the price determination of a product among buyers and sellers.
 - **One Price:** The price of the product is same in the market because of free competition among buyers and sellers.
- 

Classification of Market

ON THE BASIS OF :

- **Area or Region**
- **Time**
- **Functions**
- **Nature of Commodity**
- **Legality**

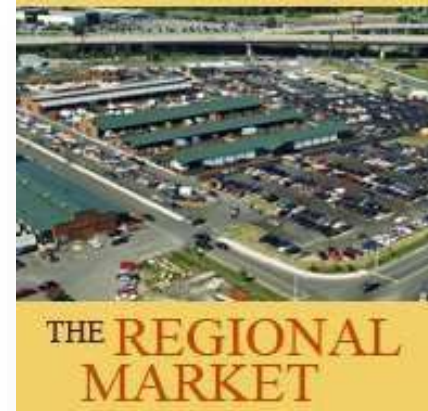


ON THE BASIS OF AREA OR REGION



If buyers and sellers of a commodity are limited to certain area or region, it is known as local market. Perishable goods and low price goods.

Ex.- Milk, Ghee.



If buyers and sellers of a commodity are confined to certain region as province, it is known as provincial market. Region area is greater than that of local market.

Ex.- Lahariya in Rajasthan



ON THE BASIS OF AREA OR REGION



When buyers and sellers are not confined to state boundary, but are spread throughout the country. They are demanded throughout the nation.

Ex.- Market of sarees, dhotis.




When buyers and sellers are spread across the geographical boundary of a nation and the demand for such commodity is world wide or demand is universal.

Ex.- Market for gold, silver.



ON THE BASIS OF TIME

- **Very short period market:** It can be classified into Daily(perishable products) or weekly market(on any specific day of week). It is which takes part in transaction for a short period of time as for few hours or a day. In this supply of product can not be increased.
 - **Short period market:** In this supply of product can be increased but we can not make any change in production plant according to changed demand.
- 

ON THE BASIS OF TIME

- **Long period market:** It is in which we can make necessary changes in plant and machinery as well increase supply of product according to its demand.
- **Very long period market:** There can be large change in supply of the product. And demand also increases because of change in population, habits, taste, customs etc.



ON THE BASIS OF FUNCTIONS



General Market

When different types of products are transacted at the same time in a market.

Ex.- Chandni chowk market in Delhi



Specialized Market

When only one product or any special product is transacted in market. In this, a particular thing is traded with its different brand names.

Ex.- Bathing soap as Lux etc.



ON THE BASIS OF FUNCTIONS



Marketing by Samples

In this the firms need not show whole of their product as they only send samples through their agents.

Ex.- in case of wool, paints etc.



Marketing by Grading

In this, the product is first graded according to its quality and then put forth for selling.

Ex.- Agricultural product market.



ON THE BASIS OF NATURE OF COMMODITY



Product Market

(production goods are exchanged)



Stock Market

(stock and shares, bonds are bought and sold)



Bullion Market

(metallic trading exists)



ON THE BASIS OF LEGALITY



Legal Market: When goods are transacted in market under certain rules and norms. Also known as **Fair Market**.

Illegal Market: Transaction of goods taking place in more than or less than quantity prescribed by legal authorities.

Ex.- Hong Kong Market (illegal market at international market)



TYPES OF MARKET STRUCTURE

- **Perfect Competition**
- **Monopoly Competition**
- **Monopolistic Competition**
- **Oligopoly Competition**



PERFECT COMPETITION

- It is such a market structure where there are large numbers of sellers and buyers.
- Homogeneous product .
- The price of the product is determined by the industry .
- One price prevails in the market and all the firms sell the product at the prevailing price .



CHARACTERISTICS

- Large number of buyers and sellers
- Homogeneous product
- No barriers to entry
- Perfect knowledge of the market
- No transportation cost
- Perfect mobility of factors of production



MONOPOLY

- It is a market structure in which there is only a single seller of the product .
- One firm has full control over the supply of the product .
- Example : Indian Railways , Rajasthan State Electricity Board etc.



CHARACTERISTICS

- **Sole supplier of the product**
- **Large number of buyers**
- **No close substitutes**
- **One firm industry**
- **Varies from industry to industry**
- **Absence of entry**
- **Monopolist is price maker**



MONOPOLISTIC COMPETITION

- It is a mid-way between perfect competition and monopoly .
- In this the number of buyers and sellers is relatively low .



CHARACTERISTICS

- Large number of firms
- Product differentiation
- Freedom of entry and exit
- Non price competition
- Price policy
- Less mobility
- No perfect knowledge
- Selling cost
- Close substitutes



OLIGOPOLY

- It is a market structure in which there are few sellers of a product selling identical or differentiated products .
- If they are selling identical products, it's a case of Pure Oligopoly.
- If they are selling differentiated products, it's a case of Differentiated Oligopoly .



CHARACTERISTICS

- **Relatively small number of sellers**
- **Interdependence of the firms**
- **Price rigidity and price war**
- **Difficulty in entry and exit**
- **Selling Costs**
- **Indeterminateness of the demand curve**
- **Complex market structure**





MODULE - V

**PRICING THEORY AND
PROCEDURE,
PRICING POLICIES AND
PRACTICES**

INTRODUCTION

The theory of price is an economic theory that contends that the price for any specific good/service is based on the relationship between the forces of supply and demand .

The theory of price says that the point at which the benefit gained from those who demand the entity meets the seller's marginal costs is the most optimal market price for the good/service.

PRICE (P)

Price (P) is the money or other considerations (including other goods and services) exchanged for the ownership or use of a good or service.



PRICING UNDER PERFECT COMPETITION

A perfectly competitive market must meet the following requirements:

- The number of firms is large.
- There are no barriers to entry.
- The firms' products are identical.
- There is complete information.
- Firms are profit maximizers.

...PERFECT COMPETITION

The number of firms is large.

- Large means that what one firm does has no bearing on what other firms do.**
- Any one firm's output is minuscule when compared with the total market.**

...PERFECT COMPETITION

There are no barriers to entry.

- *Barriers to entry* are social, political, or economic impediments that prevent other firms from entering the market.
- Barriers sometimes take the form of patents granted to produce a certain good.
- Technology may prevent some firms from entering the market.
- Social forces such as bankers only lending to certain people may create barriers.

...PERFECT COMPETITION

The firms' products are identical.

- **This requirement means that each firm's output is indistinguishable from any competitor's product.**
- **The condition ensures that the same price rules in the market for the same commodity.**

...PERFECT COMPETITION

There is complete information.

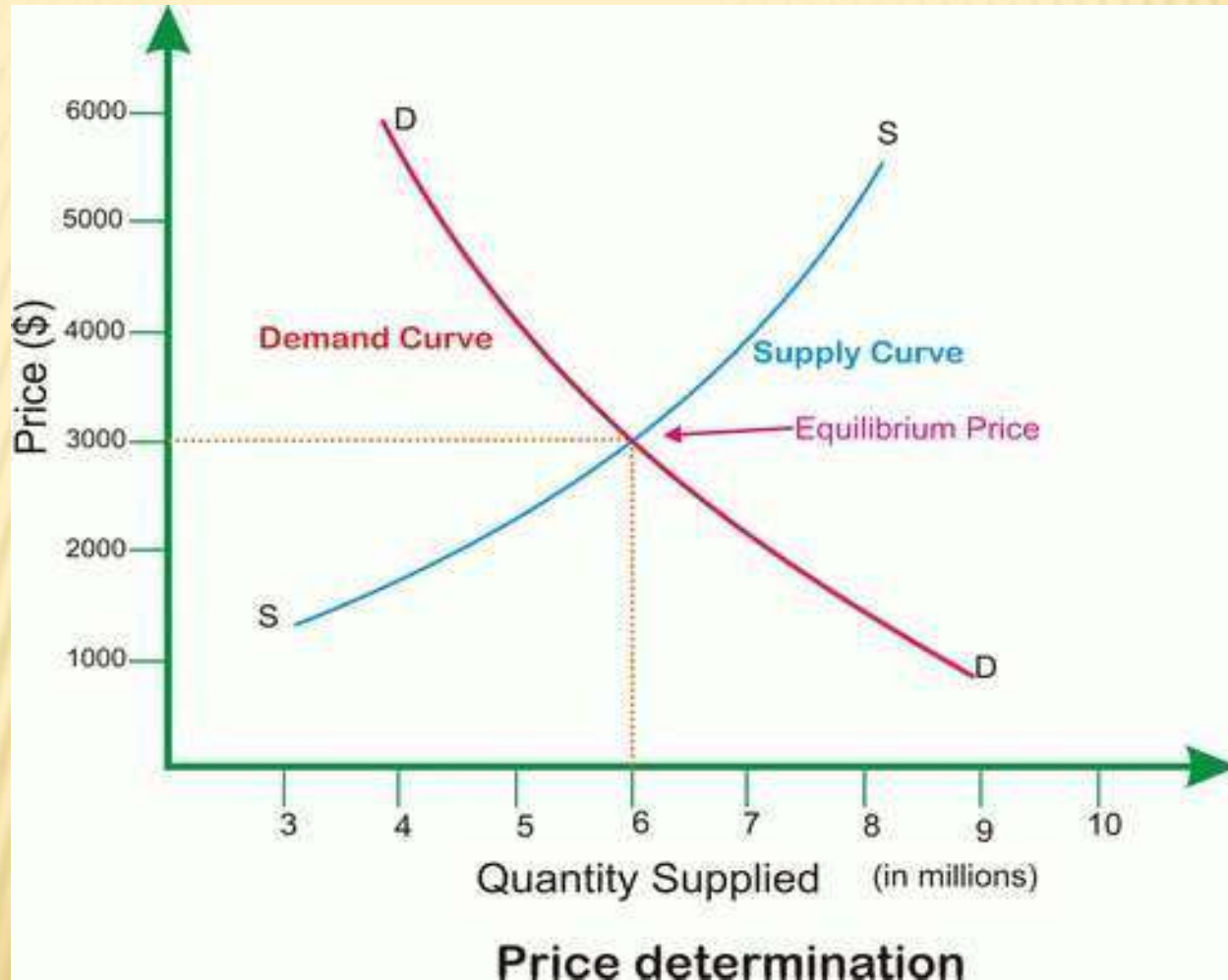
- Firms and consumers know all there is to know about the market – prices, products, and available technology.
- Any technological advancement would be instantly known to all in the market.

...PERFECT COMPETITION

Firms are profit maximizers.

- The goal of all firms in a perfectly competitive market is profit and only profit.**
- Firm owners receive only profit as compensation, not salaries.**

EQUILIBRIUM PRICE



MONOPOLY

Monopoly is that situation of market in which there is a single seller of a product, for example, there is only one firm dealing in the sale of cooking gas in a particular town.

Hence, monopoly is a market situation in which there is only one producer of a commodity with no close substitutes.



...MONOPOLY

Features

- 1. One seller & large number of buyers:** Under monopoly there should be single producer of the commodity. The buyers of the product are in large number. Consequently, no buyer can influence the price but the seller can.
- 2. Restrictions on the entry of new firms:** There are some restrictions on the entry of new firms into monopoly industry. There is no competitor of a monopoly firm.

...MONOPOLY

3. **No close substitutes:** The commodity produced by the firm should have no close substitute, otherwise the monopolist will not be able to determine the price of his commodity as per his discretion. The cross elasticity of demand is zero.
4. **Price maker:** Price of the commodity is fully under the control of the monopolist. In case, the monopolist increases the supply of the commodity, the price of it will fall. If he reduces the supply, the price of it will rise. A monopolist may also indulge in price discrimination. In other words, he may charge different prices of the same product from different buyers.

...MONOPOLY

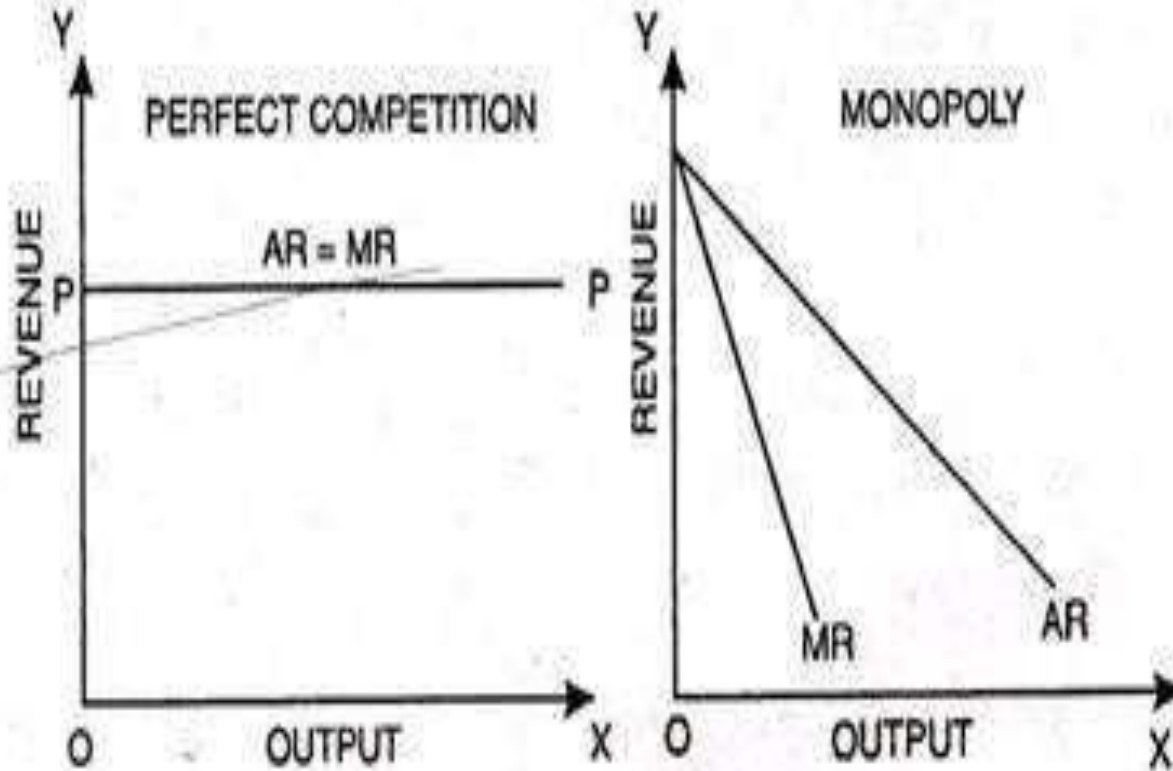


Fig. 10.

MONOPOLISTIC COMPETITION

**An economic view of the wide world between
Perfect Competition and Pure Monopoly.**

**The study of which will help us answer one of life's
great mysteries, e.g.,**

Why in the world do we have so many:

- × Fast food places**
- × Coffee shops**
- × Clothing retailers ... ?**

...MONOPOLISTIC COMPETITION

Characteristics:

- × Numerous participants**
- × Freedom of exit and entry**
- × Heterogeneous (or differentiated) products**
- × Selling cost**
- × Imperfect knowledge**

...MONOPOLISTIC COMPETITION

Which of the characteristics of Monopolistic Competition match those of Perfect Competition?

- × **Numerous participants**
- × **Freedom of entry and exit**
- × **Imperfect knowledge**
- × **Heterogeneous (or differentiated) products**
 - Perfect Competition assumes all products from different firms are identical
 - Under Monopolistic Competition each seller's product is perceived by the buyer as somewhat different from the products of other sellers

...**MONOPOLISTIC COMPETITION**

How are Products Differentiated?

× **Fast Food**

- **Location**
- **Product “quality”**
- **Brand image**

× **Coffee Shops**

- **Location/convenience**
- **Product taste/quality**
- **Store atmosphere**

OLIGOPOLY

- ◆ few firms
- ◆ either homogeneous or differentiated products
- ◆ interdependence of firms - policies of one firm affect the other firms
- ◆ substantial barriers to entry
- ◆ Price rigidity



examples: auto industry and cigarette industry

...OLIGOPOLY

Collusion and Competition

Oligopoly firms may collude (act as a monopoly) and earn positive profits.

OR

Oligopolists may compete with each other and drive prices down to where profits are zero.

...OLIGOPOLY

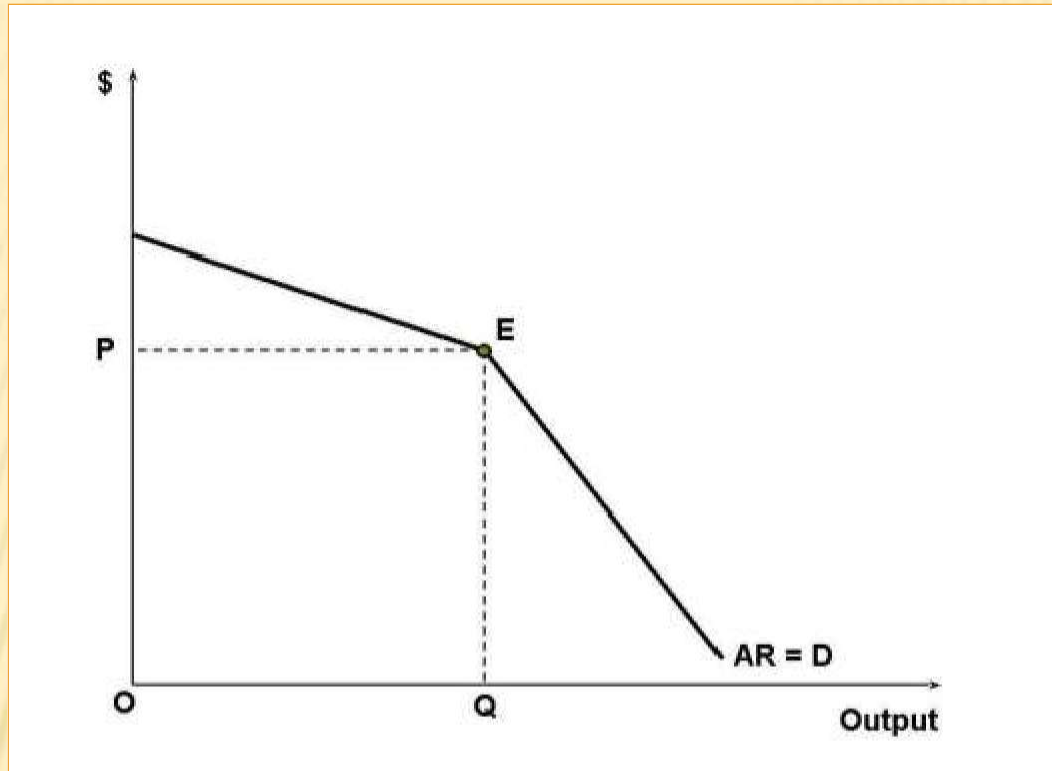
- × **Some oligopolistic markets operate in a situation of price leadership.**
- × **A single firm sets industry price and the remaining firms charge the same price as the leader.**

...OLIGOPOLY

Sweezy's kinked demand curve model of oligopoly

Assumptions:

1. If a firm raises prices, other firms won't follow and the firm loses a lot of business.
So demand is very responsive or elastic to price increases.
2. If a firm lowers prices, other firms follow and the firm doesn't gain much business.
So demand is fairly unresponsive or inelastic to price decreases.



KINKED DEMAND CURVE

PRICING POLICY AND PRACTICES

Objectives of pricing policy

- × Maximization of profit
- × A target return on investment
- × To regulate market share
- × To achieve price stability
- × To face competition
- × Profit stabilization
- × Survival and growth
- × Prevention of enter of new firms
- × To avoid price war
- × To retain prestige and good will

...PRICING METHODS

Cost Plus Pricing

- This is a very common method of determining the selling price of products.
- The selling price is found out by adding a certain percentage mark-up to the average variable cost.
- The **mark-up or contribution margin** contributes towards fixed cost and profit.

$$\text{Price} = \text{AVC} + \text{CM}$$

...PRICING METHODS

...Cost Plus Pricing

- ✘ **This method ignores the influence of demand on price. There is essentially no relationship between cost and what people will be ready to pay for a product.**
- ✘ **It helps fixing a fair price.**
- ✘ **Here cost is considered as the main factor influencing price.**

...PRICING METHODS

Marginal cost pricing

- ❑ Here fixed costs are ignored and prices are fixed on the basis of marginal cost.
- ❑ Only those costs that are directly attributable to product are taken.
- ❑ As marginal cost does not take account of full cost it is only a short-run phenomenon.

...PRICING METHODS

...Marginal cost pricing

- ✘ This method is usually adopted when the product is introduced in a new market.
- ✘ Marginal cost concept helps to ascertain the changes in cost due to a pricing decision.
- ✘ Identification of marginal cost helps to increase marginal physical productivity and thereby reducing cost.

...PRICING METHODS

- ✓ **Target return pricing**
- ✓ **Follow-up pricing**
- ✓ **Barometric pricing**
- ✓ **Break-even point pricing**
- ✓ **Peak-load pricing**

...PRICING METHODS

Going-rate pricing

- ✘ The **Going-Rate Pricing** is a method adopted by the firms wherein the product is priced as per the rates prevailing in the market especially on par with the competitors.
- ✘ It is helpful where cost ascertainment is difficult.
- ✘ This pricing technique may be resorted to in the situation of price leadership, this helps to avoid price wars.
- ✘ Different **Motor bike companies** followed the price of Bajaj and brought out bike variants accordingly. They control their cost of production.

...PRICING METHODS

Product-line pricing

- ✘ A product-line is a group of products produced by a firm that are related either as substitutes and complements.
- ✘ The products may be physically distinct or may be physically the same but sold under different demand conditions which give the seller a chance to charge different prices.
- ✘ The relative pricing of a company's products are based on the competitive situations and demand elasticities of each product.

...PRICING METHODS

Pricing of a new product

- ✘ It is not at all easy as it has neither an established market nor an established demand.
- ✘ It has to consider the elasticity of demand of its product when it fixes a price.
- ✘ The cost of marketing is unknown.
- ✘ The firm producing the new product is yet to consider the market size , buyers reactions and prospective competitors move in fixing the price of the product.
- ✘ It may resort to skimming price or penetration price.

...PRICING METHODS

Price skimming

- ✘ When a new product is introduced in the market, the firm fixes a price much higher than the cost of production in absence of the competitors.
- ✘ The consumers are ready to pay a high price to enjoy the pleasure of being the first users of the product.
- ✘ After a certain time, it will gain a huge profit as well as new competitors too, so after squeezing the enthusiastic buyers, goes on reducing the price step-by-step so that it can reach the various sections of consumers who are willing to buy it at lower prices.

...PRICING METHODS

Penetration pricing

- ✘ The price fixed is relatively a low one.
- ✘ This pricing is adopted when the new product faces a strong competition from the existing substitute products.
- ✘ The new firm has to penetrate the market and achieve an acceptance for its product, so it will charge only a very low price initially, hoping to charge a normal price later when it is established in the market.
- ✘ The penetration price sometimes below the cost of production.

CONCLUSION

A market is a set of conditions under which sellers and buyers sell and buy a commodity. The price of any commodity depends upon the demand for and the supply of the commodity.

Pricing policy and theories vary from firm to firm

depending upon the goals of firm and

nature and

MEANING AND NATURE OF PROFIT

- The term "profit" means all excess of income over costs.
- In economics, profit is regarded as a reward for the entrepreneurial functions of final decision making and ultimate uncertainty bearing.

PROFITS CAN BE EXPRESSED IN THE FOLLOWING DIFFERENT WAYS

- Gross Profit and Net Profit
 - It is the excess of revenue receipt over explicit payment and charges.
 - $\text{Gross profit} = \text{Total Revenue} - \text{Explicit costs}$
- Normal Profit and Supernormal Profit
 - Normal profit refers to that portion of profit which is absolutely necessary for the business to remain in operation

- Super normal profit or abnormal profit could be treated as any return above the normal profit. It is the residual surplus after paying for explicit costs, implicit costs and normal profit.

PROFIT MEASUREMENT

- The most practical measure of whether firms are making adequate profits or not
- It is called as rate of return on capital

BREAK EVEN ANALYSIS

- It examines the relationship between the total revenue, total costs and total profits of the firm at various levels of output
- Break even point is that volume of sales where the firm breaks even i.e., the total costs equal total revenue
- A point where losses cease to occur while profits have not yet begun. That is, it is the point of zero

profit

$$\text{BEP} = \frac{\text{FIXED COST}}{\text{SELLING COST} - \text{VARIABLE COST}}$$

ASSUMPTIONS OF BREAK EVEN ANALYSIS

- All costs are either perfectly variable or absolutely fixed over the entire period of production
- The volume of production and the volume of sales are equal
- All revenue is perfectly variable with the physical volume of production
- The assumption of stable product mix

THE BREAK EVEN CHARTS

- The difference between price and average variable cost (P-AVC) is defined as 'profit contribution'
- After fixed costs are covered, the firm will be

earning a profit

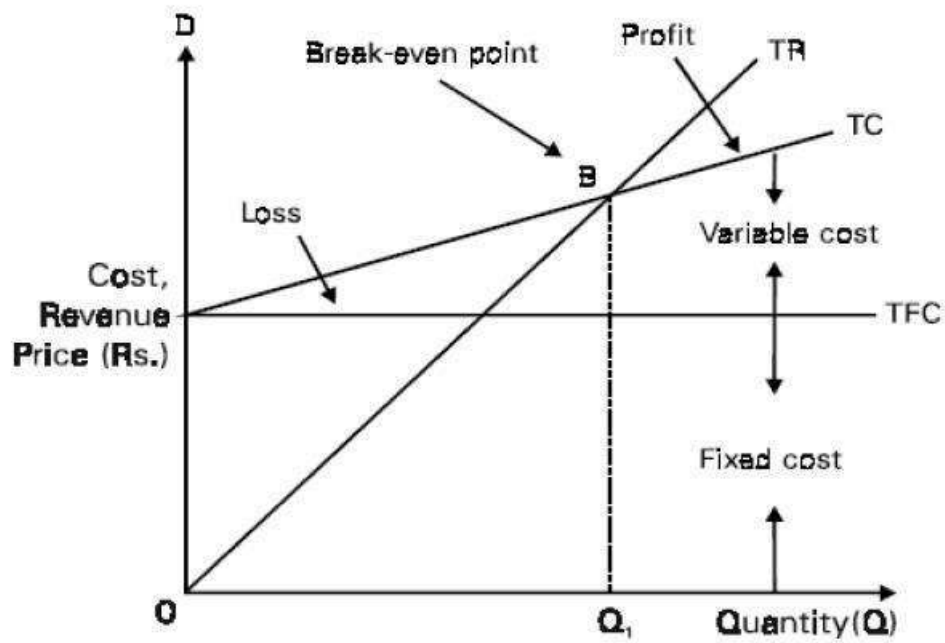
- A manager may want to know the output rate necessary to cover all fixed costs and to earn a "required" profit

- Here, $P = \text{Profit}$

TR= Total Revenue

TC=Total Cost


BREAK EVEN ANALYSIS CHART



Profit Management
Profit Maximization
Profit Planning and Control

Profit Management

- The concept of profit management dictates all functions and processes within an organisation.
- And extending from the organisation into its suppliers and customers, impacts profitability and continuously needs measurement and review to optimise performance and result.

- 
- Profit management includes the strategy and decision of how to deliver activities that support the delivery of value to the customer, the cost of channel engagement and product/customer profitability and the assets required to deliver value.

Parts of Profit Management

1] Profit Formation Management

- It includes the development of policy for managing profits and operational, investment and financial activities.
- The basic constituents of these activities are income, expenses, tax payment, risk management




2] Profit Distribution Management

It includes duty of payment of taxes and collection of other compulsory payments related to profit as well as optimization of the proportion between the capitalizing and usable profits

Profit Planning And Control

- Profit planning is a disciplined method whereby the environment encroaching on an organisation are analyzed, the available resources and internal competence identified, agreed objectives established and plans made to achieve them.

- 
- Profit planning is largely routine and covers definite time span.
 - Profit planning And strategy formulisation are complementary .
 - Profit planning is often reasonable substitute for fair and imagination need of the entrepreneurs.

Steps in Profit Planning

Establish Suitable Objectives


It will be essential to take account of past performance, resource availability, management competence, environment changes, competitor's activities activities and so on.

- **Objectives should not be imposed.**



Need for Profit Planning

- To improve management performance.
- To ensure that the organization as a whole pulls in right direction.
- To ensure that the objectives should be set which will stretch but not overwhelm managers.

- 
- To encourage strict evaluation of managers performance in monetary terms.
 - To run company in more demanding way.

Establish Suitable Control System

- Profit planning and control may have grown out of budgetary control systems.
- It is necessary to have some form of budgetary cost control, plan monitoring and management information systems which will serve to enable profit planning to be effective.

Establish Job Responsibilities

- Job responsibilities are too imprecise to provide the information on which performance standards can be established and then judged.
- It is necessary to have job breakdowns in such a detail that the need for resources can be identified.

Carry-Out Situation Audit

- It entails an audit of all the factors both internal and external that will have influence on company affairs.
- It should include establishing the skills of competition, the economic situation which will impinge on company performance and the potential and actual social, technological and cultural changes to be accommodated.

Gap Analysis

- This is an activity where the desired company objectives are compared with the probable result of continuing current trends.
- Profit planning is largely concerned about how the gap be filled.



Establishing Base Data

- Often base data is essential for profit planning.
- The data include product and operational costs, production speeds, material utilisation, labour efficiency etc.

Establish Appropriate Strategies

Plans and

- Management should ensure that there is plan integration.
- Strategies are result of choosing between alternatives in use of the company resources.



Profit Maximization

Definition

A process that companies undergo to determine the best output and price levels in order to maximize its return. The company will usually adjust influential factors such as production costs, sale prices, and output levels as a way of reaching its profit goal.



There are two main profit maximization methods used, and they are


- Marginal Cost-Marginal Revenue Method
- Total Cost-Total Revenue Method.

Objectives

- To avoid potential competition.
- Achieving leadership.
- To prevent government's intervention.
- To maintain customer goodwill.
- Avoiding risk.

Importance

- To get more money.
- For the survival of business.
- For growth of a organization.
- It is reward for business activity.

- 
- **Profit maximization** is the short run or long run process by which a firm determines the price and output level that returns the **greatest profit**.
 - **Profit maximization** refers to the sales level where profits are **highest**. You might assume that the higher the sales level, the higher the profits - but that is not always true!

Important Terms

- **Profit** is defined as *total revenue minus total cost*.

$$\text{Profit} = \text{TR} - \text{TC}$$

- **Profit:** The money left over once you pay all of your bills out of funds that come in from your customers.
- **TR:** This stands for 'Total Revenue'. Total revenue simply means the total amount of money that the firm receives from sales of its product or other sources **or** the total amount of money the firm collects in sales.
- **TC:** This stands for 'Total Cost'. Its the cost of all factors of production.

Important Terms

- **MC:** This stands for '*marginal cost*,' which means the per-unit cost of your item. Marginal cost is the **additional cost** incurred in producing one more unit of output
- .
- **MR:** This stands for '*marginal revenue*,' which means the per-unit selling price of your item. Marginal revenue is the **additional revenue** earned by selling one more unit of a product.

Profit Maximization


- To maximize economic profits, the firm should choose the output for which **Marginal Revenue is equal to Marginal Cost**

ie., $MR = MC$

Profit Management
Profit Maximization
Profit Planning and Control

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