

# RESEARCH METHODOLOGY

## **THE RESEARCH DESIGN: PLANNING YOUR RESEARCH**

# INTRODUCTION

- ❖ Research planning is much like architectural planning. Architectural planning are a meticulous set of plans developed by architects to ensure successful construction of a building.
- ❖ Research planning requires a conceptualization of the project and a detailed specification of the of the steps to be carried out.
- ❖ Work on the project should not commence before such planning has occurred. The successful completion of a research project requires plans that are clearly conceived and accurately drawn.

# PLANNING YOUR RESEARCH

- ❖ **What is a research design?**- this is the complete strategy of attack on the central problem. It provides the overall structure for the procedures that the researcher follows, the data that the researcher collects and the data analyses that the researcher conducts. **Simply put research design is planning.**
- ❖ It involves decisions regarding what?, where?, when?, how much?, and by what means concerning an inquiry or a research study.
- ❖ It is a conceptual structure within which the research is conducted; it constitutes the blue print for the collection, measurement and analysis of data.

# THE NEED FOR THE RESEARCH DESIGN

- ❖ The RD is needed because it facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible, yielding maximum info with minimal expenditure of effort, time and money.
- ❖ Most research effort is wasted by going off half prepared, with only a vague set of ideas and procedures. As a researcher you will be much more efficient and effective if you identify your resources, procedures and your data-always with a central goal of solving your research problem in mind.

# FEATURES OF A GOOD RESEARCH DESIGN

- ❖ A good design is often characterized by adjectives like flexible, appropriate, efficient economical etc. It has the following features:-
  1. Minimizes bias and maximizes the reliability of the data collected and analyzed.
  2. Gives the smallest experimental error.
  3. Yields maximum info and provides an opportunity for considering many different aspects of a problem.

# RESEARCH DESIGN VS RESEARCH METHODOLOGY

- ❖ These two concepts are different, do not confuse them.
- ❖ Where as the general approach to planning a research study is similar across disciplines, the specific methods used to collect and analyze data may be specific to a particular academic discipline. This is because data vary so widely in nature.
  - ❖ E.g. you can not deal blood cell in the same way that you deal with historical documents

# RESEARCH DESIGN VS RESEARCH METHODOLOGY

- ❖ In planning the RD , it is extremely important for the researcher to not only choose a viable research problem but also to consider the kinds of data an investigation of the problem will require and feasible means of collecting and interpreting those data.
- ❖ Don't become so entranced with the glamour of the problem that you fail to consider practical issues related to data availability, collection and interpretation.

# GENERAL CRITERIA FOR A RESEARCH DESIGN

- ❖ As you plan your research project, certain features common to all research should serve as guidelines. All research is ultimately tested by certain criteria that must be built into research design in the planning stage; here are those criteria.
- 1. **Universality:** The research project should be such that it could be carried out by any concerned person. In this case the researcher is merely a catalyst, or an agent whose function is to collect , organize and report what the collected data seem to indicate.

Another individual who is equally capable of carrying out the research, might take your place and complete the project with essentially the same results.



# GENERAL CRITERIA FOR A RESEARCH PROJECT

## contd.

2. **Replication:** the research should be repeatable. Any other competent researcher should be able to take the problem and, collecting data under the same circumstances and within the identical parameters that you have used, achieve results comparable to those you have obtained.
3. **Control:** the researcher must isolate, or control, those factors that are central to the research problem. Control is important for replication. An experiment should be repeated under the identical conditions and in the identical way in which it was first carried out. Control is also important for consistency. Control is more easily achieved in physical sciences.
4. **Measurement:** the data should be susceptible to measurement. This is easily accomplished in the physical sciences.

# IMPORTANT CONCEPTS

1. **Population:** A population is a complete set of individuals, cases or objects with some common observable characteristics. A particular population has some characteristics that differentiate it from other populations.
- ❖ **Target population** is that population to which the researcher wants to generalize the results of the study.
- ❖ It is often impossible study the whole of the target population and therefore the researcher should identify and define experimentally accessible population sometimes referred to as a survey population.
- ❖ **Accessible (survey) population** must be the most representative of the target population. Both of them must be comparable in many characteristics which are important to the study.

# IMPORTANT CONCEPTS contd.

2. **Sample:** it is obvious that dealing with all the members even of the smaller accessible population would still involve a tremendous amount of the time and resources.

Researcher therefore should further select a given number of members or cases from the accessible population. This subgroup is carefully selected so as to be representative of the whole population with the relevant characteristics.

- ❖ Definition: a sample is therefore a smaller group obtained from the accessible population.

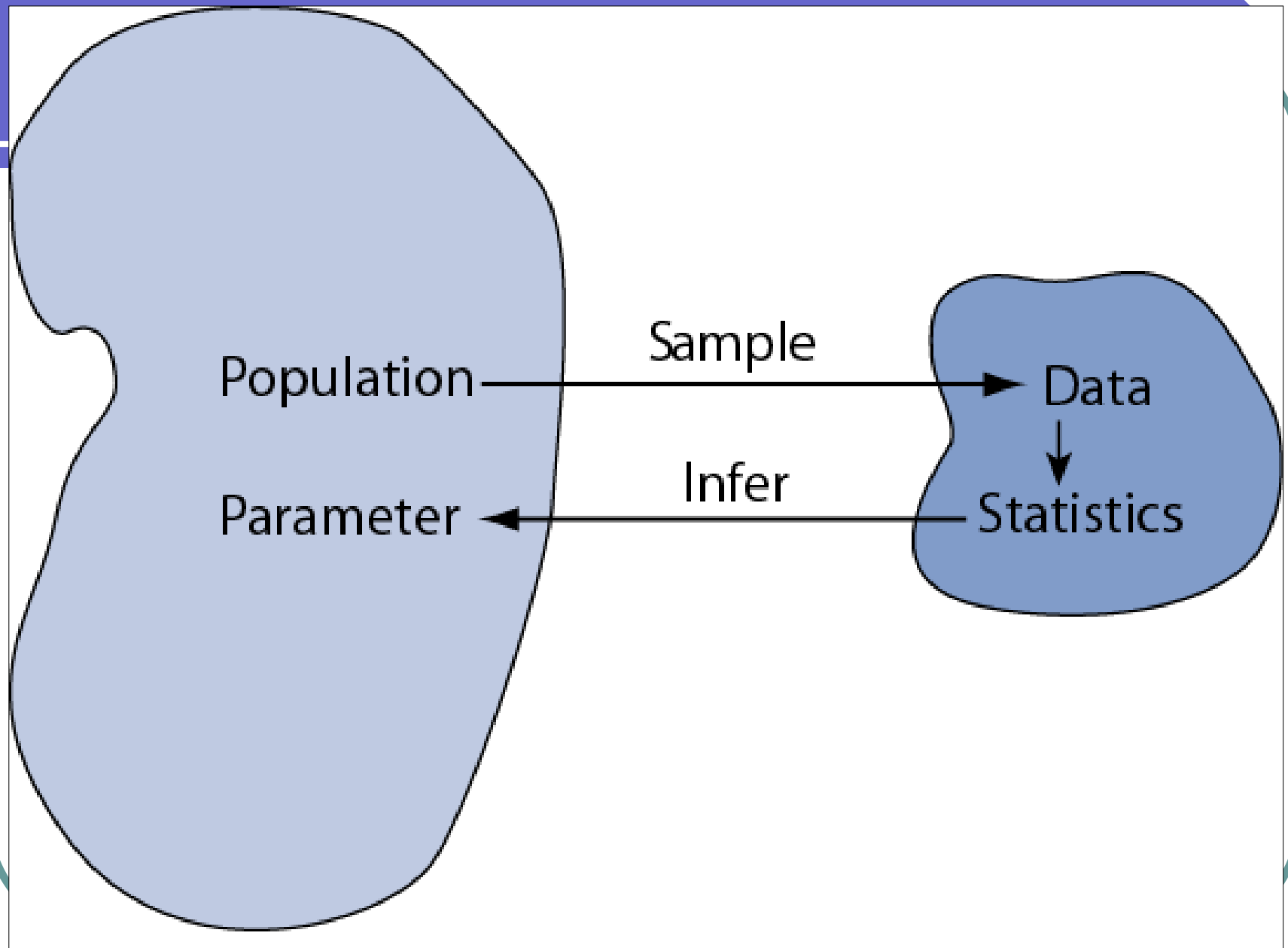
# IMPORTANT CONCEPTS contd.

- ❖ Where time and resources allow, a researcher should take as big a sample as possible.
- ❖ With a large sample the researcher is confident that if another sample of the same size were to be selected, findings from the two samples would be similar to an acceptable degree.
- ❖ The discrepancy between the sample characteristics and the accessible population is referred to as sampling error. The smaller the sample, the bigger the sampling error.

# IMPORTANT CONCEPTS contd.

## ❖ Distinctions between parameters and statistics

	Parameters	Statistics
Source	Population	Sample
Notation	Greek (e.g., $\mu$ )	Roman (e.g., $\bar{x}$ )
Vary	No	Yes
Calculated	No	Yes



# IMPORTANT CONCEPTS contd.

3. **The data:** research is a viable approach to a problem only when there are **data** to support it. The word data (plural; datum-singular) is the past participle of the word “**dare**” in Latin which means “to give”.
- ❖ Thus data are pieces of info that any particular situation “gives” to an observer, i.e. all the info that the researcher gathers for his/her study.
  - ❖ Data is not absolute reality, i.e. the pure, undiluted naked truth that underlies all the phenomena we observe. Rather data are manifestation of the reality. Research seeks, through data to discover underlying truth.

# TYPES OF DATA

❖ There two types or data

1. **Primary data:** this is the info that a researcher obtains from the field i.e. from the subjects in the sample. They are the most valid, most illuminating and most truth manifesting.
2. **Secondary data:** the info that the researcher obtains from research articles, books, casual interviews etc. They are derive from primary data.



# TYPES OF DATA contd.



NB:

- i. data may be classified as quantitative (numerical) or qualitative (words, phrases).
- ii. data are transient and ever-changing-we catch merely a fleeting glance of what seems to be true at one point in time but is not necessarily true in the next.



Even the most carefully collected data may have an elusive quality about them and that, at a later point in time, they may have no counterpart in reality whatsoever. Data are volatile. They evaporate quickly.

# ADMISSIBILITY OF DATA

- ❖ Not all data that come to the researchers attention are acceptable for use in a research project. Data can be defective. If they are, they may affect the validity of the researcher conclusions.
- ❖ The imperfections of data stem from the imperfections and irregularities of nature. If the researcher include in the mass of data those that are imperfect or irregular- i.e. data which is incomplete, biased, confounded with other data etc-they will corrupt the entire body of data.

# ADMISSIBILITY OF DATA

- ❖ To ensure the integrity of data we must set forth before hand precisely the standards that the data must meet. This helps in isolating only those data that are acceptable for our use.

## IDENTIFYING THE APPROPRIATE MEASUREMENT INSTRUMENTS

- ❖ Measurement instruments are used to pin down what the researcher observes e.g. an oscilloscope to measure patterns of sound, a published personality test to measure a person's tendency to be shy or outgoing.
- ❖ Some times the researcher has to develop his/her own instrument e.g. a paper-pencil test to measure what student have learned from a particular instructional units.
- ❖ Measurement instruments provide a basis on which the entire research efforts rests. Faulty measurement tools provide little or no value in solving the problem under investigation

## IDENTIFYING THE APPROPRIATE MEASUREMENT INSTRUMENTS contd.

- ❖ In planning the research project it is important to clearly and definitively determine the nature of the measurement instruments that will be used. It should be described in explicit, concrete terms.
- ❖ E.g. if you use the questionnaire, you should describe the questions asked, the overall length of the instrument (e.g. number of items, time required for administration) and the method of capturing the responses.
- ❖ NB. The researcher should also provide evidence that the instruments have reasonable degree of validity and reliability for the purpose.

# DETERMINING THE VALIDITY OF MEASURING INSTRUMENTS

- ❖ The validity of a measuring instrument is the extent to which the instrument measure what it is supposed to measure. Validity takes different forms, each of which is important in situations
- 1. **Face validity-** is the extent to which, on the surface, an instrument ***looks like*** it is measuring a particular characteristic.
  - ❖ Its often useful for ensuring the cooperation of people who are participating in a research study.
  - ❖ It relies entirely on subjective judgment -it is not, in and of itself, terribly convincing evidence that an instrument is truly measuring what the researcher wants to measure.

# DETERMINING THE VALIDITY OF MEASURING INSTRUMENTS CONTD.

2. **Content validity-** is the extent to which a measurement instrument is a representative sample of the content area (domain) being measured.

- ❖ A measuring instrument has high content validity if the items or questions reflect the various parts of the content in appropriate proportions and if it requires the particular behaviors and skills that are central to the domain.

## DETERMINING THE VALIDITY OF MEASURING INSTRUMENTS CONTD.

3. **Criterion validity**- is the extent to which the results of an assessment instrument correlate with another, presumably related measure (the criterion).
  - ❖ E.g. an instrument designed to measure a sales' person effectiveness on the job should correlate with a number of sales the individual actually makes during the course of a business day.



4. **Construct validity**- is the extent to which the instrument measures a characteristic that cannot be directly observed but must instead be inferred from patterns in people's behavior. Such a characteristic is called a construct. Motivation, creativity, racial bias are constructs.
- ❖ When a researcher asks questions, presents tasks, or observes behavior as a way of assessing an underlying construct, they should obtain some kind of evidence that their approach does, in fact, measure the construct in question

## DETERMINING THE RELIABILITY OF MEASURING INSTRUMENTS

- ❖ The reliability of a measuring instrument is the extent to which it yields consistent results when the characteristics being measured hasn't changed. Forms of reliability:-
  1. **Interrater reliability-** is the extent to which two or more individuals evaluating the same product or performance give identical judgment.
  2. **Inter consistency reliability-** is the extent to which all the items within a single instrument yields a similar results.
  3. **Equivalent forms reliability-** is the extent to which two different versions of the same instrument e.g. Form A and Form B of a scholastic aptitude test yield similar results.
  4. **Test-retest reliability-** is the extent to which the same instrument yields the same results on two different occasions.

# LINKING DATA AND RESEARCH METHODOLOGY

- ❖ NB. Data is the link between absolute truth and the researcher's enquiring mind.
- ❖ Data are like an ore: they contain pieces of the truth but are in a rather unreal state. To extract meaning from the data, we employ the *methodology*.
- ❖ Data and the methodology are inextricably interdependent- thus for the methodology used for a particular research problem must always take into account the nature of the data that will be collected in the resolution of the problem.
- ❖ NB many kinds of data may be suitable only for a particular methodology. E.g. you cannot extract much meaning from historical documents by using a laboratory experiment .
- ❖ Many researchers tend to categorize research studies into two broad methodologies

## ❖ QUANTITATIVE AND QUALITATIVE APPROACHES.

1. **Quantitative research** is used to answer questions about relationships among measured variables with the purpose of explaining, predicting and controlling phenomena. This approach is sometimes called the traditional experimental or positivist approach.
2. **Qualitative research** is typically used to answer questions about a complex nature of phenomena. Often with the purpose of describing and understanding the phenomena from the participants' point of view. Its also referred to as the interpretative, constructivist, or post positivist approach.

# THE VALIDITY OF YOUR METHOD

- ❖ Validity of the method refers to the accuracy, meaningfulness and credibility of the research project as a whole. The research effort will be worth time and effort only to the extent that it will allow the researcher to draw meaningful and defensive conclusions from the data. There two forms of method validity
- A. **Internal validity-** is the extent to which the design of the research project and the data that it yields, allow the researcher to draw accurate conclusions about the cause-and-effect and other relationships with in the data.
- ❖ To ensure the internal validity of a research study, we need to take whatever precaution that we can to eliminate other possible explanations for the results we observe

# THE VALIDITY OF YOUR METHOD contd.

## ❖ STRATEGIES FOR ENHANCING INTERNAL VALIDITY

1. **Controlling laboratory studies** -conducting experiments in a lab setting so that environmental conditions can be carefully regulated.
2. **Conducting double blinded experiments-** in a situation where two or more different methods are being compared, neither the participant nor the people administering the method know what the researchers hypothesis is, or which method is expected to be, more effective – they are “blind”
3. **Unobtrusive measure-** people are observed in such a way that they do not know their actions are being recorded. E.g. a university lib measures students and Faculty use of different parts of the library by looking at wear-and-tear patterns of the carpet.
4. **Triangulation-** multiple sources of data are collected with the hope that they will converge to support a particular hypothesis or theory.

# THE VALIDITY OF YOUR METHOD contd.

- B. External validity-** is the extent to which its results of a research study apply to situations beyond the study itself, i.e. the extent to which the conclusions drawn can be generalized to other contexts- contributing more to humanity's knowledge.

## ❖ **STRATEGIES THAT ENHANCE EXTERNAL VALIDITY**

1. **A real life setting-** research that is conducted in the outside world may be more valid in the sense that it yields results with broader applicability to other real world contexts.

# THE VALIDITY OF YOUR METHOD contd.

2. **A representative sample-** the sample for study that we identify should be a representative of the whole since the results will be generalized to the whole population. This is referred to as inductive reasoning.
3. **Replication in a different context-** when a research study is replicated and produces the same results and similar conclusions are drawn, then under such circumstances, the studies taken together provide evidence that the conclusion has validity and applicability across diverse contexts and situations



# ETHICAL ISSUES IN RESEARCH

- ❖ The use of human subjects in research is quite common across all disciplines. Whenever human beings are the focus of investigation, we must look closely at the ethical implications of what we are proposing to do.
- ❖ **Ethical issues fall into four categories**
  1. **Protection From Harm-** The researcher should not expose research participants to undue physical or psychological harm. The risk involved should not be greater than the normal risks of day-to-day living. E.g.. Loss of life or a limb, unusual stress, embarrassment, or loss of self esteem.
    - ❖ In cases where the nature of study involves creating a small amount of discomfort, participants should know a head of time, and any necessary debriefing or counseling should follow immediately.

# ETHICAL ISSUES IN RESEARCH CONTD.

2. **Informed Consent-** research participants should be told the nature of the study to be conducted and be given the choice of either participating or not.

They should be told that, if they agree to participate, they have the right to withdraw from the study at any time. *Any participation in a study should be strictly voluntary.*

3. **Right To Privacy-** any research study should respect participants right to privacy. Under no circumstances should a research report, either orally or written, be presented in such a way that others become aware how a particular participant has responded or behaved (unless the you have the permission in writing form the participant).

# ETHICAL ISSUES IN RESEARCH contd.

4. **Honesty With Professional Colleagues-** researchers must report their findings in a complete and honest fashion, without misrepresenting what they have done or intentionally misleading others as to the nature of their findings.

Under no circumstances should a researcher fabricate data to support a particular conclusion no matter how seemingly “noble” that conclusion may be.

- ❖ NB: Remember to give credit where it is due-use of other peoples ideas or words demands full acknowledgment-otherwise it constitutes plagiarism and documentary theft.

- Avoiding deceptive practices
- Providing the right to withdraw from the sample

# PLANNING FOR DATA COLLECTION

- ❖ After identifying the research design and methodology, considering the issues of validity and reliability and addressing the ethical implications of a project.
- ❖ The researcher must also make decisions about how to acquire and interpret the data necessary for resolving the overall research problem. Such decision are made before the researcher begins to write the proposal.
- ❖ Basic to the research design are four fundamental questions about the data. These questions must be answered specifically, concretely and without mental evasion or reservation to avoid serious trouble later on.

# PLANNING FOR DATA COLLECTION contd.

1. **What data are needed?**- a visualization of the data, an appreciation of their nature and a clear understanding of their treatment are fundamental to the research effort.
- ❖ On piece of paper ask yourself what data are mandatory? Statistical? interview data? questionnaire replies? Observations?
- ❖ Measurement must made before and after an experiment intervention? i.e. what data do I need and what are their characteristics?

# PLANNING FOR DATA COLLECTION contd.

2. **Where are the data located?-** novice researchers say that data are located **somewhere** but you should say **precisely where-** the library, and the collection you need, the organizations and where they are located-geographically-by town, street and address.
3. **How will the data be secured?-** you need to know how you will obtain that data. It may not be easy as many researcher think. This question should not be ignored when designing a research project.
4. **How will the data be interpreted?-** this is perhaps the most important question of all. The other three hurdles have been overcome and you have the data in hand. Spell out precisely what you intend to do with the data to solve the problem or one of its sub problems.

# THE VALUE OF A PILOT STUDY

- ❖ Planning a research project is not something that occurs in one swoop. In reality, a researcher may sometimes need to do a brief experiment investigation, or *pilot study*, to try out particular procedures, measurement instruments and methods of analysis.
- ❖ *A brief pilot study is an excellent way to determine the feasibility of your research project.*
- ❖ Furthermore, though it may take some time initially, it may ultimately save your time in future if you know, after a small investment on your part, which approaches will and will not work effectively in helping you solve your overall research problem.



# SUMMARY

- ❖ The research plan therefore must contain the following items:
  1. Research objectives should be clearly stated briefly which tell exactly what it is the researcher expects to do and should also be clearly linked to the research method.
  2. The problem to be studied by the researcher must be explicitly stated so that one may know what info is to be obtained for solving the problem.
  3. The plan should contain what method is to be used to solve the problem.
  4. The plan must state the details of the measurement instruments adopted e.g. the questionnaire, the interview, the observation etc.

# SUMMARY contd.

5. A clear mention of the population to be studied as well as the sample to be used and how it was identified. The method of identifying the sample should be such that generalization from the sample to the original population is feasible.
6. The plan must also contain the methods to be used to processing the data. Statistical and other methods should be indicated in the plan.
7. Results of pilot test, if, any should be reported. Time and cost budgets for the project should also be prepared and laid down in the plan itself.