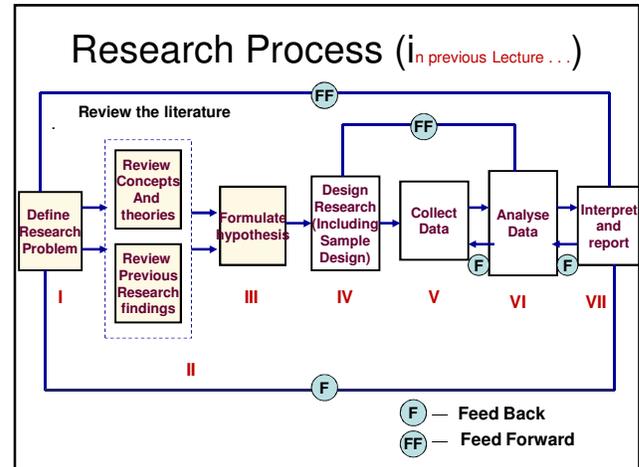# Research Process:
A Brief Description

PhD Course Work -2014
Research Methodology
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Research Process (in previous Lecture . . .)

F — Feed Back
FF — Feed Forward

Research Process

The order concerning various steps for a useful procedural guideline regarding the research process:

- Formulating the research problem;
- Extensive literature survey;
- Developing the hypothesis;
- Preparing the research design;
- Determining sample design;
- Collecting the data;
- Execution of the project;
- Analysis of data;
- Hypothesis testing;
- Generalisations and interpretation, and
- Preparation of the report or presentation of the results, i.e., Formal write-up of conclusions reached.

Defining a Research Problem

- To define a problem correctly, a researcher must know:
  - What a problem is?

- State the components of a research problem as under:
  - an individual or a group which has some difficulty or the problem.
  - some objective(s) to be attained at.
    - If one wants nothing, one cannot have a problem.
  - Must be alternative means (or the courses of action) for obtaining the objective(s) one wishes to attain
    - There must be *at least two means* available to a researcher for
    - if he has no choice of means, he cannot have a problem.

- State the components of a research problem as under:
  - There must remain some doubt in the mind of a researcher with regard to the selection of alternatives.
    - This means that research must answer the question concerning the relative efficiency of the possible alternatives.
  - There must be some environment(s) to which the difficulty pertains.

- SELECTING THE PROBLEM
  - The research problem undertaken for study must be carefully selected.
  - The task is a difficult one, although it may not appear to be so.

- SELECTING THE PROBLEM
  - Subject which is **overdone** should not be normally chosen, for it will be a difficult task to throw any new light in such a case.
  - Controversial subject should not become the choice of an average researcher.
  - Too narrow or too vague (fuzzy) problems should be avoided.
  - The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach.

- SELECTING THE PROBLEM
  - Contact an expert or a professor in the University who is already engaged in research.
  - Read articles published in current literature available on the subject and may think how the techniques and ideas discussed there in might be applied to the solution of other problems.
  - Discuss with others what he has in mind concerning a problem. In this way he should make all possible efforts in selecting a problem.

- SELECTING THE PROBLEM
  - The importance of the subject, the qualifications and the training of a researcher, the costs involved, the time factor
    - Whether he is well equipped in terms of his background to carry out the research?
    - Whether the study falls within the budget he can afford?
    - Whether the necessary cooperation can be obtained from those who must participate in research as subjects?
  - The selection of a problem must be preceded by a preliminary study. This may not be necessary when the problem requires the conduct of a research closely similar to one that has already been done.
    - But when the field of inquiry is relatively new and does not have available a set of well developed techniques, a brief feasibility study must always be undertaken.

- TECHNIQUE IN DEFINING A PROBLEM
  - Statement of the problem in a general way;
  - Understanding the nature of the problem;
  - Surveying the available literature
  - Developing the ideas through discussions; and
  - Rephrasing the research problem into a working proposition.

- **(i) Statement of the problem in a general way:**
  - the problem should be stated in a broad general way, keeping in view either some practical concern or some scientific or intellectual interest.
  - In case of social research, it is considered advisable to do some field observation, some sort of preliminary survey or what is often called *pilot survey*.
  - Then the researcher can himself state the problem or he can seek the guidance of the guide or the subject expert in accomplishing this task.

- **(ii) Understanding the nature of the problem:**
  - Understand its origin and nature clearly
  - to discuss it with those who first raised it in order to find out how the problem originally came about and with what objectives in view
  - A discussion with those who have a good knowledge of the problem concerned or similar other problems.
  - The researcher should also keep in view the environment within which the problem is to be studied and understood.

- **(iii) Surveying the available literature:**
  - All available literature concerning the problem must necessarily be surveyed and examined
    - It will be well-conversant (Familiar with or knowledgeable about something)with relevant theories in the field, reports and records
    - To find out what data and other materials -- "Knowing what data are available often serves to narrow the problem itself as well as the technique that might be used."
    - If there are certain gaps in the theories, or whether the existing theories applicable to the problem under study are inconsistent with each other, or whether the findings of the different studies do not follow a pattern consistent with the theoretical expectations and so on.
    - for indicating the type of difficulties that may be encountered in the present study as also the possible analytical shortcomings.

- **(iv) Developing the ideas through discussions:**
  - Often produces useful information
  - Various new ideas can be developed
  - Discuss problem with colleagues and others who have enough experience in the same area or in working on similar problems --- known as an ***experience survey***.
  - People with rich experience are in a position to enlighten the researcher on different aspects of his proposed study and their advice and comments are usually invaluable (Extremely useful) to the researcher --- sharpen his focus of attention on specific aspects within the field.

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- **(v) Rephrasing the research problem:**
  - to rephrase the research problem into a working proposition
  - rephrasing the problem into analytical or operational terms is not a difficult task
  - Through rephrasing, the researcher puts the research problem in as specific terms as possible so that it may become operationally viable and may help in the development of working hypotheses

- The following points must also be observed while defining a research problem:
  - (a) Technical terms and words or phrases, with special meanings used in the statement of the problem, should be clearly defined
  - (b) Basic assumptions or postulates (if any) relating to the research problem should be clearly stated

- Defining a research problem:
  - (c) A straight forward statement of the value of the investigation (i.e., the criteria for the selection of the problem)
  - (d) The suitability of the time-period and the sources of data available
  - (e) The scope of the investigation or the limits within which the problem is to be studied must be mentioned explicitly in defining a research problem.

- An example :
- Let us suppose that a research problem in a broad general way is as follows:
  - "Why is productivity in Japan so much higher than in India"?
  - It has a number of ambiguities such as
    - What sort of productivity is being referred to?
    - With what industries the same is related?
    - With what period of time the productivity is being talked about?
    - In view of all such ambiguities the given statement or the question is much too general to be amenable to analysis.

- Rethinking and discussions about the problem may result in narrowing down the question to:
- Example
  - "What factors were responsible for the higher labour productivity of Japan's manufacturing industries during the decade 1971 to 1980 relative to India's manufacturing industries?"
- Further rethinking and rephrasing might place the problem on a still better operational basis as shown below:
  - "To what extent did labour productivity in 1971 to 1980 in Japan exceed that of India in respect of 15 selected manufacturing industries?
  - What factors were responsible for the productivity differentials between the two countries by industries?"

- Example:
  - With this sort of formulation, the various terms involved such as 'labour productivity', 'productivity differentials', etc. must be explained clearly.
  - The researcher must also see that the necessary data are available.
  - In case the data for one or more industries selected are not available for the concerning time-period, then the said industry or industries will have to be substituted by other industry or industries.
  - The suitability of the time-period must also be examined. Thus, all relevant factors must be considered by a researcher before finally defining a research problem

- Defining a research problem is crucial in defining the quality of the answers, and determines the exact research method used.

- A quantitative experimental design uses **deductive reasoning** to arrive at a testable hypothesis.

- Qualitative research designs use **inductive reasoning** to propose a research statement.

Sample Deductive and Inductive Arguments

Example of Deduction
- major premise:
  All professors like research
- minor premise:
- Dr NS Chaudhari is a professor
- Conclusion: Therefore, Dr NS Chaudhari likes research

Example of Induction
- Boss to employee: "Biff has a tattoo of an anchor on his arm. He probably served in the Navy."

- Example
  - An anthropologist might find references to a relatively unknown tribe in Papua New Guinea.
  - Through inductive reasoning, she arrives at the research problem and asks, 'How do these people live and how does their culture relate to nearby tribes?'
  - She has found a gap in knowledge, and she seeks to fill it, using a qualitative case study, without a hypothesis

Determining Sample Design

- Sampling may be defined as the selection of some part of an aggregate or totality, on the basis of which a judgment or inference about the aggregate or totality is made.

- In other words it is process of obtaining information about an entire population by examining only a part of it.

Need for Sampling

Sampling is used in practice for a variety of reasons such as:-
1. Reduces the time and cost
2. saves labor
3. Quality of a study is often better with sampling than with a complete
4. Coverage
5. Provides much better results
6. Only procedure possible, if the population is infinite.

Need for Sampling
Representative Sample

Simple natural Language

⟨⟨⟨the⟩⟨⟨girl⟩⟩⟩⟨⟨likes⟩⟨⟨a⟩⟨⟨cat⟩⟩⟩⟩⟩

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⟨⟨⟨the⟩⟨⟨dog⟩⟩⟩⟨⟨chases⟩⟨⟨a⟩⟨⟨young⟩⟨⟨girl⟩⟩⟩⟩⟩⟩.

$S \rightarrow NT\,1\; NT\,2$
$NT\,1 \rightarrow NT\,3\; NT\,4$
$NT\,4 \rightarrow NT\,5$
$NT\,4 \rightarrow NT\,6\; NT\,4$
$NT\,2 \rightarrow NT\,7\; NT\,1$
$NT\,3 \rightarrow$ the
$NT\,3 \rightarrow$ a
$NT\,5 \rightarrow$ girl
$NT\,5 \rightarrow$ cat
$NT\,5 \rightarrow$ dog
$NT\,6 \rightarrow$ young
$NT\,7 \rightarrow$ likes
$NT\,7 \rightarrow$ chases.

There are many types of sampling, most sampling types can be categorized as:

a) Probability sampling and
b) Non-probability sampling

a)   Probability sampling:-

is one in which every unit in the population has a chance (greater than Zero) of being selected in the sample, and this probability can be accurately determined. The combinations of these traits make it possible to produce unbiased estimates of population totals, by weighing sampled units according to their probability of selection.

Probability Sampling is of the following types:

1.Simple Random sampling
2.Stratified Random sampling
3.Systematic Random sampling
4. Cluster/ Area sampling
5.Multi stage sampling

Non-Probability sampling:

• Non probability sampling plans are those that provide no basis for estimating how closely the sample characteristics approximate the parameters of the population from which the sample was obtained. In fact the investigator is generally unable to identify the parent population.

Non-Probability sampling may be classified into:-

1.Convenience or Accidental sampling

2.Purposive or judgment sampling

3.Quota sampling

4.Snow – ball sampling

Simple Random sampling: -

 A simple random sample is one in which each element of the population has an equal and independent chance of being included in the sample i.e.

 a sample selected by randomization method is known as simple random sample and this technique is simple random-sampling. Randomization is a method and is done by using a number of techniques as:-

a)Tossing a coin

b)Throwing a disc

c)Lottery method

The Fish Bowl Draw:

The simplest and most familiar type of sample selection consists of putting numbers on slips of paper or marbles and depositing them in a large container. The numbers identify and stand for specific elements in the populations and presumably the entire population of elements has been numbered and is represented in the bowl. After mixing the thoroughly, the investigator selects one number at a time, blindfolded until the desired sample size is obtained. This is called a random sample.

Systematic Sampling:

Systematic sampling relies on arranging the target population according to some ordering scheme and then selecting elements at regular start and then proceeds with the selection of every Kth element from the onwards. It is important that the starting point is not automatically the first in the list, but is instead randomly chosen from within the first to the Kth element in the list.

Example

A simple eg:- would be to select every 10th name from the telephone directory (an every 10th sample, also referred to as sampling with a skip of 10).

Stratified Sampling

It is an improvement over the earlier method, when employing this techniques, the researcher divides his population in strata on the basis of some characteristics, and from each of these smaller homogenous groups (strata) sample items are selected at random a pre-determined number of Units. Researcher should choose that characteristic or criterion which seems to be more relevant in his research work. Can be applied to obtain representative sample when population does not constitute a homogeneous group.

Cluster sampling:

To select the intact group as a whole is known as a cluster sampling. In cluster sampling the sample units contain groups of elements (clusters) instead of individual members or items in the population.

- Example:- Suppose some departmental store wishes to sample its credit card holders. It has issued its cards to 15,000 customers. The sample size is to be kept say 450. For cluster sampling this list of 15,000 card holders could be formed into 100 clusters of 150 card holders each. Three clusters might then be selected for the sample randomly.

Multi-stage sampling: -

In this method, sampling is carried out in two or more stages. The population is regarded as being composed of a number of first stage sampling units. Each of them is made up of number of second stage units and so forth. That is, at each stage, a sampling unit is a cluster of the sampling units of the subsequent stage, first, a sample of the first stage sampling is drawn, and then from each of the selected first stage sampling unit, a sample of the second stage sampling units is drawn. The procedure continues down to the final Sampling units or population elements. Appropriate random sampling method is adopted at each stage.

USAGE

Multi-stage sampling is appropriate where the population is scattered over a wider geographical area and no frame or list is available for sampling. It is also useful when a survey has to be made within a limited time and cost budget.

Non- probability sampling methods :

Convenience or accidental sampling: It means selecting sample units in a '1 hit and miss fashion'. Example: interviewing people whom we happen to meet. This sampling also means selecting whatever sampling units are conveniently available.

Example: A teacher may select students in his class.

This method is also known as accidental sampling because the respondents whom the researcher meets accidentally are included in the sample.

Purposive or Judgment Sampling:

- This method means deliberate selection of sample units that conform to some pre-determined criteria. This is also known as judgment sampling. This involves selection of cases which we judge as the most appropriate ones for the given study. It is based on the judgment of the researcher or some expert. It does not aim at searching a cross section of a population.

Quota Sampling:

- This is a form of convenient sampling involving selection of quota groups of accessible sampling units by traits such as Sex, Social class etc. In specific proportions, each investigator may be given an assignment of quota groups specified by the pre-determined traits in specific proportions. He can then select accessible persons belonging to those groups in the area assigned to him.

- Quota sampling is therefore, a method of stratified sampling in which the selection within strata is non-random. Quota sampling is used in studies like marketing survey, opinion polls, and readership survey which do not aim at precision but to get quickly some crude results.

Snow ball sampling: Is a technique of building up a list or a sample of a special population by using an initial set of its members as informants. For example a researcher wants to study the problem faced by Indians in another country, Say, he may identify an initial group of Indians through some source like Indian Embassy, Then he can ask each one of them to supply names of other Indians known to them and continue this procedure until he gets an exhaustive list from which he can draw a sample or make a census survey.

This sampling technique may also be used in socio-metric studies. For example, the members of a social group may be asked to name the persons with whom they have social contacts, each one of the persons so named may also be asked to do so, and so on. The researcher may thus get a constellation of associates and analyze it.

Unit 1 of the Paper 'Research Methodology' ENDS

Strict Last Date for Assignments Submission is: **21 November 2014** for the both: Review of Papers and Study of a Research Tool

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