SEC II: Research Methodology (SEM-IV)

Unit I: Methodological Issues I

Date: __/__/____

- **Meaning of Research**

Research in common parlance refers to a search for knowledge. one can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. Dictionary definition of research is a careful investigation or inquiry specially through search for new facts in any branch of knowledge. Some people consider research as a moreement from the known to the unknown. It is actually a voyage of discovery.

According to Clifford Woody, research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organising and evaluating data, making deductions and reaching conclusions, and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis. D. Slesinger and M. Stephenson in the Encyclopaedia of Social Sciences define research as "the manipulation of things, concepts or symbols for the purpose of generalising to extend, correct or verify knowledge, whether that knowledge aids in construction of

theory or in the practice of an art." Research is thus, an original contribution to the existing stock of knowledge making for its advancement. In short, the search for knowledge through objective and systematic method of finding solution to a problem is research.

- Objectives of Research

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose, let us mention some general objectives of research below:

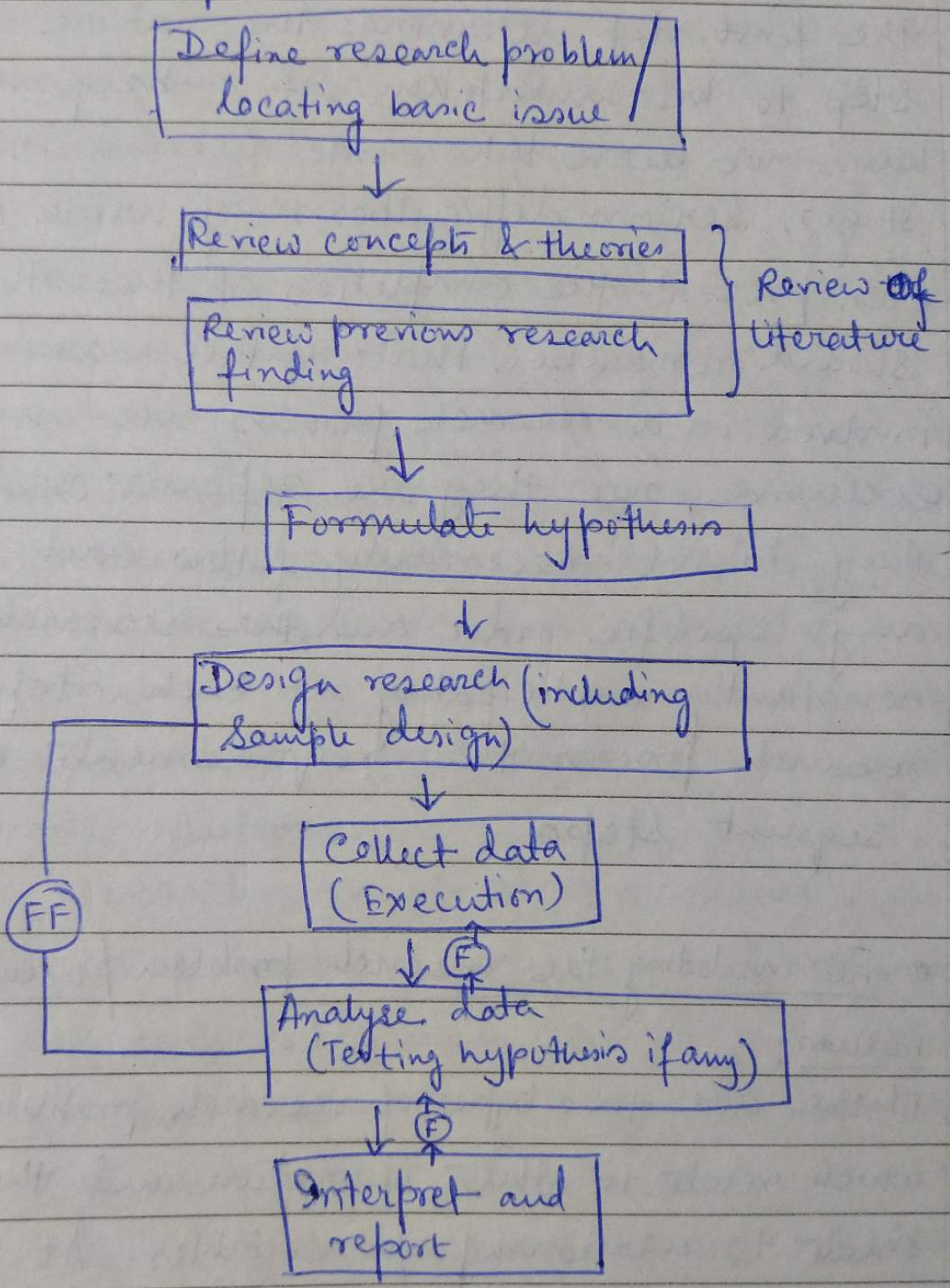
i) To gain familiarity with a phenomenon or to achieve new insights into it.

ii) To portray accurately the characteristics of a particular individual, situation or a group

iii) To determine the fregnency with which something occurs or with which it is associated with something else.

iv) To test a hypothesis of a causal relationship b/w variables.

• Research Process: Research process consists of series of actions or steps necessary to effectively carry out research. The following chart illustrates a research process.



(FF) = feed forward (serves the vital fn of providing

(F) = feedback (Helps in controlling the sub-system to which it is transmitted)

The above chart indicates that the research process consists of a number of closely related activities. But such activities overlap continuously rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember that neither various steps involved in a research process are mutually exclusive, nor they are separate and distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the subsequent steps.

- Formulating the research problem / Locating the basic issues:

There are two types of research problems, viz. those which relate to states of nature and those which relate to relationships b/w variables. At the very outset, the researcher must single out the problem

Date: __/__/____

he wants to study, i.e he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Essentially two steps are involved in formulating the research problem, viz. understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In private business unit or in governmental organisations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came out and what considerations are involved in its possible solutions.

The researcher must at the same time examine all available literature to get himself acquainted with the selected problem. He may review ~~the~~ two types of literature — the conceptual literature concerning the concepts and theories, and the empirical literature consisting of studies made earlier which are similar to the one proposed.

Date: __/__/____

The basic outcome of this review will be the knowledge as to what data and other materials are available for operational purposes which will enable the researcher to specify his own research problem in a meaningful context.

After this the researcher put the problem in as specific terms as possible. This task of formulating or defining a research problem is a step of greatest importance in the entire research procers. The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must, however, be taken to verify the objectivity and validity of the background facts concerning the problem. The statement of the objective is of basic importance because it determines the data which is to be collected, the characteristics of the data which is relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report. If there are certain pertinent terms, the same should be clearly difined along with the task of formulating the problem.

Date: __/__/____

• Literature survey — After locating the research problem, the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, govt. reports, books etc., must be tapped depending on the nature of the problem. In this process, it should be remembered that one source will lead to another. The earlier studies, if any, which are similar to the study in hand should be carefully studied. A good library will be of a great help to the researcher at this stage. In this era of internet, it has become quite easy to search the articles. One can use some search engine like 'google' or specially 'google scholars' to search scholarly articles.

✡

⇒ Theme based literature survey —

Literature review should be organized thematically because the purpose is to show, overall, what the literature has demonstrated. The goal is not to give the reader a summary of each article; instead,

Date: __/__/____

it is the systhesis that matters. A literature review Synthesizes the ideas in sources and engages with several sources.

In the order to write a literature review, writers must do a lot of planning. Without proper planning, it will be hard to determine what the major themes are that have arisen in the literature, and the review might become disorganized and require significant revision. Let us mention a method for ~~approaching~~ approaching literature review at the planning stage:

i) At the beginning one should read his/her sources, do some critical reading to decipher: what are the major themes and ideas that s/he is seeing in the literature related to his/her topic?

ii) once few themes are noticed, one should start to create an outline, organized by theme where s/he has the theme at the top and then list out each source that had something to do with that theme. Ideally, one will eventually have several themes in his/her outline with several sources below each theme. This will help him/her to structure and organize by themes and plan body paragraphs.

Date: __/__/____

iii) One should continue to read through the sources to 1) identify themes in the literature and 2) identify which sources have information and ideas that contribute to those themes. At this stage it may be needed to re-read sources to catch

• Research Design: A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. In fact, the research design is the conceptual structure within which research is conducted, it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data.

The overall research design may be splitted into the following parts:

Date: __/__/____

a) The sampling design which deals with the method of selecting items to be observed for the given study.

b) The observational design which relates to the conditions under which the observations are to be made.

c) The statistical design which concerns the question of how many items are to be observed and how the information and data gathered is to be analysed.

d) The operational design which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

- Features of a good design: A research design appropriate for a particular research problem, usually involves the consideration of the following factors:

i) The means of obtaining information;

ii) The availability and skills of the researcher and his staff, if any;

iii) The objective of the problem to be studied

iv) The nature of the problem to be studied

v) The availability of time and money for the research work.

Date: __/__/____

• Sample Design: A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sample design is determined before data are collected. There are many sample designs from which a researcher can choose. Some designs are relatively more precise and easier to apply than others. Researcher must prepare a sample design which should be reliable and appropriate for his research study. The main steps of sampling design are as follows:

i) Objective: The first step of sampling design is to define the objectives of survey in clear and concrete terms.

ii) Population: The population should be clearly defined.

iii) Sampling units and frame: A decision has to be taken concerning a sampling unit before selecting sample. Sampling unit may be a geographical one such as state, district, village, etc. or a construction unit such as house, flat etc., or it may be a social unit such as family, club, school etc. or it may be an individual. The researcher will have to decide one or more of such units

that he has to select for his study. The list of sampling units is called as 'frame' or sampling frame. Sampling frame contains the names of all items of a universe.
Such a list should be comprehensive, reliable and appropriate. It is extremely important for the source list to be as representative of the population as possible.

iv) Size of sample: This refers to the number of items to be selected from the universe to constitute a sample.

v) Parameters of interest: In determining the sample design, one must consider the question of the specific population parameters which are of interest.

vi) Data collection: No irrelevant information should be collected and no essential information should be discarded. The objective of the survey should be very much clear in the mind of the surveyor.

vii) Non-respondents: Because of practical difficulties, data may not be collected from all the sample units. This may change the result. The reasons for non-respondents should be clearly recorded.

viii) Selection of proper sampling design.

ix) organizing field work: The success of a survey depends on the reliable field work.

* Being the replica and rehearsal of the main survey, pilot survey brings to the light the weaknesses (if any) of the questionnaires and also of the survey techniques.

Date: __/__/____

x) Pilot survey: It is always helpful to try out the research design on a small scale before going to the field. This is called 'pilot survey' or 'pretest'. It might give the better idea of practical problems and troubles. *

xi) Budgetary constraint: Cost considerations, from practical point of view, have a major impact upon decisions relating to not only the size of the sample but also to the type of the sample. This fact can even lead to the use of a non-probability sample.

- Types of Sampling:

a) Purposive sampling
b) Simple random sampling
c) Systematic sampling
d) Stratified sampling
e) Quota sampling
f) Cluster Sampling and area Sampling
g) Multi-stage sampling
h) Segmental Sampling

Date: __/__/____

• Role of random numbers in Simple Random Sampling.

Simple random sampling from a finite population refers to that method of sample selection which gives each possible sample combination an equal probability of being picked up and each item in the entire population to have an equal chance of being included in the sample. It is of two types, viz. SRS with replacement and SRSWOR.

The process of SRS can be simplified by using random number tables. Various statisticians like Tippett, Yates, Fisher have prepared tables of random numbers which can be used for selecting a random sample. Generally, Tippett's random number tables are used for selecting a random sample. Tippett gave 10,400 four figure numbers. The process is illustrated in the following paragraph. For this purpose, let us reproduce the first thirty sets of Tippett's numbers:

2952	6641	3992	9792	7979	5911
3170	5624	4167	9525	1545	1396
7203	5356	1300	2693	2370	7483
3408	2769	3563	6107	6913	7691
0560	5246	1112	9025	6008	8126

Date: __/__/____

Suppose we are interested in taking a sample of 10 units from a population of 5000 units, bearing numbers from 3001 to 8000. We shall select 10 such figures from the above random numbers which are not less than 3001 and not greater than 8000. If we randomly decide to read the table numbers from left to right, starting from the first row and second column, we obtain the following numbers: 6641, 3992, 7979, 5911, 3170, 5624, 4167, 7203, 5356 and 7483.
The units bearing the above serial numbers would then constitute our required random sample.

It may be noted that it is easy to draw random samples from finite populations with the aid of random number tables only when lists are available and items are readily numbered.

▨ Data collection: 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. 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.

• Experiments vs. Surveys: An experiment refers to an investigation in which a factor or variable under test is isolated and its effect(s) measured. Survey refers to the method securing information concerning a phenomena under study from all or a selected no. of respondents of the concerned Universe.

• Different Methods of collecting primary data:

i) Observation method
ii) Interview method
   a) Personal interviews
   b) Pre-requisites and basic tenets of interviewing
   c) Telephone interviews
iii) Collection of Data through Questionnaires
iv) Collection of Data through Schedules

Date: __/__/____

• Methods behind preparation of a questionnaires

A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. The question-naire 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. Following methods should be followed for preparing a successful questionnaire:

i) It should be comparatively short and simple i.e. the size of the questionnaire should be kept to the minimum.

ii) Questions should proceed in logical sequence moving from easy to more difficult questions.

iii) Personal and intimate questions should be left to the end. Questions affecting the sentiments of the respon-dent should be avoided.

iv) Technical terms and vague expressions capable of different interpretations should be avoided in a questionnaire.

v) Open-ended questions are difficult to analyse and hence should be avoided in a questionnaire to the extent possible. There should be some control questions to cross check whether the information collected is correct or not.

Date: __/__/____

vi) Adequate space for answers should be provided in the questionnaire to help editing and tabulation.
vii) There should always be provision for indications of uncertainty, e.g., "do not know", "no preference" and so on.
viii) Brief directions with regard to filling up the questionnaire should invariably be given in the questionnaire.
ix) The physical appearance of the questionnaire affects the cooperation the researcher receives from the recipient 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 color, must be good so that it may attract the attention of recipients.

9)

Data Preparation process: The plan of data analysis is decided in advance before collecting the data. Data preparation process is guided by that plan of data analysis. Important steps of data preparation process are as follows:

Ref: Kothari & Garg Ch. 7

i) Questionnaire Checking.

Date: __/__/____

II) Editing → Field Editing
→ Central Editing
III) Coding
IV) classification → a) classification according to attributes.
b) classification according to class-intervals.
V) Tabulations
VI) Graphical representation
VII) Data cleaning
VIII) Data adjusting.

• Tabulation : Tabulation is the process of summarising raw data and displaying the same in compact form for further analysis. In a broader sense, tabulation is an orderly arrangement of data in columns and rows. Tabulation is essential because of the following reasons:

1. It conserves space and reduces explanatory and descriptive statement to a minimum.
2. It facilitates the process of comparison.
3. It facilitates the summation of items and the detection of errors and omissions.
4. It provides a basis for various statistical computations.

Date: __/__/____

Tabulations can be done by hand or by electronic devices like computer.
Hand tabulations may be done using tally marks or by using simple codes.
Tabulation may be classified as simple and complex tabulation. The former type of tabulation gives information about one or more groups of independent questions, whereas the latter type of tabulation shows the division of data in two or more categories and as such is designed to give information concerning one or more sets of inter-related questions.

- Generally accepted principles of tabulation/characteristics of a good table.

- Graphical Representation:

i) Bar chart
ii) Line diagram
iii) Pie chart
iv) Histogram.