

COURSE INTRODUCTION

Dear distance learner! Welcome to the course ‘Research Methodology for Management.’ This is a semester course work of three (3) credit hours. The course should equip you with an in depth knowledge and appreciation of the importance of research and research methods in any of your work activities and, skill of doing research to resolve problems encountering in either management or leadership functions or both.

Research Methodology is a subject matter that is associated with our daily business and organizational dealings in one way or the other. It is a very crucial tool with which organizational and managerial problems are identified, rectified and sound decision-making directions are set to smoothly function, and achieve organizational goals and objectives.

The purpose of this course is to provide you the basic understandings of research, research problem identification, relevant critical literature review, research design, sampling design, data collection techniques, analysis of data collected, result interpretation and research report writing.

The first chapter of this module introduces research and basic concepts related to research. The second chapter discusses defining research problem, review of literature and research proposal development. The third chapter describes research design; features of research design, criterion for good research design, measurement, sampling design and questionnaire design. The fourth chapter is about sources of data and data collection. In this chapter concepts related to sources of data for research, and methods of data collection are dealt with in details. Chapter five of the module elucidates data presentation and analysis, while the last chapter, chapter six, discusses interpretation of data collected and analyzed in chapter five, and research report writing meant for concerned readers and research result users.

Each study chapter contains an introduction, objectives, the main content, summary, self-test exercise, checklist and answer key for self-test exercises. You are expected to study the materials carefully, reflect on them and do the tasks and exercises accordingly.

We wish you success in this course and hope you will find it interesting and useful. Enjoy your study. Good luck!

Course Objectives:

At the end of this course, you will be able to:

- Explain the nature and concept of research
- Identify research problem, review relevant literatures and develop research proposal
- Describe research design, sampling design and questionnaire development
- Discuss sources of data and systematic methods of data collection
- Present and analyze data collected
- Interpret data analyzed to contextual settings
- Write standardized research report for end users

CHAPTER ONE

INTRODUCTION TO RESEARCH

Introduction

Research in management is the application of the scientific method in searching for the truth about business phenomena. It is a process that includes activities of: idea and theory development, problem definition, searching for and collecting information, analyzing data, and communicating the findings and their implications.

1.1. Meaning of Research

In a common vernacular research is a *combination of 're- and search'* and simply represents *searching truth or something again*. Research is investigation using scientific procedures, by searching again and again to find out truth. It is a continual search for truth using scientific method. It is the pursuit of the truth with the help of study, investigation, observation, comparison and/or experimentation. Research can also be defined as follows by different sources and scholars:

- “The systematic investigation into and study of materials, sources, etc., in order to establish facts and reach new conclusions” Oxford English dictionary
- “A process of finding out information and investigating the unknown to solve a problem” Maylor and Blackmon (2005)
- “Something that people undertake in order to **find out things** in a **systematic way**, thereby **increasing their knowledge**” Saunders *et al* (2007, p.5)

Research isn't information gathering:

- Gathering information from resources such as books or magazines isn't research.
- No contribution to new knowledge.

Research isn't the transportation of facts:

- Merely transporting of facts from one resource to another doesn't constitute research.
- No contribution to new knowledge although this might make existing knowledge more accessible.

On the other hand, we can define business research as *the systematic and objective process of generating information for aid in making business decisions*.

Research is an *academic activity* and as such the term should be used in a technical sense. According to **Clifford Woody** research comprises *defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data, making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis*.

Research is, thus, an *original contribution to the existing stock of knowledge* making for its advancement. It is the *pursuit of truth with the help of study, observation, comparison and experiment*.

In short, ***the search for knowledge through objective and systematic method of finding solution to a problem is research.*** The systematic approach concerning generalization and the formation of a theory is also research.

1.2. 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, we may think of research objectives as falling into a number of following broad groupings:

- i) *To gain familiarity with a phenomenon or to achieves new insight into it* (Exploratory or formulative research studies)
- ii) *To portray accurately the characteristics of a particular individual, situation or a group* (Descriptive research studies)
- iii) *To determine the frequency with which something occurs or with which it is associated with something else* (diagnostic research studies)
- iv) *To test a hypothesis of a casual relationship between variables* (hypothesis-testing research studies)

What makes people to undertake research?

The possible motives for doing research may be either one or more of the following:

- i) *Desire to get a **research degree** along with its consequential benefits*
- ii) *Desire to face the challenge in **solving the unsolved problems**, i.e., concern over practical problems initiates' research.*
- iii) *Desire to **get intellectual joy/happiness** of doing some creative work*
- iv) *Desire to **get respectability***

1.3. Types of Research

Research can be classified into different areas on the basis of different criterion. Thus, depending on the following three criteria research is classified as follows:

A. By Process

- 1. Reportive
- 2. Descriptive
- 3. Explanatory
- 4. Predictive
- 5. Exploratory
- 6. Qualitative and Quantitative
- 7. Analytical

B. By Purpose

- 1. Business Research
- 2. Social Science Research
- 3. Techniques oriented Research
- 4. Motivation Research

C. By Objective and Nature

- 1. Applied Research
- 2. Fundamental Research
- 3. Conclusion oriented research and Decision oriented Research
- 4. Conceptual or empirical Research

A. Classification by Process

1. Reportive: This type of research provides an **account or summary of some data**. The task in reporting may be quite simple and data readily available. Some times, the information may be difficult to find and under such circumstance the assignment calls for knowledge and skill with information sources. Usually there is *little inference or conclusion drawing*.

Purists claim that this should not be called research even though carefully gathered data can have great value. However, other researchers argue that at least one form, investigative reporting, has a great deal in common with widely accepted qualitative and clinical research.

2. Descriptive: A descriptive study tries to discover answers to the questions of **who?, what? when?, where? and sometimes, how?**. At this level, researchers attempts to *describe or define a subject, often by creating a profile of group of problem, people or events*. Such studies may be a *single variable* frequency distribution or they may involve *bivariate* or *multivariate* relationship.

They *may or may not have potential* for drawing powerful inferences. They *do not answer the question why?*. The descriptive study is **popular in business research** because of its versatility across disciplines. The main characteristic of this method is that researchers have **no control over the variable**; he can report only what has happened or what is happening.

3. Explanatory Research: Explanatory study **goes beyond description** and **attempts to explain phenomenon** which was only observed in the descriptive study. In this study the researcher *uses theories or at least hypothesis* to account for the forces that caused a certain phenomenon to occur.

The aviation industry may be interested in explaining the radiation risks for flight crews and passengers from the sun and stars. The variables might include *attitude, proximity of air routes* to the poles, *time of year*, and *aircraft scheduling*. The risk variable is exploited by the relations between each of the variables and radiation risk or by combination of the four variables and risk.

4. Predictive Research: This type of research is concerned with **foreseeing the occurrence of a phenomenon**.

In business research, prediction is found especially in studies conducted to evaluate specific courses of action *to forecast current and future values*. Control is logical outcome of prediction. Success in this endeavor, however, is largely determined by the *complexity of the phenomenon and the adequacy of the theory*.

5. Exploratory Research: This is the **initial research conducted to clarify and define the nature of the problem**. This also *provides background information*. It may mean to give qualitative scenario or measurement. Three interrelated activities exist in exploratory research.

- a) Diagnose a situation
- b) Scanning the alternatives
- c) Discovering new ideas

6. Quantitative and Qualitative Research: Quantitative research is based on the *measurement of quantity or amount*. It is applicable to phenomenon that can be expressed in terms of quantity.

Qualitative research, on the other hand, is concerned with *qualitative phenomenon* i.e., phenomenon relating to or involving *quality or kind*.

For instance, when we are interested in investigating the research for *human behavior* (i.e., *why people think or do certain things*), we often talk of qualitative research.

7. Analytical Research: In analytical research the researcher has to *use facts or information* already available, and *analyze these to make a critical evaluation of the material*.

B. Classification by Purpose

1. Business Research: A systematic enquiry that provides information *to guide business decision to be carried out*. It is systematic process to find solutions to the business problems.

2. Social Science Research: Is systematic enquiry that provides information *to guide societal related decision* to be conducted.

3. Technique Oriented Research: Adheres to *provide technical solutions* to technical problems.

4. Motivation Research: Motivation research is a *new field* in research. Behavioral sciences such as psychology, sociology, cultural anthropology are concerned with the study of human behavior. It *requires in-depth interviews which are designed to discover underlying motivation and desires*.

C. Classification by Objectives and Nature

1. Applied Research: Applied research aims at *finding a solution for immediate problems facing a society or an industrial/business organization*.

For example, research conducted to identify social, economic or political trends that may affect particular institution.

2. Fundamental Research: Fundamental research is mainly *concerned with generalizations, and formulation of theory*. *Gathering knowledge for knowledge's sake* is termed as 'pure' or 'basic' research.

Examples,

- *Research concerning some natural phenomenon.*
- *Research relating to pure mathematics.*
- *Research studies concerning human behavior carried on with a view to make generalizations about human behavior.*

3. Conclusion Oriented Research and Decision Oriented Research

Scientific research, though not a type, is a *process, method aiming at purposive accurate results*. Researches pertaining to this are conclusion oriented and decision oriented researches.

Conclusion oriented research is a *freelance/irregular/temporary function of picking up a problem, and design the enquiry as it proceeds*.

Decision oriented research is *confined to the problem assigned*. The researcher is *not free to go by his inclination*. Operations research is an example of decision oriented research.

4. Conceptual or Empirical Research

Conceptual research is research that is *related to some abstract idea(s) or theory*. It is generally used by philosophers and thinkers to develop concepts or to reinterpret existing ones.

On the Other hand, **empirical research** relies on *experience or observation alone*, without due regard for system and theory. It is data based research, coming up with conclusions which are capable of being verified by observation or experiment.

1.4. Characteristics of Research

Research is precisely characterized by the following basic points:

- ✚ Originates with a question or problem.
- ✚ Requires clear articulation of a goal.
- ✚ Follows a specific plan or procedure.
- ✚ Often divides main problem into sub problems.
- ✚ Guided by specific problem, question, or hypothesis.
- ✚ Accepts certain critical assumptions.
- ✚ Requires collection and interpretation of data.

1.5. Significances of Research in Management

The significances of research in management and business are:

1. **To cope with modern environment:** Business, behavior, social cultural, and economic environment are ever changing and dynamic. Hence, it is required to study the present, past and future.
2. **To analyze relations of variables:** Each area is composed of a number of variables. All the variables are required to be analyzed to know how the variables affect the business operations.
3. **To make decisions to obtain better results:** Every body at one stage or other those who are managing business have to take decisions to obtain better result.

As a result:

- Relevant information is necessary
 - Availability of scientific techniques and tools to collect information
 - There would be problem of “**information overload**” if required discipline (research) is not employed
4. **To access to knowledge/information to better compete:** Competitive spirit increases. Hence, every body’s responses, activities etc, have to be carefully analyzed, understood, and forecasted.
 5. **To bring economic, social and political developments:** These type of developments are the results of rigorous research, and their applications
 6. **To meet aspirations of people’s expectations from the business, and government:** People’s expectations are ever increasing. Hence government and business activities must promote welfare and this needs lots of forecasting and programming, which is possible through research.
 7. **To extract meaningful information or knowledge from volumes of data:** For all this application of research technique is essential.
 8. **To warehouse and store data in electronic form:** One must know new techniques of integration of data because research power and number of tools have increased.
 9. **To cope up with increased research communication and measurement techniques**

Hence knowledge of research is essential for every body.

All of the above significances of research can be summarized as follows. Research methods are useful in:

- a) *Decision making*
- b) *Understanding the data, and analysis*
- c) *Understanding earlier research reports, their evaluation and applicability*
- d) *Evaluating research proposal in case of out sourcing*
- e) *To develop professionalism and a career in research*

“All progress is born of enquiry. Doubt is often better than overconfidence, for it leads to enquiry and enquiry leads to invention” is a famous **maxim/saying** in content of which the significance of research can well be understood. Increased amount of research make progress possible. Besides, significances of research can be highlighted by the following points.

1. *Research indicates scientific and indicative thinking*
2. *It promotes the development of logical habits of thinking and organization*
3. *Research provides the basis for nearly all governmental policies in our economic systems*
4. *Research has its special significance in solving various operational and planning problems of business and industry*
5. *Research is equally important for social scientists in studying social relationships and in seeking answers to various social problems*

In addition to what has been stated above, the significance of research can also be understood keeping in view the following points:

- ✚ To those students who are to write a masters or PhD, thesis, research may mean a ***careerism or a way to attain a high position*** in the social structure;
- ✚ To professionals in research methodology, research may mean ***a source of livelihood;***
- ✚ To philosophers and thinkers, research may mean the ***outlet for new ideas and insights;***
- ✚ To literary men and women, research may mean the ***development of new style and creative work***
- ✚ To analysts and intellectuals, research may mean the ***generalizations of new theories.***

Thus, research is the fountain/source of knowledge for the sake of knowledge and an important source of providing guidelines for solving different business, governmental and social problems. It is a sort of formal training which enables one to understand the new developments in one's field in a better way.

Research Method Vs Research Methodology

The terms research methods and research methodology are interchangeably used by people. But, there is a difference between the concepts.

- **Research methods** refer to ***specific activities designed to generate data*** such as questionnaires, interviews, focus group discussions, observations.
- **Research methodology**, on another hand, is about ***ones attitude to and understanding of research and the strategy one chooses to answer research questions.***

1.6. Criteria for Good Research

What ever may be the types of research work and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. Good scientific research satisfies the following criteria.

1. The *purpose* of the research should be **clearly defined** and **common concepts be used**
2. The *research procedure* used should be **described in sufficient detail** to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.
3. The *procedural design* of the research should be **carefully planned to yield results** that are as objective as possible,’
4. The **researchers should report with complete frankness**; flaws/defect in procedural design and estimate negatively impact their effects upon the findings
5. The *analysis of data* should be **sufficiently adequate to reveal its significance** and the **methods of analysis used should be appropriate**. The *validity and reliability of the data* should be checked carefully.
6. *Conclusions* should be **confined to those testified by the data** of the research and limited to those for which the **data provides an adequate basis**.
7. Greater confidence in research is warranted if the *researchers are experienced*, has a *good reputation* in research and is a *person of integrity*.

In other words, we can state the qualities of a good research as under:

- Good research is **systematic**
- Good research is **logical**
- Good research is **empirical**; i.e. Research is basically related to one or more aspects of a **real situation or it deals with concrete data** that provides basis for external validity to research result.)
- Good research is **replicable**

1.7. Research Process

Research process consists of **series of actions or steps necessary to effectively carry out research** and the **desired sequencing of these steps**. One should remember that the various steps involved in a research process are *not mutually exclusive; nor are they 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. However, the following order concerning various steps provides a useful procedural guideline regarding the research process.

1. Formulating the research problem
2. Extensive literature survey
3. Developing the hypothesis
4. Preparing the research design
5. Determining the sample design
6. Collecting the data
7. Analysis of data
8. Hypothesis testing
9. Generalization and interpretation
10. Preparation of the report or presentation of the result, i.e., formal write-up of conclusions reached.

CHAPTER TWO

DEFINING RESEARCH PROBLEM, REVIEW OF LITERATURE AND RESEARCH PROPOSAL

1.1. Introduction

Research in management and leadership is conducted when problem that hampers the smooth functioning towards organizational objectives and goals arises. On the other hand, research is undertaken to resolve problems encountering management or leadership process, and in order to set decision-making directions. Relevant literatures are reviewed to see and rectify how much research is conducted on the problem area and identify the gaps in literature. On the basis of literature reviewed, a proposal is developed and used as a roadmap in the further data collection, analysis, interpretation, and research report writing.

2.2. Research Problem

The **first step** in designing management research is to ***perceive a problem either theoretical or applied***. It is *researcher's perception or recognition of a problem that motivates research*. A ***problem exists when we do not have enough information to answer a question***.

This may happen:

1. When there is ***noticeable gap*** in the results of investigations. Those questions which have remained unanswered by earlier investigations may make us aware of the problem. Collection of data with a view to fill this gap is thus indicated.
2. When a ***result of several enquires disagree***
3. When a ***fact exists in the form of a bit of unexplained information***. For example, when the production or sales targets are not being met or the cost of production or rate of absenteeism or the number of accidents is going up without there being sufficient explanation for such developments.
4. When there is ***desire for innovation***. For example, a manufacture may think of conducting research in new methods of productions, packing or sale even when there is no problem existing in any of these areas.

The problem for research should ordinarily be expressed in an interrogative form. For example:

- What are the effects on workers' performance of different types of incentives?
- What are the influences of improper budgeting?
- Does anxiety affect achievement?

The goal of research in all these cases would be to seek answers to these questions.

2.1.1. Criteria of a Research Problem

Every problem selected for research must satisfy the following criteria.

1. It should be Original

The purpose of research is **to fill the gaps in the existing knowledge** to discover new facts and *not to repeat already known facts*. Therefore, a preliminary survey of the existing literature in the proposed area of research should be carried out to *find out the possibility of making original contribution*.

Knowledge about the previous research will serve the following five useful purposes:

- i. *It will enable the researcher to identify his specific problems for research:*
- ii. *It will eliminate the possibility of unnecessary duplication of effort.*
- iii. *It will give him/her valuable information on the merits and demerits of various research techniques which have been used in the past.*
- iv. *It will tell him/her where others have floundered so that he may be cautious, and*
- v. *It will enrich his/her knowledge of the characteristics concepts and terminology in his area of specialization.*

2. It should be neither very general nor very specific

If the problem is very general, it is *usually too vague* to be tested. On the other hand, if the problem is very specific, it is *usually too narrow to be important or consequential*. Too great specificity is perhaps a worse danger than too great generality. *At any rate some kind of compromise must be made between generality and specificity.*

3. It should be Solvable

No problem, however significant, is a good choice if it is unsolvable. Generally a problem may be unsolvable due to two reasons:

- i) *It may concern some super natural or amorphous phenomenon.* For example how does mind work? Who created this world?
- ii) *It cannot be operationally defined.* For example, to measure sex or social class is every easy but to measure anxiety, creatively is difficult.

4. It should be feasible

The feasibility of carrying out research on the selected problem should be checked against the following considerations;

- iii) *Study design,*
- iv) *Access to organization and respondents,*
- v) *Sample or universe to be studied,*
- vi) *Source of data,*
- vii) *Method of collecting data,*
- viii) *Type of variables (nominal/ordinal) involved,*
- ix) *Selection of scale of measurement and statistics*
- x) *Character of distribution of variables:*
 - *Normal (allowing for parametric statistics)*
 - *Non-normal (requiring non-parametric statistics)*
- xi) *Treatment of data – manual calculation or computer calculation*
- xii) *Time required for study and its availability*
- xiii) *Funds required and their availability.*

2.3. Introduction to Literature Review

Review of the relevant literature is one of the preliminary steps in the research process. The literature review has to ***summarize and organize the previous research findings*** with respect to the topic being studied. This will help in ***identifying the gaps and justifying the proposed research***. While carrying out this review, it is *necessary to cite all* the literature used.

2.3.1. Purposes of Literature Review

Many different purposes have been identified for the literature review. **Denscombe (1998)** felt that literature review is serving *three fundamental purposes* listed below.

2. It shows those who read the research findings that the *researcher is aware of the existing work already done on the topic*
3. It identifies what the researcher believes are the *key issues, crucial questions, and the obvious gaps* in the field
4. It establishes a *set of guiding signs that allow readers to see which theories and principles the researcher used* to shape the research design and analysis

The literature review is *not intended to be just a summary of the articles and books* that were read. It should *not be a list of authors* with whom the researcher agrees or disagrees. A good literature review has a ***greater purpose; it is a source of data in its own right***. **Piantanida and Garma (1999)** have listed ***five purposes*** for the literature review.

1. The review can *trace the historical evolution of the study problem* or key issues, themes, or constructs pertaining to the problem
2. The review can *provide a schematic of the different schools of thought* that have developed or are developing with regard to the study problem
3. The review can *examine the study problem from several different disciplines* (for example, looking at service delivery from the point of sociology, management and public administration)
4. The review can *examine the positions of different stakeholder groups*, such as public administrators, citizen groups, and non-profit organizations
5. The review can *trace different conceptual schools of thought* that have emerged over time and that may be currently taking opposing or conflicting views in the literature

Review of the literature has been considered as a ***crucial early step in the design and conduct of all research***. A thorough investigation of the relevant literature on the study topic, the research question, and the methodology followed by others who have studied the same or similar problems is called as literature review. It has been defined as ***‘a systematic, explicit, and reproducible method for identifying, evaluating, and interpreting the existing body of recorded work produced by researchers, scholars and practitioners.’***

Review of the literature is *‘the process whereby a researcher identifies and examines research done by scholars that is relevant to the topic under investigation’*. The following steps have been suggested in this context.

1. *Introduce the literature review by pointing out the major research topics* that will be discussed, the central idea being explored, and the general importance of this topic for research scholars or the general public
2. *Not everything written on the subject can be covered*. Many students fear that they will not find enough material, but the real problem is separating the wheat from the chaff. It is necessary to ***pick***

out the research most relevant to the topic being studied and then to pull out of each piece of the ideas that are most useful. One has to start out with a good idea of her/his research question and conduct the search and review so as to establish the place of that question in the literature. This makes it easy to organize and limit the review to the most relevant literature possible.

3. Research *relevant to all the variables being studied should be covered.* The research that explains the relationship between these variables is a top priority

4. **Ward and Hansen (1987)** recommended that the following questions be answered when selecting and evaluating previous research:

1. **Clarity:** Does the material have one unmistakable meaning?
2. **Verifiability:** Is the information capable of being verified?
3. **Accuracy:** Has the correctness of the information been established?
4. **Recency:** Is the information the most recent available?
5. **Relevance:** Is the information relevant to the subject?
6. **Sufficiency:** Is there enough information for each main point?
7. **Internal consistency:** Is the information consistent with itself, or are there internal contradictions?
8. **External consistency:** Are the pieces of information consistent with one another, or does some information contradict other information?
9. **Comparative quality:** How do pieces of information compare in quality? Is some material clearly inferior to other material?
10. **Contextuality:** Has the information been placed within the true context?
11. **Statistical validity:** Does the information meet tests of statistical validity?

5. *Organizing the research one has decided to review requires a plan.* There are many ways to structure this literature review. **Rubin and Piele (1986)** recommend the following *patterns for organizing the literature review section.*

- a) **Topical order:** Organize by main topics or issues and emphasize the relationship of the issues to the main problem
- b) **Chronological order:** Organize by historical progression in terms of time
- c) **Problem-cause-solution order:** Organized the review so that it moves from the problem to the solution
- d) **General-to-specific order:** Examine broad-based research first and then focus on specific studies that relate to the topic
- e) **Known-to-unknown order:** Examine current literature about the problem and then identify at the end what still is not known
- f) **Comparison-and-contrast studies:** Show how research studies are similar to and different from each other
- g) **Specific-to-general order:** Try to make sense out of specific research studies so that conclusions can be drawn

6. After reviewing the body of the literature, *summarize what has been done, what has not been done, and what needs to be done.* Literature review functions as an argument. Hence ***it is a chance to present arguments and evidence about what research has found and what needs to be investigated in the future***

7. After the review of the literature is complete, *pose a formal research question or state a hypothesis*. Be sure to explain clearly how that question or hypothesis is tied to the literature reviewed.

8. *List all the sources used in writing the literature review in alphabetical order in a bibliography*. There are many reference stylebooks published by many associations. Some of them are, American Psychological Association (APA), Modern Language Association of America (MLA), and University of Chicago (Manual of Chicago Style).

David E McNabb has suggested that the ***formal literature review has to follow an organized series of steps***. The model developed by him was based on various sources and the contributions of **Arlene Fink (1998)** were particularly acknowledged. It encourages the researchers to *study all their options before embarking on the review*. All potential sources should be considered. It should ***not be restricted to a quick*** perusal of the Internet or a run through a single CD-ROM database, as it is not considered as the way to conduct a thorough, scientific review of the literature. The next step in the process consists of ***three equally*** important activities. The researcher must establish some basis for selecting articles (content criteria) and establish methodological criteria. Examples of the criteria are:

1. *Should the studies all be qualitative or quantitative?*
2. *Should they all be about the same size?*
3. *Should the samples discussed all have been randomly selected?*

These decisions will be *based on the study question and may change somewhat when the search itself is underway*. Identifying high quality studies to include in the analysis should follow the establishment of selection criteria.

The collected research must then be read in detail. When this takes place, relevant categories of information should begin to stand out. These categories must be coded, with the pertinent information copied into cards or worksheets. Repeated salient themes in the literature should be recorded. These often *serve as discussion points while writing the final research report*. Detailed analysis begins at this point. ***The researcher, at this stage, writes interpretive memos that summarize the material and the researcher to comments on the content***. These memos are sometimes carried into the final report with little or no revision.

During the penultimate step in the process, the researcher is encouraged to *record all the important bibliographic information on the source documents*. This includes information about the author(s), the discipline in which they did the research, all information about the source, and any connections to other sources that have been or might be also investigated. ***The final step in the process is preparing and presenting a report of the research findings***.

It is apt to use the conclusion of **Lawrence R. Frey et al (1991)** to conclude this module. ***Research does not take place in a vacuum***. Researchers must therefore examine the extant literature to learn *what is already known* about the topic that interests them. Since time is valuable, the *literature search must be as fruitful as possible*, which means doing it in a logical, step-by-step manner.

The primary source of information for any researcher is the ***scholarly journals***. Understanding the format of a typical journal enables the researchers to evaluate the relevance of each publication. *This evaluation process leads researchers to revise the research question being asked, helps them to select*

the most appropriate research articles, and enables them to write an effective review of the literature. Finding, reading, evaluating and reporting relevant literature for the purpose of clarifying a research question is a cyclical process.

2.3.2. Procedures of Literature Review/Survey

Literature search is a methodical search of published sources of information to identify items relevant to a particular need, for instance;

- Topic selection, Find specific project information
- Discover structure of information in a particular subject, etc.

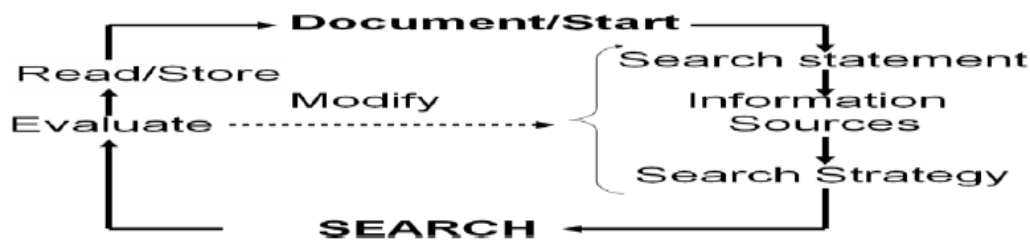
But remember to:

- Define your initial topic, scope, content and parameters for your own work first
- Decide on what sort of relevant information to your project
 - Range of sources - e.g., reference works, books and articles, government publications, theses, conference proceedings, standards and statistics, directories, company and market reports...

Structure how you get literature:

- Decide on a search order, allow enough time, keep detailed records
- Identify keywords for searching, use computerized databases and Internet, but narrow your search first
- Keep notes of references on index cards or computer

Literature Searching Cycle



Evaluating your Search Results

In order to evaluate your research results ask yourself the following questions;

- *Is it relevant to your needs?*
- *Is it useful for the problem in hand?*
- *Is the date of publication appropriate?*
- *Is it obtainable?*
- *Is the level of information correct?*
- *Is it too simple/advanced?*
- *Is this a new information or do I know this already?*

2.3.3. Planning, Structuring and Writing Literature Review

Literature review is a history or narrative, which documents the previous research that is relevant to your own research area. It essentially “sets the scene” and prepares the reader for your own contribution. Usually it occurs as chapter two in your research work, but other sections of your

research are likely to contain references to material considered in the literature review. Also the literature review is an opportunity to learn more about the subject area you are researching.

Planning Literature Review #1

In planning the literature review

- *Set aside enough time to find, read and review a given publication.*
- *75% of the literature review can be done in one session*
- *The other 25% may be ongoing as your understanding, knowledge and research skills develop*

To identify the main areas of the literature to be covered make up a “shopping-list” of these areas so you know what you are looking for.

Planning Literature Review #2

In order to find relevant publications always follow the literature search cycle.

- Remember to find 10 relevant publications you may have to read over 30
- Thus you need to adhere to find, read and record relevant literature, record the title of each publication, record the source (e.g. reference or a web-page) and make a brief note about the relevance of the publication.

Structuring the Literature Review

Structuring your Review #1

Structure the literature that you have reviewed you could even use a table with appropriate categories and start by drawing a “concept map” or an overall plan of the literature review chapter. Then, you identify the main areas of the literature:

- This will include the “parent” or main discipline and the context of your research
- The main areas will be the main sections in the literature chapter

Last, you need to identify relevant sub-areas to be highlighted

- Sub-divide the main literature areas into smaller sections
- These sections will be the sub-sections within the main sections of the literature chapter

Structuring your Review #2

➤ Section 2.1 (introduction)

- Introduce your own research topic and explain what literature areas need to be reviewed
- Briefly present your concept map or plan to show the reader how the literature review is logically structured

➤ Section 2.2 to 2.x

- Address each of the main areas of the concept map or plan
- Try to move towards specific discussion of each area and identify what is already known and what is not known

➤ Section 2.x (final section)

- End by stating your own research challenge/question or any hypothesis

Structuring your Review #3

Different literature review structures can be used including:

1. The ‘funnel’ approach: This is an approach that runs:

- From broad to narrow focus,
- From main areas/issues to detail
- From periphery to centre of research issue

2. The ‘family tree’ approach: Uses different levels of knowledge at each level:

- Various options/theories/issues
- Time line
- Concept map

Writing Literature Review

While writing your literature review the following guidelines assist you to be successful.

Guidelines #1

The literature review chapter should not be standalone but relates to other chapters and you need to ensure that the literature review chapter is closely linked to your study. Here;

- *Mention your research topic up-front*
- *Then proceed to identify the main areas that will drive the literature review*
- *Show how your study is related to previous work (e.g. extends, fills gap, applies in different contexts, etc.)*
- *Use the literature review chapter to develop your own research framework or research model*
- *Use the literature review chapter to help shape subsequent chapters in your thesis; often to highlight the gap including research problem that your project is to focus on*

Guidelines #2

In writing literature review for your research, try to review topics rather than articles. Therefore, there are good or not good reviewing methods:

❖ **GOOD: Reviewing topics**

 ‘Absenteeism’ has been defined in three ways:

- *Genuine absences through illness [1]*
- *Voluntary non-attendance e.g. Skiving [2]*
- *Frequent absences due to mental or physical health problems [3]*

❖ **NOT AS GOOD: Reviewing articles**

 “[1] Says voluntary absences are due to illness. [2] Suggests some absences are simply due to non-attendance e.g. skiving. [3] Did a study and found that frequent absences are caused by mental or physical health problems ”

2.4. The Research Proposal

A written proposal statement is often required when a study is being suggested. ***It assures that the parties understand the project’s purpose and proposed methods of investigation.*** Cost and time budgets are often spelled out, as are other responsibilities and obligations. Depending upon the needs and desires of the client, there may also be *substantial background detail and elaboration of proposal techniques.*

The length and complexity of research proposals ranges widely. A graduate student may present a dissertation proposal that **runs 50 pages** or more. Applicants for foundation or government research grants typically file a proposal request of a few pages, often in a standardized format specified by the granting agency. *Business research proposals normally range from perhaps **one to five pages**.*

2.4.1. Proposal Contents

Every proposal, regardless of length, should include *two basic sections*. **First is the problem statement.** In the brief memo type proposal the problem statement *may be only a paragraph* setting out the situation and *stating the specific task* that the research is going to undertake. A **second** necessary section of the proposal includes **a statement of what will be done.**

Often proposal will be *much more detailed* and *may include **specific measurement devices that will be used, time and cost budgets, sampling plans and many other operational details.***

2.4.2. The Formal Research Plan

Another format, still essentially a *proposal is the **formal research plan***. It is found in student and business research situations, especially when a *two-stage project* is needed. Exploration is undertaken to determine **the dimensions of the problem before the proposal is made for the major study**. Under these circumstances it is reasonable to *expect a written proposal that is more detailed than proposals suggested.*

Formats will vary, but one set of sample instructions used for students research projects include the following.

Research Plan Outline

1. *Statement of research objectives (what you expect to do)*
2. *Statement of problem questions or hypothesis to be tested by the research*
3. *Each measure concept or construct expected to measure should be defined in operational terms pertinent to the project.*
4. *Statement of investigative questions for which answers need to be found*
5. *Specifying research technique to be used*
6. *Describing the sampling plan*
7. *Report results of pilot study*
8. *Preparing time and cost budget*

We can shortly order the **research proposal contents** as follows though the order may be exchanged in some areas:

1. Introduction

- *Background of the study*
- *Statement of the problem*
- *Objectives of the study*
 - *General objective*
 - *Specific objectives*
- *Research hypothesis*
- *Research questions*
- *Scope and limitation of the study*
- *Significance of the study*

2. Review of Literature

- *Brief review of related literature on variables of the study*
- *Operational definitions*
- *Conceptual framework*

3. Research Methodology

- *Description of study area*
- *Sampling technique and sample size determination,*
- *Sources and methods of data collection,*
- *Theoretical research technique to be used, and*
- *Method of data analysis*

4. Work Plan and Budget Required

- *Work plan/work schedules*
- *Budget required/Research cost/budget breakdown*

It is not uncommon for the elements of the proposal or research design to become sections of the final research report.

CHAPTER THREE

RESEARCH DESIGN

3.1. Introduction

Research design is decisions regarding what, where, when, how much, by what means concerning an enquiry or a research study. It is an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to research purpose with economy in procedure.

In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement and analysis of data. As such design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data.

3.2. Introduction to Research Design

Research Design refers to decisions regarding *what, where, when, how much, by what means* concerning an enquiry or a research study. It is an **arrangement of conditions for collection and analysis of data** in a manner that aims to combine relevance to research purpose with economy in procedure.

In fact, the research design is the **conceptual structure** within which research is conducted; it constitutes the **blue print** for the **collection, measurement** and **analysis** of data. As such design includes an **outline** of **what** the researcher will do from **writing** the **hypothesis** and its **operational** implications to the final analysis of data.

More explicitly, the design decisions happen to be in respect of:

- i) What the study is about?
- ii) Why is the study being made?
- iii) Where will the study be carried out?
- iv) What type of data is required?
- v) Where can the required data are found?
- vi) What periods of time will the study include?
- vii) What will be the sample design?
- viii) What techniques of data collection will be used?
- ix) How will the data be analyzed?
- x) In what style will the report be prepared?

Keeping in view the above stated decisions, one may *split the overall research design* in to the following parts:

a) The Sampling Design: which deals with the *methods of selecting items to be observed* for 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 with the question of *how many items are to be observed and how the information and data gathered are to be analyzed*; and

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*.

3.3. Important Features of Research Design

1. It is a plan that *specifies the sources and types of information relevant* to the research problems.
2. It is a *strategy specifying which approach will be used for gathering and analyzing* the data.
3. It also includes the *time and cost budgets* since most studies are done under these two constraints.

In brief, research design must, at least contain:

- a. A clear statement of *research problems*;
- b. *Procedures and techniques* used for gathering information;
- c. The *population* to be studied; and
- d. *Methods* to be used in *processing and analyzing* data.

3.4. Criteria for a Good Research Design

A good design is often characterized by adjectives like *flexible, appropriate, efficient, economical* and so on.

Generally, the design which ***minimizes bias and maximizes the reliability*** of the data collected and analyzed is considered a good design. The design which gives *smallest experimental error* is supposed to be best design in many investigations. Thus, the question of good design is related to the *purpose or objective of the research problem* and also with the *nature of problem* to be studied. A design may be quite suitable in one case, but may be found waiting in one respect or the other in the context of some other research problem. ***One single design can not serve the purpose of all types of research problems.***

A research design appropriate for a particular research problem, usually involves the consideration of the following facts:

- i) *The means of obtaining information*;
- ii) *The availability and skills of the researcher and his staff*;
- iii) *The objectives 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.*

3.5. Important Concepts Relating to Research Design

1. Dependant and Independent Variables

If one variable depends upon or is a consequence of the other variable, it is termed as dependant variable. For example we say height depends up on age, then height is dependent variable and age is independent variable. Further, if in addition to being dependant on age, height also depends upon individual's sex, then height is dependant variable and, age and sex are independent variables.

2. Extraneous Variables

Independent variables that are ***not related to the purpose of the study, but may affect the dependent variable*** are termed as extraneous variables.

3. Control

One important characteristics of a good research design is ***to minimize line influence or effect of extraneous variables***. The technical term 'control' is used when we design the study minimizing the effect of extraneous independent variable.

4. Confounded Relationship

When the ***dependent variable is not free from the influence of extraneous variables***, the relationship between the dependent and independent variables is said to be confounded relationship.

5. Research Hypothesis

When ***prediction or hypothesized relationship is to be tested by scientific methods***, it is termed as research hypothesis. The research hypothesis is a *predictive statement that relates an independent variable to dependent variable*. Usually a research hypothesis must contain, *at least, one independent and dependent variable*.

6. Experimental and Control Groups

In an experimental hypothesis testing research, ***when a group is exposed to usual conditions***, it is termed as 'control group' but ***when group is exposed to some novel or special conditions***, it is termed as 'experimental group.'

7. Treatments

The ***different conditions under which experimental and control groups are put*** are usually referred to as "Treatments". Suppose we want to determine through an experiment the comparative impact of three varieties of fertilizers on the yield of wheat, in that case the three varieties of fertilizers will be treated as three treatments.

8. Experiment

The ***process of examining the truth of statistical hypothesis***, relating to some research problem, is known as experiment. Experiments can be of *two types: absolute experiment and comparative experiment*. If we want to determine the impact of fertilizer (one fertilizer) on the yield of a group, it is a case of ***absolute experiment*** but if we want to determine the impact of some other fertilizer, our experiment then will be termed as ***comparative experiment***.

9. Experimental Units

The ***predetermined plots or the blocks***, where different treatments are used, are known as experimental units. Such experimental units must be selected very carefully.

3.6. Different Research Designs

Different research designs can be conveniently described if we categorize them as follows:

1. Research design in case of ***exploratory research*** studies
2. Research design in case of ***description and diagnostic*** research studies
3. Research design in case of ***hypothesis testing*** research studies

1. Research Design in case of Exploratory Research Studies

Exploratory research studies are also termed as **formulate** research studies. The main purpose of such studies is **formulating a problem** for more precise investigation or **developing the working hypothesis** from an operational point of view.

The major emphasis in such studies is **discovery of ideas and insights**. As such the research design appropriate for such studies **must be flexible enough** to provide opportunity for considering *different aspects* of a problem under study.

Generally, following *three methods* in context of this research are relevant:

- a. *The survey concerning literature*
- b. *The inference survey*
- c. *The analysis of 'insight stimulating' examples*

a) *The Survey Concerning Literature*

The survey concerning literature happens to be the **most simple and fruitful method** of precisely formulating the research problem or developing hypothesis. Hypothesis stated by *earlier workers may be reviewed and their usefulness be evaluated* as a basis for further research. It may also be considered *whether the already stated hypothesis suggests new hypothesis*. In this way the research should **review and build upon the work already done by others** but in cases where hypothesis have not yet been formulated, his task is **to review the available material for deriving the relevant hypothesis from it**.

Besides, the bibliographical survey of studies, already made in one's area of interest may as well be made by the research for precisely formulating the problem. Research should also make an **attempt to apply concepts and theories developed in different research contexts to the area in which he is himself working**. Some times the works of creative writers also provide a fertile ground for hypothesis formulation and as such may be looked in to by the researcher.

b) *The Experience Survey*

Experience survey means the **survey of people who have had practical experience with the problem** to be studied. The object of such survey is *to obtain insight in to the relationships between variables and new ideas relating to research problem*. For such a survey people who are *competent and can contribute new ideas* may be carefully selected as respondents to ensure representation of different types of experience.

The **respondents so elected may then be interviewed** by the investigator. The researcher must prepare an *interview schedule* for the systematic questioning of informants. But the *interview must ensure flexibility* in the sense that the respondents should be allowed to raise issues and questions which the investigator has not previously considered.

Generally, the experience collecting interview is *likely to be long and may lose for few hours*. Hence, it is often considered desirable to *send a copy of questions to be discussed to the respondents well in advance*. This will also give an opportunity to the respondents for doing some *advance thinking over the various issues involved* so that, at the time of interview, they may be able to contribute effectively.

Thus, an experience survey may enable the research *to define the problem more concisely and help in the formulation of the research hypothesis*. This survey may as well provide information about the *practical possibilities for doing different types of research*.

c) The Analysis of Insight Stimulating

Analysis of insight stimulating examples is also a fruitful method for suggesting hypothesis for research. It is ***particularly suitable in areas where there is little experience to serve as a guide***. This method consists of the ***intensive study of selected instances of the phenomenon*** in which one is interested. For this purpose the ***existing records if any***, may be examined, the *unstructured interview may take place*, or some other approach may be adopted.

Attitude of the investigator, the intensity of the study and the ability of the researcher to draw together diverse information in to a unified interpretation are the main features which make this method an appropriate procedure for evoking insights.

What sort of examples to be selected and studied? There is no clear cut answer to it. Experience indicates that for particular problems certain types of instances are more appropriate than others. One can mention few examples of insight stimulating, *the reactions of strangers, the reactions of marginal individuals, the study of individuals who are in transition from one stage to another, the reactions of the individuals from different social strata and the like*. In general, cases that provide sharp contrasts or have striking features are considered relatively more useful while adopting this method of hypothesis formulation.

2. Research Design in case of Descriptive and Diagnostic Research

Descriptive research studies are those which are concerned with ***describing the characteristics of a particular individual, or of a group***, where as diagnostic research studies ***determine the frequency with which something occurs or its association with some thing else***.

The studies concerning whether certain variables are associated are examples of diagnostic research studies. As against this, studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are examples of descriptive research studies. Most of the social science researches come under this category.

From the point of view of the research design, the descriptive as well as diagnostic studies *share common requirement* and as such we may group together these two types of research studies.

In descriptive as well as in diagnostic studies, the researcher *must be able to define clearly, what he wants to measure and must find adequate methods for measuring it along with clear cut definition of 'population' he wants to study*. Since the aim is ***to obtain complete and accurate information*** in the social studies, the procedure to be used must be carefully planned.

The research design must make enough provision for ***protection against bias and must maximize reliability***, with due concern for the *economical completion* of the research study. The *design in such studies must be rigid and not flexible* and must focus attention on the following.

- a. Formulating the *objectives of the study* (what the study is about and why is it being made?)
- b. Designing the *methods of data collection* (what techniques of gathering data will be adopted?)
- c. *Selecting the sample* (How much material will be needed?)

- d. *Collecting the data* (where can the required data be found with what time period should the data be related)
- e. *Processing and analyzing the data*
- f. *Reporting the findings*

Thus, the research design in case of descriptive/diagnostic studies is a **comparative design** throwing light on all points narrated above and *must be prepared keeping in view the objectives of the study and the resources available*. However, it must ensure the *minimization of bias and maximization of reliability* of the evidence collected. The said design can be appropriately referred to as a **survey design** since it takes in to account all the steps concerning a phenomenon to be studied.

3. Research Design in Case of Hypothesis Testing Research Design

Hypothesis testing research studies (generally known as experimental studies) are those where **researcher tests the hypothesis of casual relationship between variables**. Such studies require procedures that will not only reduce bias and increase reliability but will permit inferences about casualty.

Usually experiments meet this requirement. Hence, when we talk of research design in such studies, we often mean the **design of experiments**. Today, the experimental designs are being used in researches relating to the phenomena of several disciplines.

Basic Principles of Experimental Design

Professor **Fisher** has enumerated three principles of experimental designs:

- a) **The Principle of Replication** (experiment should be repeated more than once)
- b) **The Principle of Randomization** (variations caused by extraneous factors can be combined under the general heading of ‘chance’)
- c) **The Principle of Local Control** (under the extraneous factor, the known source of variability, is made to vary deliberately over a wide range as necessary)

Important Experimental Designs

a) *Informal Experimental Design*

These are those research designs that *normally use a less sophisticated form of analysis base on difference in magnitudes*. Important informal experimental designs are:

- Before-and-after without control designs
- After-only with control design, and
- Before-and-after with control design

b) *Formal Experimental Designs*

These designs **offer relatively more control and use precise statistical procedures** for analysis.

Formal experimental designs include:

- Completely randomized design (subjects are randomly assigned to experimental treatments)

3.7. Measurement

In every day usage we ‘measure’ when we use *some established yardstick to determine the height, weight, or some other feature of a physical object*. We also measure when we judge how well we like

a song, a painting, or the personalities of our friends. We, thus, measure ***physical objects as well as abstract concepts***. Measurement is a relatively complex and demanding task, especially so when it concerns qualitative or abstract phenomenon.

3.7.1. The Concept of Measurement

Measurement may be defined as the ***assignment of numerals to characteristics of objects, persons, states or events according to rules***. What is measured is not the object, person, state, or event itself but ***some characteristic of it***.

When objects are counted, for example, we do not measure the object itself but its characteristic of being present. We never measure people, only their age, height, weight, or some other characteristic.

According to **S. S. Stevens**, measurement is the ***matching of an aspect of one domain to aspect of another***. This matching, often called mapping is the operation of establishing *correspondence between properties of one area (or set) and properties in another set*. Mapping from one set onto the members of the other is done according to some rule of correspondence.

3.7.2. Levels of Measurement (Measurement Scales)

There are four levels of measurement, i.e. nominal, ordinal, interval and ratio.

A) Nominal Scale

Nominal scale is simply a system of ***assigning number, symbols to events in order to label them***. The usual example of this is the *assignment of numbers of basketball players in order to identify them*. These numbers are just convenient labels for the particular class of events and as such have ***no quantitative value***.

Nominal scales provide convenient ways of keeping track of people, objects and events. One *cannot do much with the numbers involved*. For example, one cannot usefully average the numbers on the back of a group of football players and come up with a meaningful value. Neither can one usefully compare the numbers assigned to one group with the numbers assigned to another.

The counting of members in each group is the only possible arithmetic operation when nominal scale is employed. One can calculate the percentages of objects falling within one category. But it will not make sense to calculate the arithmetic mean of sex in a sample consisting of 80 men and 20 women. All we can say is that there are more males than females in the sample or that 80 percent of the sample is male.

Nominal scale is the ***least powerful level of measurement***. It *indicates no order or distance relationship and has no arithmetic origin*. This scale simply ***describes differences between things by assigning them to categories***. Nominal data are, thus, counted data. The Scale wastes any information that we may have about varying degrees of attitude, skills, understanding etc.

In spite of all this, nominal scales are *still very useful and are widely used in surveys and other ex-post-facto research* when data are being classified by major sub-groups of the population.

B) Ordinal Scale

In ordinal measurement **numerals, letters or other symbols are used to rank objects**. This is essentially an advanced form of categorization. Objects in this measurement are classified not only as to whether they share some characteristic with another object but also whether they have more or less of this characteristic than some other object. Thus, ordinal data indicate the *relative position of two or more objects* on some characteristic.

Rank orders represent ordinal scales and are frequently used in research relating to qualitative phenomena. A student's rank in his graduation class involves the use of an ordinal scale. One has to be very careful in making statement about scores based on ordinal scales. For example, if Bonsa's position in his class is 10 and Kenna's position is 40, it *can not be said that Bonsa's position is 4 times as good as that of Kenna*. The statement would make no sense at all. Ordinal scales *only permit the ranking of items* from highest to lowest. *Ordinal measures have no absolute values, and the real differences between adjacent ranks may not be equal*.

The kind of descriptive statistics that can be calculated from these data are mode, median and percentages.

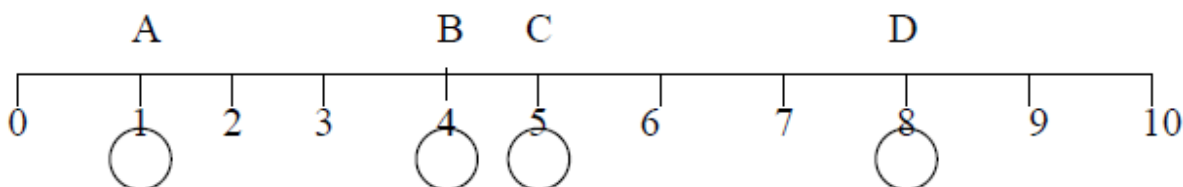
For example; the following table shows the quality ratings given by 500 housewives to one brand of tea from which one can usefully calculate the *median and modal quality* ratings. Both are '2' in this case. One can also calculate the *percentages* of the total appearing in each rank. But it is meaningless to calculate a mean because the differences between ordinal-scaled values are not necessarily, the same.

Quality Rating	Number of Respondents giving rating
1	100
2	200
3	100
4	50
5	50

C) Interval Scale

Interval measurement represents **numerals used to rank objects such that numerically equal distances on the scale represent equal distances in the property being measured**. The distances between numerals are thus; very meaningful because, by comparing these distances we *can know how far apart the objects are with respect to the property in question*.

For example, if we are measuring the achievements of 4 students A, B, C and D on the interval scale and obtain the values 1, 4, 5 and 8 respectively (as shown below) then by comparing the intervals, we can legitimately say that the difference between A and C in their achievements is the same as the difference between B and D and that the difference between B and D is four times the difference between B and C.



One very important drawback of this measurement, however, is that ***we cannot compare objects on the basis of ratios of their absolute scores.*** Thus, in our example, we cannot say that the achievement of D is twice as great as that of B. The reason is that in our measurement the zero point is arbitrary so that any change in this point will change the absolute score and the ratios between scores. For example, if the arbitrary zero point of the above scale is shifted to four points downward, the position of B and D on the scale will change to 8 and 12 and the previous ratio of 1:2 will now become 2:3.

The most common examples of interval scales are the *centigrade and Fahrenheit temperature scales* which start with different points of origin. The point of origin (for the same natural phenomenon, the freezing point of water) is zero on centigrade scale and 32 on Fahrenheit. Because of this difference the ratio between any two readings on the centigrade scale (e.g., between 10 to 30) is not the same as that on the Fahrenheit scale as shown below. One can talk of a 20° c rise in temperature but not of 30° c as being three times as hot as 10° c.

Centigrade 0 10 30 100

Fahrenheit 32 53 86 212

The most frequent form of interval measurement in social sciences is ***index numbers***, which are, *calculated on the basis of an arbitrary zero point.* Another common form of interval measurement is a ***Likert Scale***, which is used in the measurement of *attitudes and personality.*

Virtually the entire range of *statistical analysis* can be applied to data measured on interval scales. One can use such descriptive measures as the ***mean, median, mode, range and standard deviation.*** Bivariate correlation analysis, t-test, analysis of variance tests, and most multivariate techniques applied for the purposes of drawing inferences can also be used.

D) Ratio Measurement

This measurement, besides *possessing the property of the interval measurement*, possesses one additional property, viz.; it ***has a true, natural or absolute zero point***, one for which there is universal agreement as to its location. A true zero means that the object-measuring zero possesses none of the property in question. *Height and weight* are obvious examples. Other common examples of this type of measurement are *sales, costs, number of purchases, length, time etc.*

With ratio measurement, *line comparison between the ratios of the absolute magnitude of the numbers becomes possible.* Thus, a person weighing 100 kg is said to be twice as heavy as one weighing 50kg and a person weighing 150 kg is three times as heavy. Further, with a ratio scale we can compare intervals, rank objects according to magnitude, or use the numbers to identify the objects. All descriptive measures and inferential techniques are applicable to ratio-measured data.

3.7.3. Components of Measurement

Ideally speaking, there should be only one component of a measurement and this component should be a *direct reflection of the characteristic being measured.* Unfortunately, such a situation seldom exists. Very often, a measurement consists of *not one but two components one representing the influence of the characteristic being measured and the other representing the influence of those characteristics which the researcher is not interested in measuring but which still creeps in against his wishes.* These other characteristics can be described as follows:

1. Additional stable characteristics of the object or event, for example, the respondents tendency to give only favorable responses independent of his true feelings

2. **Short-term characteristics** of the object, for example, fatigue, health, hunger, and emotional state
3. **Situational characteristics**, for example, the presence or absence of some other person or of location under which the measurement is taken
4. **Characteristics of the measurement process**, for example, sex, age, ethnic background, and style of dress of the interviewer or the method of interviewing telephone, mail, personal interview, etc
5. **Characteristics of the measuring instrument**, for example, unclear instructions, ambiguous questions, confusing terms, omitted questions, etc
6. **Characteristics of the response process**, for example, mistakes caused by checking a wrong response
7. **Characteristics of the analysis**, for example, mistakes caused by wrong coding, tabulating, etc

3.7.4. Tests of Sound Measurement

Sound measurement must meet the test of *validity, reliability, and practicality*. In fact, these are the three major considerations one should use in evaluating measurement tool.

1. Test of Validity

Validity indicates the ***degree to which an instrument measures what it is supposed to measure***. Validity can also be thought of as ***utility***. In other words, validity is the extent to which differences found with a measuring instrument reflect true differences among those being tested.

But the question arises: how can one determine validity without directly confirming knowledge?

The answer may be that we *seek other relevant evidence that confirms the answers we have found with our measuring tool*. What is relevant evidence often depends upon the nature of research problem and the judgment of the researchers? But one can certainly consider four types of validity in this connection:

- a. Face validity
- b. Content validity
- c. Criterion related validity and
- d. Construct validity

a) Face Validity: A measure has face validity *to the extent that it appears to measure what it sets out to measure*. This measure may only appear to be a valid index of some characteristic under study but may really lack it. Conversely, a measure may lack face validity but be an excellent index of some characteristic.

b) Content Validity: is the *extent to which a measuring instrument provides adequate coverage of the topic under study*. If the instrument contains a representative sample of the universe, the content validity is good. Its determination is primarily judgmental and intuitive. It can also be determined by using a *panel of persons* who shall judge how well the measuring instrument meets the standard, but there is *no numerical way to express it*.

c) Criterion-Related Validity: is related to our *ability to predict some outcome or estimate the existence of some current condition*. This form of validity reflects the success of measures used for some empirical estimating purpose. The concerned criterion must possess the following *qualities*.

- **Relevance:** (A criterion is relevant if it is defined in terms of which we judge to be the *proper measure*).
- **Freedom from bias:** (This is attained when the criterion gives each subject an *equal opportunity to score well*).

- **Availability:** (The information specified by the criterion must be available)

In fact, a criterion – related validity is a broad term that actually refers to a) predictive validity, (b) con-current validity, and post-dictive validity.

i) Predictive Validity: refers to the usefulness of a *test in predicting some future performance*. When predictor variable is measured at one point of time and the criterion variable is measured at other point of time, it is known as predictive validity.

ii) Con-Current Validity: refers to the usefulness of a test in *closely relating to other measures of known validity*. When predictor and criterion variables are measured at the same point in time, it is called concurrent validity.

iii) Post-dictive Validity: When the *criterion variable is measured at one point in time and the predictor is measured at a later point*, it is called post-dictive validity.

d) Construct Validity: is the *most complex and abstract*. A measure is said to possess construct validity *to the degree that it confirms to predicted correlations with other theoretical propositions*. It is the degree to which scores on a test can be accounted for by the explanatory constructs of a sound theory.

If the above stated criterion and test are met with, we may state that our measuring instrument is valid and will result in correct measurement; otherwise we shall have to look for more information and/or exercise of judgment.

2. Test of Reliability

This is another important test of sound measurement. A measuring instrument *is reliable if it provides consistent results*. Reliable measuring instrument does contribute to validity, but a reliable instrument need not be a valid instrument. For instance, a scale that consistently over weights objects by 5kgs is reliable scale, but it does not give a valid measure of weight.

Two aspects of reliability viz. *stability* and *equivalence* deserve special mention.

❖ **The stability aspect** is concerned with securing consistent results with repeated measurements of the same person and with the same instrument.

❖ **The equivalence aspect** considers how much error may get introduced by different investigators or different samples of the items being studied. A good way to test for the equivalence of measurement by two investigators is to compare their observations of the same events.

Reliability can be improved in the following two ways:

a) *By standardizing the conditions under which the measurement takes place* i.e., we must ensure that external sources of variation such as boredom, fatigue etc., are minimized to the extent possible. That will improve stability aspect.

b) *By carefully designing directions for measurement with no variation from group to group*, or by using trained and motivated persons to conduct the research and also by broadening the sample of items used. This will improve equivalence aspect.

3. Test of Practicality

The practicality characteristic of a measuring instrument can be **judged in terms of economy, convenience and interpretability**. From the operational point of view the measuring instrument ought to be practical i.e. it should be economical, convenient and interpretable.

Economy consideration suggests that some *trade-off is needed between the ideal research project and that which the budget can afford*. The length of measuring instrument is an important area where economic pressures are quickly felt. Similarly, data-collection methods to be used are also dependant at times upon economic factors.

Convenience test suggests that the *measuring instrument should be easy to administer*. For this purpose, one should give due attention to the proper layout of the measuring instrument. For instance, a questionnaire with clear instructions (illustrated by examples), is certainly more effective and easier to complete than one which lacks these features.

Interpretability consideration is especially important when *persons other than the designers of the test are to interpret the results*. The measuring instrument, in order to be interpretable, must be supplemented by (a) *detailed instructions for administering the test*; (b) *scoring keys*; (c) *evidence about reliability* and (d) *guides for using the test and for interpreting results*.

3.7.5. Techniques of Developing Measurement Tools

The technique of developing measurement tools involves a *four stage process*, consisting of the following:

- a) **Concept development** (Researcher should arrive at an understanding of major concepts pertaining to his study)
- b) **Specification of concept dimensions** (This requires researcher to specify dimensions of the concept that he developed in the first stage)
- c) **Selection of indicators** (Researcher must develop indicators for measuring each concept element. Indicators are specific questions, scales or other devices by which respondent's knowledge, opinion, or expectation etc. are measured) and
- d) **Formation of index** (combining of various indicators into an index i.e., formation of an index)

a) **Concept Development**

This is the first and foremost step, which means that the researchers should, arrive at an understanding of the major concepts pertaining to his study. This step of concept development is *more apparent in theoretical studies* than in the more pragmatic research, where the fundamental concepts are often already established.

b) **Specification of Concept Dimensions**

This is the second step, which requires the researcher to specify the dimensions of the concepts that he developed in the first stage. This task may either be accomplished by deduction i.e., by adopting a more or less intuitive approach or by empirical correlation of the individual dimensions with the total concept and/or the other concepts.

For instance, one may think of several dimensions such as product reputation, customer's treatment, corporate leadership, concern for individuals, sense of social responsibility and so forth when one is thinking about the image of a certain company.

c) **Selection of Indicators**

Once the dimensions of the concept have been specified, the researcher must develop indicators for measuring each concept element. Indicators are specific questions, scales, or other devices by which

respondent's knowledge, opinion, expectation, etc., are measured. As there is seldom a perfect measure of a concept, the researcher should consider several alternatives for the purpose. The use of more than one indicator gives stability to the scores and it also improves their validity.

d) Formation of Index

The last step is that of combining the various indicators into an index, i.e., formation of an index. When we have several dimensions of a concept or different measurements of a dimension, we may need to combine them into a single index. One simple way for getting an overall index is *to provide scale values to the responses and then sum up the corresponding scores*. Such an overall index would provide a better measurement tool than a single indicator because of the fact that *individual indicator has only a probability relation to what we really want to know*. In this way we must obtain an overall index for the various concepts concerning the research study.

3.7.6. Scaling

In research we quite often face measurement problem, especially when the concepts to be measured are *complex and abstract and we do not possess the standardized measurement tools*. Alternatively, we can say that while measuring *attitudes and opinions*, we face the problem of their valid measurement. A researcher, of course, may face similar problem in lesser degree, while measuring physical or institutional concepts. As such we should study some procedures, which may enable us to measure abstract concepts more accurately. This brings us to the study of scaling techniques.

The instrument with the help of which a concept is measured is called **a scale**. A scale has a wide range of application in social science research. *It is used in all types of data collection techniques such as observation, interview, projective techniques etc.*

Scaling **describes the procedures of assigning numbers to various degrees of opinion, attitude and other concepts**. This can be done in **two** ways viz,

- i. *Making a judgment about some characteristics of an individual and then placing him directly on a scale that has been defined in terms of that characteristic, and*
- ii. *Constructing questionnaires in such a way that the score of individual's responses assigns him a place on a scale*

Scaling has been defined as a, **“procedure for assignments of numbers (or other symbols) to a property of objects in order to impart some of the characteristics of numbers to the properties in question” (Bernard S. Phillip)**

Scale Classification Bases

The number assigning procedures or the scaling procedures may be broadly classified on one or more of the follow basis; (a) subject orientation (b) response form; (c) degree of subjectivity; (d) scale properties; (e) number of dimensions and (f) scale construction techniques.

a) Subject Orientation: Under this a scale may be designed to measure *characteristics of the respondent who completes it or to judge the stimulus object* which is presented to respondent. In respect of the former, we presume that the stimuli presented are sufficiently homogenous so that between stimuli *variation is small* as compared to the variation among respondents. In latter approach, we enable the respondent to *judge some specific object in terms of one or more dimensions*

and we presume that the between- respondent variation will be small as compared to the variation among different stimuli pressured to respondents for judging.

b) Response Form: Under this we may classify the scales as *categorical and comparative*. Categorical scales are also known as rating scales. These scales are used when a respondent *scores some object without direct reference to other objects*. Under comparative scales, which are also known as ranking scales, the respondent is asked to *compare two or more objects*. In this way the respondent may state that *one object is superior to the other* or that three models of pen rank in order 1, 2, and 3. The essence of ranking, infect, a relative comparison of a certain property of two or more objects.

c) Degree of Subjectivity: With this basis the scale data may be based on whether we measure *subjective personal preferences or simply make non preference judgments*. In the former case, the respondent is asked whether he would like to see employed, where as in the latter case, he is simply asked to judge which person is more effective in some aspect or which solution will take fewer resources without reflecting any personal preference.

d) Scale Properties: Considering scale properties, we may classify the scales a nominal, ordinal, interval and ratio scales.

e) Number of Dimensions: In respect of this basis, the scales can be classified as '*one-dimensional*' and '*multi dimensional*' scales. Under the former we measure *only one attribute* of the respondent or object, whereas the later recognizes that an object might be described better by using the concept of an *attribute space of 'n' dimensions*, rather than a single dimension continuum.

f) Scale Construction Techniques:

The following are five main techniques by which scales can be developed.

i. *Arbitrary approach (Ad hoc basis)*

ii. *Consensus approach (panel of judges evaluate the items for inclusion)*

iii. *Cumulative scales are chosen on the basis of their conforming to some ranking of items with ascending and descending discriminating power.*

iv. *Factors scales may be constructed on the basis of inter correlations of items which indicate that a common factor accounts for the relationships between items.*

Important Scaling Techniques

Broadly, there are two types of scales, i.e. rating scales and attitude scales.

1. Rating Scales: The rating scales involve *qualitative description* of a limited number of aspects of a thing or of traits of a person. When we use rating scales (or categorical scales), we judge an object in *absolute terms* against some specified criteria i.e., we judge properties of objects *without reference to other similar objects*. These ratings may be in such forms as, "like, dislike", "Above average, average, below average" or other categories such as, "like very much-like some what-neutral-dislike some what-dislike very much, '. These scales can be either *discrete or continuous*.

i) Discrete Scales: These scales are *used for rating ordinal data* about an object. In these scales two or more categories are provided representing *discrete amounts of some characteristics*. The rater can

tick the category which he feels best describes the person or object being rated. Thus, for example, the characteristic 'job knowledge' may be divided into five categories on a discrete scale:

Exceptionally good,
Above average,
Average,
Below average, and
Poor

ii) Continuous or Graphic Scales: These scales are used for rating interval data about an object under which the various points are usually put along the line to form a continuum and the rater indicates his rating by simply making a mark (such as) at the appropriate point on a line that runs from one entrance to the other.

Scale-points with brief descriptions may be indicated along the line, their functions being to assist the rater in performing his job. The rater can tick any where he considers appropriate along the length as show below.

Exceptionally good Above average Average Below average Poor

Both types of rating scales can use *three kinds of standards* for measuring a characteristic: *numerical, alphabetical, descriptive or behavioral sample.*

Rating scales generally suffer from lack of reliability and validity. Reliability of these scales is generally low due to the following reasons.

- Where these scales do not give specific standards for purposes of comparison, *different raters may use different standards or reference points.* For example, when asked to rate the overall quality of a particular brand, some respondents may compare it to their ideal brand, other to their current brand, and still other to their perception of average brand.
- Where more than one characteristic of an object is to be judged the *rater may carry over a generalized good or bad impression about the object* from one rating to the next.
- The *rater may award to the object 'average'* on most of the characteristics on the ground that it will not impose his lack of more definitive information.

All the above reasons can be removed, however, if the researcher takes care to:

- *Select trained and experienced raters*
- *Provide well-defined response categories on the scale; and*
- *Specify common frame of reference*

2. Attitude Scales: Attitude scale are *carefully constructed sets of rating scales designed to measure one or more aspects of an individual's or group's attitude towards some object.* The individual's responses to the various scales may be aggregated or summed to provide a single attitude for the individual. Or, more commonly, the responses to each scale item or sub group of scales item *may be examined independently of the other scales items.*

There are four important types of these scales which are:

- *Likert's summated scale,*
- *Thurstone's equal appearing interval scale,*
- *Guttman's cumulative scale, and*
- *Osgood's semantic differential scale*

a) Summated Rating Scale (or Likert Type Scales): Summated scales are developed by utilizing the items analysis approach where in a particular item is evaluated on the basis of how well it discriminates between those persons whose total score is high and those whose score is low. Those items or statements that best meet this sort of discrimination test are included in the final instrument.

Thus, summated scales consist of a number of statements which *express either a favorable or unfavorable attitude* towards the given object to which the respondent is asked to react. Respondent indicates his agreement or disagreement with the statement. *Each response is given a numerical score*, indicating favorableness and unfavorable and the scores are totaled to measure attitude.

Overall scores represents the respondent's position on the continuum of favorableness or unfavorableness towards an issue.

Most frequently used scale is Likert Scale. Here respondent is asked to respond to each of the statements in terms of degrees usually five degrees (but at times 3 to 7 degrees) of agreement and disagreement.

For example; when asked whether he considers his job pleasant, the respondent may be asked in one of the following ways.

Strongly Agree (1) Agree (2) Undecided (3) Disagree (4) Strongly disagree (5)

b) Thurstone's Equal Appearing Interval Scale: Known after the name of its inventor, this scale consists of 15 to 20 statements which form continuum of attitudes towards a subject ranging from the most favorable to the least favorable.

c) Louis Guttman's Scalogram Analysis (Cumulative Scale): This consists of statements to which a respondent expresses his agreement or disagreement. The special feature of this type of scale is that *statements in it form a cumulative series.*

This in other words, means that *statements are related to one another in such a way that an individual, who replies favorably to item C would also tick D and E, but he would not tick F and G* because these are statements denoting exclusion. If an individual does not tick C then it is reasonable to expect that he will not tick of A and B since these are statements indicating even closer relationship compared to C.

d) Semantic Differential Scale: This scale was developed by Charles Osgood, G.J.Suci and P.H.Tannenbaum in 1957. This scale is an *attempt to measure the psychological meaning of an object to an individual.* This scale is based on presumption that an object can have *different dimensions of connotative meanings* which can be located in multidimensionality property space, what can be called the semantic space in the context of semantic differential scale.

3.8. Sample Design

A sample design is a ***definite plan for obtaining a sample from population***. It refers to the technique or the procedure the researcher would adopt in *selecting items for the sample*. Sample design may as well lay down the number of items to be included in the sample i.e., the size of sample.

Why is sampling used?

- *Economy in expenditure*
- *Greater speed*
- *Greater scope*
- *Greater accuracy*
- *Practicability*

3.8.1. The Sampling Process

The sampling process consists of seven sequential steps. These steps can be identified as follows:

1. *Define the population*
2. *Specify sampling frame*
3. *Specify sampling unit*
4. *Specify sampling method*
5. *Determine sampling size*
6. *Specify sampling plan, i.e. set the sample*
7. *Select the sample*

1) Define the Population

Population may be defined as the *target group which the researcher wants to know about* by studying one or more of its samples. To be complete, a population must be very explicitly defined in terms of *elements, sampling units, extent and time*. For example, in a study aimed at establishing a demographic profile of coffee drinkers of a town the population may be defined as: (element) (sampling unit) (extent) (time).

2) Specify Sampling Frame

The *physical material* from which samples are chosen is called a frame. A map, a telephone directory, a list of debtors, a card file, a list of business establishments, a list of license plates issued to owners of cars, Census records, etc., are regarded as sample frame. The means of representing the elements of the population, for example, telephone directory, map, or city directory can be described.

3) Specify Sampling Unit

The sampling unit is *the basic unit containing the elements of the population to be sampled*. The sampling unit may contain one or several population elements.

4) Specify Sampling Method

In this step the *method by which the sampling units are to be selected* is described.

5) Determine Sampling Size

Here, the *number of elements or units of the population to be sampled* is decided.

6) Specify Sampling Plan Set The Sample

Under this step the operational procedure for selection of the sampling units is specified.

7) Select the Sample

Here, the *office and field work necessary for the selection of the sample are carried out* and finally sample is selected for the purpose of study.

3.8.2. Sampling Methods

Sampling methods can be categorized as follows:

1. Probability Sampling

- i. Simple random sampling
- ii. Systematic sampling,
- iii. Stratified random sample,
- iv. Multi-stage random sampling,
- v. Cluster sample or area sample,
- vi. Sequential sample or sampling in installments, and
- vii. Replicated or interpenetrating sample

2. Non-Random (Non-Probability) Sampling

- i. Purposive sampling,
- ii. Quota sampling, and
- iii. Convenience sampling.

1. Probability Sampling Methods

i) Simple Random Sampling: Simple random sampling is one in which *each possible sample of n different units has an **equal chance** of being selected*, which also implies that every member of the population has an equal chance of selection into the sample.

In this type of sample, sampling is *done without replacement*, so that no unit can appear more than once in the sample. Thus, if from a population consisting of 4 members A, B, C and D a simple random sample of $n = 2$ is to be drawn, there would be 6 possible samples without replacement, viz., AB, AC, AD, BC, BD and CD. One can easily see how each member in this list is picked for 3 of the 6 possible samples or has an equal chance ($3/6=1/2$) of selection.

When sampling is conducted *with replacement*, units can appear more than once in the sample. This is known as **unrestricted random sampling**. In this sampling also each possible sample of units from a population of N units has an equal chance of being selected, which in turn implies that every member of the population has an equal chance of selection into the sample.

Merits

- The method *requires minimum knowledge* about the population in advance which is needed in the case of purposive sampling
- The method is *free from classification errors*
- Sampling errors can be *easily computed* and the *accuracy of estimate easily assessed*

Demerits

- This method *does not make use of the knowledge about the population* which researcher may have
- The size of the sample required to *ensure statistical reliability* is usually *large under stratified sampling rather than this sampling*
- From the point of view of field survey it has been claimed that cases selected by random sampling *tend to be too widely dispersed geographically* and that the *time and cost of collecting data become too large*
- The use of simple random sampling *necessitates a completely catalogued universe* from which to draw the sample. But it is *often difficult for the investigator to have up-to-date lists* of all the elements of the population to be sampled.

ii) Systematic (Quasi-Random) Sampling: A systematic sample is formed by *selecting every n th item from the universe where n , refers to the sampling interval*. The sampling interval can be determined by *dividing the size of the universe by the size of the sample to be chosen*. For example, if we wish to draw a sample of 320 traveling expense vouchers from a universe of 32,000 vouchers, the sampling interval would be 100; that is, every 100th voucher will have to be selected. We may start the sample selection anywhere between the first and the 100th voucher. A *random start is always preferable*, that is, a start determined by chance. If this number is 6, the sample is composed of the number 6, 106, 206, 306....

Merits

- This method is *simple to follow*
- This method *distributes the sample more evenly* over the entire listed population

Demerits

- This method is *not truly random*. All items selected for the sample (except the first item) are predetermined by the constant interval
- This method *may sometimes result into a badly biased sample*. For example, if by chance every 10th, 20th, 25th or 50th expense voucher in the universe is one made out by an executive; the sample drawn would over represent the expenses by executives which may have certain special characteristics.

iii) Stratified Random Sampling: Stratified random sampling refers to sampling design where the ***entire universe is divided in to groups or strata in such a manner that*** a) there is as *great homogeneity* as possible within each stratum b) there is as *marked a difference* as possible between the strata.

Example: Classify customers according to their financial status and then draw samples from each class in order to measure customer demand for expensive and luxury items.

Merits

- A random *stratified sample is superior to a simple random sample* because it ensures representation of all groups and is thus *more representative of the population* which is being sampled
- A random stratified sample *can be kept small in size without losing its accuracy*
- *Characteristics of each stratum can be estimated* and hence *comparison can be made*

Demerits

- Proportionate *stratification requires accurate information* on proportion of population in each stratum
- It is *very costly to prepare stratified lists* of all members
- There is always a *possibility of faulty classification* and hence *increase in variability*

iv) Multi-Stage Random Sampling or Sub-Sampling: Under this method sample is prepared by *stages*. The population is divided into a number of large sampling units, each of which in turn is divided into smaller units and so on. *A random sample is taken of the large units at the first stage and from those selected a further random sample i.e., the second stage is collected of the smaller units.*

Suppose, we want to take a sample of 5000 households from Oromia region. At the first stage, the region may be divided into a number of zones and a few zones selected at random. At the second stage, each zone may be sub-divided into a number of villages and a sample of villages may be taken at random. At the third stage, 5000 households may be selected from the villages selected at the second stage.

Merits

- Sampling lists, identification, and numbering are required *only for units selected in the sample at each stage* and not for all units of the population
- If sampling units at each stage are geographically defined (such as town, village, etc.), this *method cuts down field costs* (i.e., travel).

Demerits

- *Errors increase* as the number of sampling units selected decreases

v) Cluster Sampling: This consists of *first selecting, at random, natural groups of units* (called clusters) from the universe. *Then all or some of the units within each cluster are chosen to make up the sample.*

Cluster sampling is *diametrically opposed to stratified sampling*. In cluster sampling, for best results (a) the units within each cluster should be as heterogeneous as possible, and (b) there should be as small a difference as possible between the clusters. Ideally, each cluster should be a miniature sampled universe.

The reason for using cluster sampling is the *reduction in costs and increase in convenience*.

Example: in a dental survey of the fifth-grade: children in a city, we might regard the child a sampling unit and select a sample of children from combined school registers for the city. Examine every fifth grade child in the selected schools. A same five schools of 100 fifth-grade boys each would very yield information of as much reliability as an considerably less expense than a simple random same 500 boys scattered over all the schools in the grade.

Merits

- A cluster sample study is considerably *less expensive and less time-consuming* because the field work in this type of study gets localized. The investigator *can obtain information about all elements of the cluster at one place*
- It *does not require a complete frame of the whole population*. It requires lists of members of the selected clusters only
- The *same sample of clusters can be used again and again* for drawing random samples of elements from them in subsequent researches

Limitation

- A cluster is *seldom a correct representative of the parent population*. This is because the requirement of heterogeneity of the elements' *a cluster is rarely fulfilled*. The tendency is for the birds of the 'feather' to cluster together. Therefore, estimates about the population based on cluster sampling are often inaccurate.

vi) Sequential Sampling or Sampling Installments: Under this method, the *researcher takes a very small sample in the beginning and tries to draw inference on the basis of that sample. If no clear-cut inference is possible, he adds some more units to the sample (often one at a time) and weighs the enlarged sample evidence to see if the inference can be drawn now. This is continued until a point is reached at which a clear-cut inference can be drawn* within some previously chosen degree of confidence.

In this way, the researcher works on the basis of a *predetermined sample-plan which tells how long he should go on increasing his sample*. This method has become very popular in drawing samples of *destructible items* (e.g., explosives) which are irretrievably lost or destroyed once they are tested for their quality. It is also used now-a-days in taking decisions to accept or reject the quality of a given lot of raw material, output, accounting record, etc.

Three characteristics of sequential sampling become evident from this illustration:

- a) Sequential sampling is *used in problems involving alternatives* (viz. to accept or to reject the entire lot or to continue further analysis)
- b) Unlike all other types of sampling, in sequential sampling *the total sample size is not determined at the time sampling starts*. We do not know in advance how many installments will be needed until we can arrive at a decision.
- c) *Each installment is selected at random*; thus, sequential sampling is probability sampling

Merits

- The major advantage of this type of sampling is that it *usually permits the use of a sample of smaller size* than would be used in random sampling of the ordinary kind

Limitation

- *Sampling units must be capable of being observed in succession*; for instance, if observations must be made at one point in time we cannot sample sequentially

vii) Replicated (Inter-Penetrating) Sampling: Replicated (inter-penetrating) sampling means *to draw two or more independent sub-samples or replicas by some random method*. Under this method the population is *first divided into as many zones as there are sampling units to be included in each sub-sample*.

For example, if we want to draw five sub-samples of 10 employees each from a total of 400 employees we will divide the population into 10 zones of 40 employees each. Next, each of the five sub-samples will be formed either by reading out random numbers—one from each zone or by reading out random number in the first zone only and then systematic selecting every 40th unit thereafter.

Merits

Replicated sampling has the following advantages:

- Findings of *various sub-samples can be compared* with each other before arriving at the main conclusion. The *consistency of findings from replica to replica is the strongest argument* for plausibility of findings.
- Replicated sampling *provides insurance against several unforeseen mishaps* that can befall a survey or some other method of research. For instance, if at some point in the enquiry it becomes necessary for the investigator to discard the data for one or two replicas he may still proceed with the analysis of the remaining replicas. A high internal consistency of findings across the remaining replicas enables the investigator to discard the faulty ones without jeopardizing his conclusion.
- Replicated sampling is *particularly useful when it is not possible to study the whole sample in the allotted time* or when the preliminary results are required quickly. In such situations work may be planned in interpenetrating samples and different sub-samples assigned to different investigators for study to speed up the whole work.
- When different sub-samples are assigned to different investigators for study, this *acts as a check on their performance*.

2. Non-Probability Methods

i) Purposive Sampling: The purposive sample is also called the *judgment sample*. These terms indicate *selection by design—by choice, not by chance*. In purposive sampling, a *sample is chosen which is thought to be typical of the universe* with regard to the characteristics under the investigation. The researcher *must know about the characteristics of the universe beforehand* in order to be able to recognize typical items in the universe.

Merits

- It is *very simple to draw*. People often use it in exploratory investigations which precede major surveys.
- It is *less costly and involves less field work* since those units can be selected which are close to each other
- It is *more representative of 'typical' conditions* than the random sample *if the size of sample is small*

Demerits

- It is *not always reliable*. The human mind has difficulty in recognizing typical items. The difficulty tends to distort purposive sampling.

- It requires from the researcher *considerable knowledge about the population which he usually does not possess*.
- It is *not possible to determine the size or likelihood of sampling errors* because purposive sampling does not meet the basic requirement of randomness.

ii) Quota Sampling: A method of selecting a sample often employed in market and public opinion polls is that of quota sampling in which an interviewer instead of receiving a list of names and addresses to be interviewed, *receives the 'quota' or the number of interviews which he has to conduct of persons who satisfy certain conditions about sex, age, income, etc.*

Thus, he may be asked to interview 20 businessmen over 50 years of age in a particular area. The interviewer can then select at his own discretion any 20 businessmen of that area who are over 50 years of age.

Advantages

- It is *less costly*. There is no need to travel all over a town to; track down pre-selected respondents.
- It is *administratively easy*. The labor of random sample selection is avoided, and so are the headaches of non-contacts and call-backs.
- It is *most suited in a situation where the field work has to be done quickly* perhaps in order to reduce memory errors. Thus, where people are to be questioned about the previous day's television program or where their immediate reaction to new budget proposals is to be obtained quota sampling may be only possibility.
- It is *independent of the existence of sampling frames* and may be the only practicable method of sampling a population for which no suitable frame is available.

Demerits

- It is *not possible to estimate sampling errors* because quota sampling does not meet the basic requirement of randomness
- It *may not provide a representative sample of respondents* despite there being instructions to, and constraints on, interviewers to guard against the main dangers of selection bias. This is because a great deal is still left to the interviewer's judgment. He may, for instance, fill the top age group of 65 and over mainly with persons of 65 and 66, so that the very old under-represented.
- In this type of sample the *investigator very often selects respondents whom he knows*. This vitiates the enquiry because the respondents many times display what may be called "courtesy effect", i.e., they give the interviewer the kind of response they believe he seeks rather than what they themselves actually believe.

iii) Convenience Sampling: In this method the researcher *selects those units of the population in the sample which appear convenient to him or to the management of the organization* where he is conducting research. If bales of goods are stacked tightly in a warehouse, it is difficult to get at the inside bales of the pile and the researcher is tempted to confine attention to the outside bales. Similarly, the management may tell the researcher that certain individuals alone can be included in the sample while others cannot.

Demerit

- One important demerit of this method is that the results obtained by following this method *cannot be generalized beyond the study's sample*. But this does not mean that such studies are of no value. The cumulative results of many such studies of the same phenomenon by different researchers provide basis for assessing the merits of a given hypothesis.

3.8.3. Determination of Sample Size

An inescapable step in a sample study is to determine the size of the sample. This involves *both statistical and non-statistical considerations*. Among the latter (*non-statistical*) we can include the following points:

(i) **Resources Available:** Gains in precision associated with large samples need to be *weighed against the costs* such large samples may entail. *Gains must be commensurate with the amount of time and money involved* in doing research on big samples. There should be trade-off between added information and added costs.

(ii) **Nature of Study:** For intensive and longitudinal studies small samples are enough but not so for extensive and one-time studies.

(iii) **Method of Sampling Followed:** *Smaller but properly selected samples are superior to larger but badly selected samples. Probability sampling is better than non-probability sampling ~ the former needs smaller samples.*

(iv) **Nature of Respondents and Other Field Conditions:** *Where the non-response rate is expected to be high, the size of the sample should be big and vice versa.*

Among **statistical considerations** we must include the following:

- i) *Nature of population*
- ii) *Degree of accuracy or precision desired from the estimate*
- iii) *Degree of confidence desired*

3.9. Questionnaire Design

3.9.1. Questionnaire

One of the most popular and widely used *techniques of data collection* used in field surveys is the questionnaire or schedule. A **questionnaire** is a *form containing a series of questions and providing space for their replies to be filled in by the respondent himself*. **Schedule** is the name usually given to a **set of questions** which are asked and filled in by an interviewer in a face-to-face situation with another person. A *schedule is, therefore, just the same as a questionnaire so far as the set of questions is concerned*. The difference between the two, however, lies in the fact that whereas a *questionnaire is filled by a respondent without any direct oral explanation or interpretation* from the investigator, a *schedule is filled in by the investigator himself* who can, if necessary, explain any point to the respondent on the spot.

Since a schedule is filled by the investigator himself, it should be convenient in field handling. It should enable the investigator to record all information in exactly the same form in which it is given by the respondent without any calculation or conversation.

3.9.2. Types of Questionnaires

Two important *dimensions* along which questionnaires generally vary are:

- *Degree of structure, and*
- *Number of response possibilities*

1. Degree of Structure

From the point of view of *degree of structure* questionnaires may be of two types as structured and unstructured.

a) Structured Questionnaires: are those in which the questions *to be asked from the investigators and the instructions to be followed by the interviewers are very precisely and concisely stated in advance*. Nothing is left to the discretion of the interviewers who are required to ask from every respondent the *same set of questions in the same form and sequence*. Structured questionnaires thus **maximize standardization**. But they make interviewing inflexible.

b) Unstructured Questionnaires: are those which *specify only the broad areas of a subject and not the form or sequence of questions*. Formulation of questions is *left to the wisdom of the interviewers themselves* who are free to question respondents in their own way. This enables interviewers to probe a subject intimately. But these questionnaires suffer from *two important limitations*.

First, the replies gathered through them *cannot be compared with each other*. This makes it difficult to judge the reliability of information.

Secondly, these *can be used by able and trained interviewers only* who can frame questions at the time of interview itself.

2. Number of Response Possibilities

Questionnaires also vary in respect of *the number of response possibilities* provided to the subject. Depending on this they can be categorized as *dichotomous, multiple-choice and open-ended* questionnaires.

a. Dichotomous Question: Is a question that *provides the subject with only two response possibilities*.

b. Multiple-Choice Question: Provides the respondent *with more than two possibilities*.

c. Open-End Question: If it provides him with *complete freedom to select his most appropriate answer* it is known as an *open-end question*.

3.9.3. Designing a Questionnaire

Much labor and care are needed in designing a good questionnaire which must possess two qualities: **brevity and accuracy**. **By brevity** is meant that the *number of questions should not be more than necessary*. The rule is gathering the data you need but not more than what is needed. **By accuracy** is, meant that the *question should be able to evoke accurate response*. Accurate response is obtained if the replies from the respondents contain the information sought.

In order to be able to design a good questionnaire the researcher should **consult all relevant books and literature on the subject**. He should go through all the available articles and research works already completed. He should also hold exploratory interviews and discussions with those who have intimate knowledge of the subject and *should never lose sight of the hypothesis to be tested*.

3.9.4. Guidelines for Designing a Good Questionnaire

Guidelines for designing a good questionnaire include the following:

1. The questionnaire *must intimately relate to the final objective* of the investigation.
2. The questionnaire *should be brief*.
3. Questions *outside the respondent's experience should not be asked*.
4. In asking questions about *past events too much reliance should not be placed on the respondent's memory*.
5. Questions which are *likely to arouse bias in the respondent should be avoided*.
6. Questions *should be very clear and simple*.
7. The *structure of the question should be according to the form in which the response is to be recorded*.
8. There should be a *logical sequence of questions* in the questionnaire.
9. It is sometimes desirable to *insert cross checks* either by asking for the same information in two different ways or by asking questions which *tie in with other question* asked elsewhere in the questionnaire.
10. A mail questionnaire should always be accompanied by a letter giving (a) *an introduction of the organization* carrying out the study, (b) *purpose* of the study, (c) *directions to fill* the questionnaire, (d) the *time that would be required to answer the questions*, (e) a *guarantee* that the identity of the respondent and the information given by him will not be disclosed, and (f) a *request to return the filled-in questionnaire in the enclosed envelope* which should always be self-addressed and stamped.
11. If a questionnaire is to be translated for use into several local dialects, *the translated version of a questionnaire should be retranslated into the original language to check its fidelity*.
12. Every questionnaire should have an *appropriate ending to it*. A final question may be in the form of a request to the respondent to kindly evaluate the questionnaire and to suggest improvements.

3.9.5. Format of the Questionnaire

Even though no standard format of a questionnaire has yet been evolved, **Pauline V. Young** has suggested the following guidelines for this purpose:

1. The *identification of the agency or organization collecting the data* should appear in a prominent place on the *front page of the form*. If the information is collected by one agency and sponsored by another, the names of both agencies should be shown. If the forms are to be returned by mail, *the address to which they are to be sent must be clearly specified*.
2. The *title of the study or survey should be on the front page of the form* and usually it is desirable to have it appear *in large print*. Printing and spacing devices can both be used for obtaining effective emphasis on the major items of the form.
3. The *authority for the collection of the information should be stated*.
4. The *confidentialness of the data should be made clear* in such a way that the respondent will be assured of protection.
5. The *dates of the period covered by the response should be stated in advance*.
6. If footnotes are needed, the *space for recording them should be clearly identified*.
7. A place for the *date on which the form is filled out should be provided*.

8. A place should be provided for the signature of the respondent or the interviewer unless none is required.
9. It is usually advisable to assign a serial number to each questionnaire in order to identify it easily, and to facilitate the control of interviewing assignments.
10. When a questionnaire contains more than one page, each page should be numbered.

<i>1. Establish what information must be gathered</i>
<i>2. Specify the appropriate data-gathering method</i>
<i>3. Specify the procedure for analyzing the gathered data</i>
<i>4. Select the question type and decide question structure</i>
<i>5. Select the best wording for each individual question</i>
<i>6. Organize the questions into a logical order</i>
<i>7. Pretest the questionnaire and revise if necessary</i>

Source: **Malhotra, Naresh (1999)**, *Marketing Research: An Applied Orientation (3rd ed.)*, Upper Saddle River, NJ: Prentice Hall quoted in David E McNabb, Research Methods in Public Administration and Non Profit Management, Quantitative and Qualitative Approaches, p 127

What information must be gathered?

Questions that contribute to the overall research objectives should only be asked.

Identify

- *The variables to be measured*
- *The type of questions that will measure these variables and*
- *The number of questions needed to assure reliability and operational validity*

Data Gathering Methods

- *Face-to-face interviews*
- *Telephone interviews and*
- *Mailed survey instruments (Questionnaires)*

A few types of questions:

- ***Open-ended questions*** require the respondents to answer *in her/his own words*.
- ***Closed-end questions*** ask the respondents to *choose from a list of responses*.
- ***Factual questions*** elicit *objective information* from the respondents - Sex, age, marital status, education, income and profession.
- ***Behavior questions*** ask the respondents *about things they do or have done*.
- ***Opinion questions*** ask respondents *what they think* about an issue or event.
- ***Motive questions*** ask respondents to *evaluate why they behave in a particular manner* or hold certain opinions or attitudes.
- ***Knowledge questions*** determine *what a respondent knows* about a topic and to extent. They appear in evaluation of programs or policy or issue.
- ***Filter question/screening question*** identify the respondents who should answer the ***contingency question*** that follows.
- ***Generally filter questions are close-ended***

- **Contingency questions** apply only to a sub-group of respondents.

Whether a respondent should answer (or not) a contingency question is determined by his or her answer to a preceding question (*Filter question / screening question*)

- **Double-barreled question** is a question that *combines two or more questions* into one. They would be confusing to the researcher as well as the respondent.
- **Leading questions** direct or influence the response toward one point of view.

Question Structure

The following tips should be considered while questions are structured:

- *Question wording, emphasis and order has to be clear and logical*
- *The respondent must understand what information is wanted*
- *The number of questions to be asked to measure each variable should be kept at the minimum necessary*
- *Lengthy questions and questionnaires should be avoided*
- *Interviews should not take longer than an hour*
- *Complex and difficult questions should also be avoided*
- *Avoid ambiguous words*
- *Word the questions precisely*
- *Questions that arouse strong emotions, generate resistance, or resulting in a refusal to answer should be avoided*
- *Leading questions should not be asked*
- *Relate every question to the study objectives*

Sequence of Questions / Questionnaire

Sequence of questions might influence the respondents/result in appropriate response.

Broad, easy-to-answer questions will be followed by more focused and in-depth questions

Funnel/Cone Sequence of Questions

The following five distinct parts of a questionnaire are required to be followed:

- The title and identification of the survey's sponsors*
- Instructions to respondents*
- Warm-up questions*
- Body of the survey and*
- Classification questions*

Accordingly, the following information has to be sequentially followed in questionnaire design:

Introductory:

- Purpose of the survey
- How the information will be used
- Sponsors of the survey
- Guarantee for individual anonymity
- How to fill the questionnaire
- Information about potential confusion

- Who is expected to answer sections of questions?
- Warm-up questions
- Simple and easy to answer questions
- With a minimum effort
- Ease the respondents into the questionnaire
- Bringing them to a level of comfort

Body of the Questionnaire:

- The place where the most important questions can be located
- The easiest questions should appear before the more difficult or complex questions
- The questions should be arranged in a logical order
- There are three sub-sections – first one a transition – second for more focused attitude, opinion, or other types of scales – third for most focused questions

Classification Questions:

- Help the researcher to describe the sample in detail
- Referred to as demographic data

Funnel Approach to Questionnaire Structure

-  Warm-up and screening questions
-  Broad awareness and general knowledge questions
-  More focused attitude and opinion scales
-  Most focused questions and scales
-  Controversial questions
-  Classification items

3.9.6. Pre-Testing of Questionnaire

Initially, a questionnaire or a schedule is constructed only tentatively. *It is only after a pretest that it is finalized.* As the name implies, “**pretest**” is *an advanced test of the questionnaire or schedule under the same kind of field population as anticipated for the main study.* The pre-test is a preview of any possible inconsistency or ambiguity in the questions. Such questions are then appropriately rewritten and questionnaire is given the final shape. Too often pretest is only used for improving a questionnaire or a schedule.

Advantages of Pretest

- 1) It reveals to the investigator in advance questions which *either are not understood or are misunderstood by the respondents or which arouse defensiveness* in them
- 2) It helps to *decide the proper form and structure of each question* whether it should be dichotomous, multi-choice, open end or some other combination
- 3) It helps to *resolve many mechanical problems of measurement*
- 4) It helps to *improve questionnaire design in terms of format, quality of instructions, need for filter or screening questions, amount of spacing required on the page, and the use of special symbols* for color coded pages for directing interviewer physically through the questionnaire.
- 5) It *gives firm estimates of the amount of time, money, personal and equipment required* to process the main study data efficiently and successfully.

Non-Response

Non-response is a *serious problem both where a schedule and a mail questionnaire are used*. It is of course the *loss in sample numbers that is serious*, but the likelihood that the non-respondents differ significantly from the respondents, so that estimates based on the latter are biased. Whereas *illiteracy and apathy are the reasons for not responding to a questionnaire*, in case of a schedule the problem arises due to the following:

(1) ***Non-coverage***: This is *failure of the field staff to local or to visit some units in the sample*. This problem arises from the *use of incomplete lists of houses in area sampling*. Sometimes *weather or poor transportation facilities* make it impossible to reach certain units during the period of the survey.

(2) ***Not-at-homes***: This group contains persons *who reside at home but are temporarily away from the house*. Families in which both parents work and families without children are harder to reach than families with very young children or with old people confined to the house.

(3) ***Unable to answer***: The respondent may *not have the information wanted in certain questions or may be unwilling to give it*. Skilful wording and pre-testing of the questionnaire is a safeguard.

(4) ***The "hard core"***: Persons *who adamantly/inflexibly refuse to be interviewed, who are incapacitated, or who are far from home during the whole time available for fieldwork* constitute this much effort is put into completing the returns.

Techniques for Increasing Response

The following are some important techniques for increasing the response to a mail questionnaire:

(1) ***Follow-up***: *Postcard or telephone follow-up* can often be used effectively for increasing percentage of returns. Researcher should *find out if respondent needs another follow up* of the questionnaire (it may have been destroyed or misplaced). The **Bureau of Social Science Research in Washington** reports a *65% to 90% return with as many as four follow-ups*. A research carried out by four researchers on large statewide samples of the general public in Arizona, Indiana, North Carolina and Washington in the U.S.A., has shown that *intense follow-ups can produce response rate from 69.7% to 75.2%*.

(2) ***Sponsor***: Researches have shown that the *sponsor who is known to the respondents gets the best results*.

(3) ***Length***: The questionnaire must be *short to have a greater probability of return*. **Norton** found that 78.5% returned with less than five questions.

(4) ***Introductory letter***: An altruistic/unselfish appeal *seems to have better than the idea that the respondents may receive something good from it*.

(5) ***Type of the questions***: Questionnaires asking for *objective information receive the best response* and questionnaires asking for subjective information receive the worst.

(6) ***Inducements***: Questionnaire *promising to give some small money or a copy of the report to the respondent* may produce better results than one without such promise. However, the population and the type of questionnaire *may make such inducements unnecessary*.

(7) ***Method of return***: A *regular stamped envelope produces better results* than the business reply envelope.

(8) ***Timer of arrival***: The questionnaire, if sent to the home, *should arrive near the end of the week*.

(9) Format: An aesthetically pleasing cover, an interesting title, an attractive page format, a size and style of type easily readable under poor illumination and by people with poor vision and photographs to illustrate the questionnaire are definitely helpful in achieving good response.

(10) Selection of respondents: Interest in or familiarity with the topic under investigation is a major factor in determining the rate of return. The better-educated and professional respondents are more likely to return questionnaires than the ill-educated and non-professional ones.

The following **techniques may be followed to reduce the effect of non-response** in case of a schedule:

(a) Call-backs: A standard technique is to specify the minimum number of callbacks that must be made on any unit before abandoning it as "unable to contact". Tight supervisory control should be exercised over completion rates and their on-going quality should be checked.

(b) Study of a random sub-sample of non-respondents. A random sub-sample of the persons who have not been reached may be taken and everyone in this sub-sample interviewed.

(c) Study of area sample of dwelling houses. When the principal frame is a directory of street addresses, it may be supplemented by an area sample, the purpose of which is to sample parts of the town not adequately covered by the directory (e.g., new buildings) and, in parts in which the directory seems accurate, to search for addresses missing from the directory.

(d) Interviewing should be scheduled according to the convenience of the respondents.

(e) Interviewers and respondents should, as far as possible, be linguistically and demographically matched.

Advantages and Limitations of a Mail Questionnaire

Advantages

1. It is a relatively inexpensive mode of data collection. It covers a wider geographical area at a relatively low cost per subject. It also eliminates the expensive and time-consuming task of training investigator.

2. It can be administered to groups of individuals. Interviewing, on the other hand, generally involves dealing with each individual separately.

3. It presents a uniform stimulus to all subjects (i.e., each subject receives an identical questionnaire). When data are collected through an interview, on the other hand, each subject may get a slightly different version of each item.

4. It enables the respondent to answer questions—perhaps those of a personal or embarrassing nature—more willingly and accurately when not face to face with the interviewer who is a complete stranger.

5. It does not give a chance to the investigator to suggest answers to the respondent as in personal interviews.

6. It can be answered at the convenience of the respondent.

Limitations

1. The technique is particularly unsuited for illiterate respondents.

2. Everybody may not respond to the questions properly. Some respondents may misinterpret questions, omit essential items, give answers casually or send in information which cannot be tabulated. It is practically impossible to return such incomplete or unsatisfactory questionnaires to their respondents for correction.

3. This technique *does not provide a check on the honesty and reliability of replies*. Occasionally, *if the respondent gives wrong replies, the investigator cannot know what the truth is*. In personal interview the investigator can know the truth by observing the actual behavior of his respondents. *He can appraise the validity of what a respondent said in the light of how he said it*. He has opportunity to supplement the respondent's answers by observational data.
4. This technique is *inappropriate when spontaneous answers are wanted*; where it is important that the views of one person only are obtained, uninfluenced by discussion with others; and where questions testing a person's knowledge are to be included.
5. The *structured nature of a questionnaire may limit the usefulness of information* that might be obtained from the respondents. The same set of questions being put to a variety of persons may not 'fit' their different personal profiles.
6. In this technique *where the response rate being very low (not exceeding 50%) the investigator is left in a dilemma* whether his returns can be generalized to the whole population or they merely represent the characteristics of people who have returned the questionnaires. It is also *difficult to obtain an up-to-date address list* of potential respondents.

CHAPTER FOUR

SOURCES OF DATA AND DATA COLLECTION

Introduction

While doing research of any kind, it is required to search for data sources and collect the data from the sources identified. An appropriate source of data must be identified by the researcher in order to find out the desired research result and make sound decision in the problem area. The sources of data may be primary or secondary or probably triangulation of both sources to make reliable research findings.

In this chapter of the module basic concepts of sources of research data and methods of data collection are discussed in details.

4.1. Sources of Data and Data Collection Methods

Data is the *basic input to any decision-making process* in business and management operations. General considerations in data collection include the following basic concepts:

- *Observation – watching people*
- *Questionnaire – ask people (written)*
- *Interview – ask people (oral)*
- *Tests and scales*
- *Documents as sources of data*

Generally, the sources of research data can be classified into two as follows:

1. *Primary data, and*
2. *Secondary data*

Primary data is *first-hand information collected directly for the research work* under consideration.

The primary data can be collected through the following methods:

- *Observation method*
- *Personal interview*
- *Telephone interview*
- *Mail survey*
- *Questionnaire*

Secondary data is a data *collected from sources which have already been created for the purpose of first-time use and future use in the previous time*. Sometimes more accurate data can be obtained only from secondary data.

There are two sources of secondary data, i.e. *internal and external* sources which are going to be dealt with under types of secondary data later on.

4.1.1. Secondary Data

Data gathered from the ***published sources*** is secondary data. Secondary data simply is ***data that were already available being collected for other purposes***. Secondary data is very important for any research study.

Types of Secondary Data

1) Internal Sources

Internal sources mean *internal organizational sources* for example;

- *Departmental reports*
- *Production summaries*
- *Financial and accounting reports*
- *Marketing and sales studies*

2) External Sources

This type of secondary data is *generally published sources available outside* an organization. In addition to internal sources other sources of information external to a company may be useful.

There are five categories of external sources of data:

Books

Periodicals

Governmental documents/publications

Variety of materials-Reference books, University publications

Publications of trade associations

Magazines, newspapers, annual reports, etc.

3) Statistical guides and data sources

4) Census data

Advantages of Secondary Data

- i) Secondary sources can usually be *found more quickly and cheaply*

- ii) In many cases we can hope to gather primary information, at any cost, comparable to published data, for example, census reports and industry statistics
- iii) Secondary data sources also extend our time and space range. Most research on past event has to rely on secondary data sources to some degree
- iv) Data gathered about distant places, for example, foreign countries, often can be collected more cheaply through secondary materials

Disadvantages of Secondary Data

- i) The most important limitation is that the information often will not meet our specific needs. Secondary source information has been collected by some one else for their purpose rather than ours.
- ii) Units of measure do not match with others
- iii) Different time periods may be involved
- iv) We often can not even assess the accuracy of the information because we know little about the conditions under which the research took place
- v) The value of secondary information often is partially obsolete/out of date before it is available. The study made five years ago may not be relevant in today's environment.

Characteristics of Secondary Data

The researcher must be very careful in using secondary data. He must make minute scrutiny because it is just possible that secondary data may be unsuitable or may be inadequate in the context of the problem which the researcher wants to study.

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

1) Reliability of Data: The reliability can be tested by finding out such things about the data.

- Who collected the data?
- What were the sources of data?
- Where they collected by using proper methods?
- At what time were they collected?
- Was there any bias of the computer?
- What level of accuracy was desired?
- What it achieved?

2) Suitability of Data: Researcher must very carefully scrutinize the definition of various terms and units of collection used at the time of collecting the data from primary sources originally.

3) Adequacy of Data: If the level of accuracy achieved in data is found inadequate for the purpose of present enquiry, they will be considered as inadequate and should not be used by the researcher.

Library Method

The place of library in designing a research study particularly a historical one and in serving as method of data collection can hardly be over emphasized. In order to be able to effectively use a library, a researcher should be well familiar with its two major reactions, viz., Library catalogue and reference material and periodicals.

Reference Material and Periodicals

Library catalogue is a *device to help the user to locate/set the required reading material in the library*. Catalogues may be available according to the title of the book or according to the name of the author or both. The researcher therefore, must have some knowledge about the catalogue system for locating the desired publication.

Another important section in good library is its periodical and reference section. This consists of *number of encyclopedias, year books and bibliographic of national and foreign literature*.

The researcher should find out where various periodicals and dissertations are stored, when can one consult them and how is he going to take notes from them.

4.1.2. Primary Data

As indicated above, primary data is a data *collected for the first-hand use directly for the research work* under consideration. It is *first-hand information collected directly for the research work*.

The primary data can be collected through the following methods:

- *Observation method*
- *Personal interview*
- *Telephone interview*
- *Mail survey*
- *Questionnaire*

1. Survey Research

Like field study a sample survey is also a form of ex-post facto research in which the researcher simply collects data about certain sociological or psychological characteristics of a sample that represent a known population in natural settings. In fact the researcher is interested in knowing something about the whole population. But rarely does he study the whole population. He only studies samples drawn from population.

The data are sought directly from respondents by some systematic technique such as, *interviewing, questionnaires or observation at a certain point or period of time once only*. If the researcher suspects that confounding influences may be present in the data obtained from survey then the potentially confounding variables may be measured and statistical techniques used to control their effects.

Purpose of Using Survey Method

Some of the purposes for which survey method may be used as method of data collection are as follows:

- *To explore the existence of some phenomena* (e.g. correlation between accessibility and knowledge in rural areas, basis of remuneration and level of performance of sales people)
- *To describe a phenomenon* (e.g. to determine how many employees of an organization are in favor of moving headquarters to a new place)
- *To predict future conditions* (e.g. the out come of an election or consumer buying behavior)
- *To evaluate social programs* (e.g. to assess the usefulness of televised teaching programs)
- *To develop social indicators* (e.g. data upon which to base the unemployment rate, the consumer price in day and the whole sale price index)

Differences between Survey and Field Study

According to **Daniel Kats**, there are two essential distinctions between survey and a field study. These are:

- A sample survey is usually *extensive in scope*. On the other hand, a field study is generally *restricted in its scope and is little concerned with the question of sampling*.
- In a sample survey a *direct study of the on going social and psychological processes is not done*. Inferences about these processes are indirectly made through statistical end-results. In the field study however, *these factors are observed and measured more directly*. Thus, a *field study provides a more detailed and more in- depth picture* of the social interrelations of the group than does the survey.

Advantages of Survey Method

- Use of a *large representative sample in a survey reduces problems of sample bias* and allows the research to generalize his results to the parent population.
- Data collection *can take place in any setting*. It is assumed that the respondents' replies generally remain influenced by the setting in which they are given, for example consumers can be as validly and reliably interviewed for their preferences in their homes as in any other setting such as offices, factories, street corners, etc.
- *Data are obtained directly from respondents*.
- A *variety of data collection techniques can be used alone or in combination*.
- If mail questionnaire is used to collect data, *the cost of collection per respondent is relatively low* as compared for example, to the interview technique.
- Surveys often *yield information that suggests new hypothesis*.

Limitations

- In this method there is *generally initial resistance to being interviewed* either because the respondent does not wish to be bothered or because he suspects some trap. If mail questionnaires are used to collect data the proportion of returned questionnaires is often low.
- In this method there are *possibilities of the information being biased or shallow*. Bias can be both deliberate and non-deliberate. **Non-deliberate bias** generally creeps up in the form of *approximation when respondents are asked to supply information on same past events which they do not exactly remember*. Thus, a village vendor may claim to have sold five kilos of salt during the last month instead of seven he actually sold. **Deliberate bias** creeps in when the *respondent distorts his replies purposefully in order to gain some favor or avoid some unpleasant consequences*. Shallowness means that the survey information ordinarily does not penetrate very deeply below the surface.
- *Use of standardized response format* (e.g. structured interviews and questionnaires) in many sample surveys force respondents to subscribe to statement they do not fully endorse.
- Most surveys are **"one shot"** studies. This means *they collect data at only one point in time as apposed to longitudinal studies* in which repeated measures are taken on the same sample.
- This method *does not involve manipulation of independent variables*. As a result *cause-and-effect relationships between variables cannot be established* by this method.
- The repetitive job of filling in the same questionnaire or *putting the same questions to the informants again and again some times causes monotony to an investigator* who, like an experiment in the laboratory setting can not change his experiments every now and then.

How to Survey

Once we have decided to use the survey approach there are *three strategy decisions* that strongly affect the design of our survey instrument.

These concerns:

- A. The *communication mode* that we choose by which to conduct the questioning
- B. The *degree of structure* that is imposed on the questioning and response processes, and
- C. The *degree to which the objectives* of the study are *to be designed*.

A. Communication Modes

Communication interactions between researcher and respondent are either *personal, impersonal/or mixed in nature*.

Personal Mode: This mode typically involves a ***one-on-one*** relationship between interviewer and interviewee. The interviewer uses either an interview schedule or interview guide. These responses may be recorded in writing, by tape recorder or in some other way.

Impersonal Mode: In this communication mode the researcher typically depends upon a ***printed instrument to carry the two-way communication task***. The impersonal mode of questioning makes it possible to use mail or group-administered surveys.

Mixed Mode: While we think of personal and impersonal approaches as alternative methods, *there is no reason why they cannot be combined*. Examples might be where prior telephone appointments or screening are made for later personal interviews. There is some question as to whether prior telephoning improves or decreases the chances of securing an interview. There is evidence for both sides of this argument. Telephone screening to qualify respondents has been very effective. *Much more complex research designs call for using all communication modes in a study.*

B. Process Structure

A second useful perspective on the development of survey instruments is based on the *degree of questioning structure and response structure*.

Questioning Structure: With structured questioning the interviewer asks questions in a ***standardized format and sequence***. This helps to assure that each question is asked the same way in each interview, prompting measurement reliability. A standardized questioning sequence also makes it easier to develop a standard line of questioning that builds on prior responses. We can also use less skilled interviewers with structured questions.

At the other extreme are the *relatively unstructured interview processes*. These include the so-called ***depth interviews, focused/and nondirective methods***. A depth interviews is *loosely structured effort to question* a respondent in detail about opinions, feelings, and attitudes.

Response Structure: Forms of response may be ***classified as open or closed***. In open form respondents are *free to reply with their own choice of words and concepts*. Open responses are always found with *unstructured questions* and are particularly useful in studies where discovery is the objective. *Response freedom encourages a variety of frames of reference which can be unanticipated insights to the researcher*. The open response form may also be used with structured questioning.

With the ***closed response form the respondent chooses from two or more predetermined response possibilities***. Closed questions also have their disadvantages. They force a statement of opinion that is couched in the researcher's terms rather than the respondent's. Respondents can easily be led to give an opinion which they really do not have, and the limited response alternatives may not adequately represent the respondent's view point.

C. Objective Disguise

A third decision affecting the survey design is ***whether we should disguise the objectives of the study***. Much research on human subjects is disguised because it is believed that if we do otherwise we will introduce too many distortions. Here we are concerned with the narrow form of this problem.

Shall we disguise the objectives of our questions? *The accepted wisdom is that often we must do this or abandon our research efforts*. Our decision as to when to use disguised questioning may be made easier by *identifying four types of interview situations* relevant to this problem of disguise.

(i) We ask for information from respondents *who know it at a conscious level but are willing to provide it*. For example, we ask whether they have watched a certain movie.

(ii) We ask for information from respondents *who know it at a conscious level but are unwilling to provide it*. For example, we ask for an opinion on some topic for which they hold a socially unacceptable view.

(iii) We ask for information *which is knowable at a conscious level but which the respondents do not know*. For example, we ask why their actions differ from those of others when the reason lies outside their knowledge and experience,

(iv) We ask for information *which the respondents do not know at a conscious level although they have the information at some deeper level*. For example, we seek insight into the basic motivations underlying their consumption practices.

Here:

Type 1: Situations seldom need disguised questions but waiting for being asked.

Type 2: Situations respondents *may not give stereotyped answers*.

The researcher *can encourage more accurate information or answers* by phrasing the questions in a hypothetical way, or by asking *how "people around here feel about this topic"*. The assumption is that responses to these questions will indirectly reveal the respondent's opinions.

Indirect questioning and analysis may often be needed to achieve the research objective in the

Type 3: Decision.

Type 4: Where the situation represents the *depth type of study*, which may or may not be disguised.

Steps in Conducting a Survey

Important steps involved in conducting a survey are: *planning, collecting of facts, analyzing the facts and presenting the findings*.

1) Planning a survey

The job of planning a survey should preferably be *assigned to a committee composed of representatives from various community organization and agencies*.

The popular character of this committee generally helps in *winning the company's co-operation in field work and laying foundations for acceptance by the community* of the recommendations of survey in future. The committee may be charged with drawing up a plan covering the following points:

- i) *Statement of objectives*
- ii) *Knowledge about similar studies*
- iii) *Preparation of a work schedule and budget*
- iv) *Arrangement*
- v) *Determination of sample*
- vi) *Preparation of questionnaire*
- vii) *Selection, training and supervision of field investigators*

2. Collecting the Facts

When planning is completed the survey team *moves "into the field" and undertakes the field work that is the collection of facts*. The first general principle of fieldwork is *to maintain good rapport with informants*. Misunderstanding of informants should be removed immediately. The staff should be helped to maintain an objective attitude.

Finally, the *data collected should be treated in the field itself*.

3. Analyzing the facts

A survey is not finished with the collection of facts. *Experienced researcher must breathe life into the cold data by skilful analysis*. But there are three preliminary steps *editing, classifying and coding the data*.

4. Presenting the Facts

Presenting of facts is the last stage of a survey. Through good presentation, *significant facts and comparisons are high lighted and their intelligent use is rendered possible*. Presentation of facts can either be *formal or informal*. Formal presentation is *in the form of graphs and tables*. Informal presentation is either in the *form of running text or in semi tabular*.

Pilot Survey

A pilot survey is the ***whole survey operation in miniature***. It is a careful *empirical checking of all phases of the study from the collection of data to their tabulation and analysis*. In testing the direction of hypothesized relationships, the pilot survey should be subjected to the same type of data analysis as expected for the main study. At least, the basic measures of central tendency and dispersion should be obtained to determine whether hypothesis are holding up as expected for major independent/dependent variable relationships.

The scale of this survey will depend on the *available resources of time/money and personnel*, but it should be large enough to permit an initial analysis of the adequacy of questionnaire and of the training, instructions and supervision of interviewers under field conditions. A pilot survey is thus a sort of ***"dress rehearsal"*** which *reveals to the planners and interviewers their weakness and teaches them the correct way of doing the job*.

Interviewers also *learn during pilot survey significant non-verbal cues*-the kinds of gestures, facial expressions, hesitations, missions, in consistencies etc., that indicate when a person is *exaggerating*,

minimizing, avoiding, guessing or otherwise falsifying answers. In short, the **pilot survey is a preview of how will interviewers performs, respondents behave and procedure work is practice.**

Advantages of Pilot Survey

1. It tells about the completeness, accuracy, and convenience of the sampling frame from which it is proposed to select the sample.
2. It unfolds the variability (with regard to subject under investigation) with in the population to be surveyed. This is of importance in determining the size of the sample.
3. It helps in bringing out the inadequacies of the draft questionnaire.
4. It shows how effective the training has been in ridding the interviewers of their prejudices and in motivating them, what are deficiencies of training curricula, staff incentives, etc.
5. It helps in distinguishing the serious type of interviewers from the non- serious and honest from the cheat. It also helps in finding out the type of person "most likely" to be a good interviewer in the study.
6. It allays interviewers' fear about overtly sensitive questions and builds their self confidence. They learn a variety of tactics and codes of conduct which they should follow to build rapport with the respondents. They also learn to respect the local culture.
7. It tests interviews' stamina to work under conditions of personal discomfort, stress and fatigue.
8. It tests the efficiency of survey organization in the field, in the office and in the communication between the two. It shows how much and what type of supervision is needed and how much can instructions be made more effective.
9. It helps in identifying the needs for different kinds of equipment and vehicles. Conditions for local terrain will decide the need for different types of transport. Similarly, the climate of the region will decide the need for different field equipments.
10. It provides data for making estimates of time and cost for completing various phases of the project and shows ways to affect savings.

2. Observation Method

Observation is a very important technique of data collection in use in experimental and non-experimental, social and anthropological research. *In the strict sense it implies the use of the eyes rather than of the ears and the voice in scrutinizing collective behavior.*

Under this method the investigator obtains the data by watching and noting the phenomena as they occur with regard to their cause and effect or mutual relations. An example of data collection by observation is the investigation of expenditure and living conditions of labor class by actually living with various labor families.

To make effective observations the investigator must have a definite goal and hypothesis. For example, in a study of road accidents the investigator may formulate the hypothesis that *accidents are caused by reckless speed and not by narrow or poor roads* as generally assumed. This will give focus to his observations for he will not divert his attention to many other causes such as the condition of the motor car, condition of road congestion, etc.

Unit of Measurement for Observation

Before starting observation the observer must first decide his unit of measurement. He should decide what behavioral acts he would use in measuring human behavior. These acts can be either small or big. Small or molecular behavioral acts are quite precisely defined and easily observed and recorded.

They thus possess a *high degree of reliability*. But collectively these acts may not measure the same behavior as was intended to be measured. They therefore, *lack validity*.

On the other hand big or ‘molar’ behavioral acts being more natural in size have a high degree of validity but being imprecise in their definition lack in reliability. Consider, for example, observation of the work behavior of a secretary.

An observer might be able to *reliably observe and record the number of minutes the secretary is engaged* in such molecular acts as typing, filing or answering telephone calls. But if the purpose of observation is to measure the general effectiveness of the secretary, then the observation of these acts is less than adequate in terms of validity since such other behaviors as devotion, confidence, guarding secrets, etc., is not represented by these acts.

Sample of Behavior

Sample of behavior can be obtained in two ways:

1. *By sampling events*
2. *By sampling time*

1. By Sampling Events: In event sampling the observer selects for his *observation integral behavioral occurrences of events* such as *temper tantrums, fights and quarrels, games, verbal interchanges on specific topics, floor interactions* between foreman and works and so on.

2. By Sampling Time: In time sampling the observer *selects for his observation (behavioral acts) at different points in time*, say, three one hour observations (at specified or random times) on each day.

Some time, *both event and time sampling are combined*. For example, for studying the behavior of a foreman one can draw a random sample of shifts and observe his behavior in its entirety during the sampled shifts.

Merits and Demerits of Event Sampling

Merits

- Events are natural life-like situations which make *the observer feel that he is actually observing what he intends to observe*. In other words *he feels that there is validity* in his observations.
- Integral events *possess continuity of behavior*. The observer witnesses situations from their beginning to end.
- *Study of infrequent and rare events requires event sampling* because they can easily be missed by time sampling.

Demerit

- The observer *must either know when the events are going to occur and be present when they occur*, as with verbal interchanges on specific topics in a meeting or wait until they occur, as with fights, quarrels, admonitions, praise, sympathetic behavior etc.

Merits and Demerits of Time Sampling

Merits

- Time samples are generally *more representative in nature if behavioral acts occur fairly frequently.*

Demerits

- Time samples *lack naturalness and continuity* more particularly when small units of time and behavior are used
- *Infrequent behavior has a high probability of escaping the sampling net.*

Types of Observation

Observation can be of three types:

1. *Simple or uncontrolled observation*
2. *Systematic or controlled observation, and*
3. *Mass observation*

a) Simple or Uncontrolled Observation

Simple or uncontrolled observations are ***those which do not make use of any standardized observational techniques*** such as carefully drawn out schedules and questionnaires, tests, etc. With this result, *there are no checks on the observer's biases*, his selection perception and the vagueness of his senses. Too often, *his prejudices and desires become concisely woven with the fabric of his conclusions.* Also there is *no check on the reliability of information.*

The data collected by any two observes ***cannot be compared.*** To the intent that each observer's record of experiences is uniquely his own, the data gathered by him cannot be compared with those gathered by any other observer. This gives rise to the *problem of standardization.* However, despite its weaknesses, the use of this method is ***very common in exploratory social investigations.***

b) Systematic or Controlled Observation

The observer's bias is the crucial weakness of uncontrolled observation. Systematic or controlled observation tries to remove this weakness by ***using various control techniques ranging from simple testing and scoring devices to elaborate laboratory set-ups.***

Very often, an exhaustive list of mutually exclusive categories of behavior with a description of each category is prepared and the *job of observer is simply to assign observed behaviors to different labeled categories.* Perhaps the best known example of such list is the interaction analysis technique devised by **Robert Bales.** Under this technique observer is required to *place his observation in twelve predetermined categories.*

Time and Motion studies are also examples of systematic or controlled observation. In these studies *categorized reporting is done of actual engagement behavior of workers on job with machine.* This technique is also used with the management staff to analyses how managers spend their time and what they actually do.

It should be noted, however, that use of such techniques *does not completely eliminate observer's bias.* Many times if the categories are vague and the specifications in adequate, different observers

can easily put different interpretations on the same behavior. On the other hand, too specific categories, while they cut down ambiguity and uncertainty, may tend to be *too rigid and inflexible*. But such lists *definitely enable the observer to tell how he made his observations, under what conditions, when and so on*. Others thus come to know the limitations of his data, and can repeat the observations if they like.

Controlled observations may be carried out *both in the natural and contrived situations* and in either case those observed may or may not be aware of the observation. Thus for examples, children may be observed for their skill when they are engaged in natural play or people may be observed for their behavior in artificially created conditions of panic.

c) Mass Observation

This method is *used to record mass or collective behavior of people in public places* on the basis of observation and interviews.

Types of Uncontrolled Observation

Uncontrolled observation may be of three types:

1. *Participant observation,*
2. *Non-participant observation, and*
3. *Quasi-participant observation*

a) Participant Observation

This method is followed in those investigations *where there is need to **penetrate deep** in to the ‘inner sanctum’ of the group* which is being studied.

In this method the **observer generally lives in the group which he is studying with out revealing his identity**. Thus he does to *procure certain vital information not procurable by other methods* of data collection. Thus, for example, an investigator interested in knowing about the *secret rituals of a tribe* may start living with them as one of their tribesmen or may attempt to find some other role which is acceptable to the group, while not divulging his real purpose.

The success of this method depends on **two factors**. **First**, the investigator *must have the skill to **gain the confidence** of the persons being studied* so that his presence does not disrupt or in any way interfere with the natural course of events and they provide him with *honest answers* to his question and not hide important activities from his view.

Second, the investigator should have *the ability to prevent his own preconceptions from distorting his interpretations*. He should collect as wide a range of facts as is possible and should not begin shifting and interpreting them until he has gained enough familiarity about the general life pattern of the people begin studied.

Advantages

- An *unobtrusive participant observer gets a realistic view of natural (unopposed) behavior* which at times can not be obtained when people get the feeling that they are being observed. In fact, people act differently, even artificially, when they know that they are being observed.

- An *unobtrusive participant observer* secures access to many secret information's and be comes aware of many new variables and processes which he may not be aware of at the inception of the study.
- Since the period of participation continues for months, *the range of material collected is much wider than that gained by any other method.*
- By living unobtrusively with the group *the observer can easily check the correctness of his information* as often as desired.

Limitations

1. This method *demands of an observer a high level of empathy.* The observer is required to recreate in his imagination the thoughts and feelings which are in the minds of his subjects. He has to structure his own thinking according to the conventions and customs of his subjects. This may be difficult for an outsider who is not intimately familiar with his subject's culture.
2. This method is *very time-consuming* and the data are generally of a *description rather than statistical* nature.
3. The *observer may some times become one with the group and loose his objectivity.* As a consequence *he may ignore several occurrences* in the group and *not record them at all* thinking that they are just common place and natural. Also, as he becomes an increasingly familiar figure in the group, he may lose a vital part of the status which encourages tolerance for his presence and his 'strange' questions.
4. *Replication Studies to standardize findings can not be easily made* in this method because the same group may object to being observed over and again or *may under go a change by the time the second investigator comes to study it.* It is because of this limitation that many social scientists prefer to think of participant observation as *merely an exploratory approach* rather than are approach which yields a finished piece of research.

b) Non-Participant Observation

In many research situations it is *almost impossible for the observer to himself participate in all ways.* For example, a researcher can not become a criminal in order to study a criminal gang or a female social scientist can not become prostitute in order to study prostitution. In all such cases the ***researcher may collect data as a non-participant observer with attempting to disguise himself completely.***

c) Quasi-Participant Observation

Purely non-participant observation is difficult. In the absence of any standard set of relationships or role patterns for the outsider who is always present but never participating, both the group and the outsider are likely to feel uncomfortable. Therefore, in many social surveys quasi-participant observation method is preferred. In this method the *observer assumes several roles. Some times he is in the role of a participant taking part in the activities* of the group such as games and dances. At other times he is in the role of an interviewer, a stranger or a listener. Nevertheless, ***he makes it clear to the group that purpose is to gather facts.***

Non participant or quasi-participant observation can be either *direct or indirect.* One can generally observe *current behavior directly.* For example, if he is interested purchasing behavior, he can observe people actually making purchases.

However, to observe other types of behavior or indirect observation i.e., *he must observe the effects or results of the behavior rather than the behavior itself*. The type of indirect observation is the examination of archives or secondary sources. Another type of example involves physical traces. For example one can use physical traces to study the consumption of alcohol in certain locality.

Rules for Guidance of an Observer

1. The observer should *first of all formulate his hypothesis*. This would provide the desired focus to his study and will guide him in deciding the categories of facts to be observed.
2. The observer should *penetrate behind the things which he observes* and should ascertain the degree and nature of interrelationships of the observed phenomena.
3. The observer should *keep a daily record of all occurrences in the form of a diary*. This can be supplemented by photographs which tend to present an event with greater authenticity, accuracy and impartiality.
4. The record of observations *should be kept separate from the record of their interpretations*.
5. A continuous *analysis of records should be made while the field work is under way*. Ideally the record should be sent for analysis to the colleagues who are not in to field so that their comments may be used in the collection of data in the following period.
6. The observer *should always take stock of himself to see if he is not becoming a victim* of any biases or prejudices.
7. *Uncontrolled observations should as far as possible be supplemented by some other tools* such as questionnaires, tests, quantitative analysis, etc.

3. Experimental Research

What is Experimentation?

Experimentation is a *special type of investigation used to determine whether and in what manner variables are related to each other*. In the classical concept of an experiment we are concerned with determining whether *there is a relation between an independent variable (IV) and a dependent variable (DV)*.

We do this by intervening in the research setting. **First**, we *manipulate IV by causing it to be present in some cases, and absent in others* than we observe the effect of this manipulation on the presence of absence of the DV. **Second**, we *arrange conditions so that other variables are not allowed to affect the DV*, usually through some type of control.

It may be **possible to approach this idealized concept under laboratory** conditions, but it is *not very practical in business research* for two reasons.

First, *full manipulation and control is usually not possible*.

Second, we are often *more interested in the question of concomitant/related variation*, that is in what manner variables are related to each other.

Experimental or Laboratory methods are so called because in them the investigator, like a scientist in a laboratory, ***tests the hypothesis about a cause and effect relationship by manipulating the independent variable under controlled conditions***. These methods are further sub-divided into *laboratory experiments simulation and field experiment*.

i. Laboratory Experiments

Laboratory experiment is one that *takes place in a laboratory as opposed to a natural setting*. Here, the investigator with a view to find out the cause and effect relationship between certain variables:

- 1. Creates a situation in the laboratory very much akin to natural setting*
- 2. Controls all extraneous variables, and*
- 3. Manipulates independent variables*

In recent years this method has been increasingly used in the field of organizational behavior.

Advantages

- 1. The experimenter has complete control over the laboratory situation*. He can and often does succeed in eliminating the many extraneous influences that may affect the dependent variable.
- 2. Measurements in laboratory are more precise* because they are made with precision instruments.
- 3. Laboratory experiments have high internal validity*. When some cause and effect relation is discovered between two variables in a well executed laboratory experiment one can have considerable confidence in the result because one knows that no other outside variables which were held under check can account for this relationship.
- 4. Laboratory experiments can be replicated*, i.e., results of one study can be reproduced in a later study.

Limitations

- 1. Organizational research by laboratory experiment is difficult because it is difficult to create a facsimile/true copy of an organization in a laboratory*.
- 2. Some phenomena* (e.g. natural disasters and the behavior that accompanies them) *can not be studied in the laboratory*.
- 3. A number of variables* (such as age, race, intelligence, etc.) *cannot be manipulated* by the experiments.
- 4. Performing laboratory experiments successfully requires high skill* on the part of experimenters.
- 5. Laboratory settings are contrived/unnatural situations*. They lack realism and hence their results may not be generalized to real life situations. They *lack external validity*.
- 6. There are ethical and moral objections to the manipulations* associated with some experiments where subjects may experience some psychological and physical harm.

ii. Simulation

As in the case of a laboratory experiment, in a simulation study also *the setting is deliberately structured to mirror important dimensions of some naturally occurring system*. The only difference between the two is that where as in a *laboratory experiment the system being studied is more generic/broad*, e.g., a formal organization, *in a simulation it is specific* e.g., person.

Advantages

- 1. There is greater realism* in the setting
- 2. There is greater amount of control over external* sources of variance
- 3. The researcher enjoys greater ability to manipulate independent variables*
- 4. There is high participant involvement*

Disadvantages

1. This method is *expensive*
2. The *high degree of participant involvement increases the risk of the subjects being psychologically harmed* in the course of the study.

iii. Field Experiment

A field experiment is a **research study done in a realistic situation in which one or more independent variables are manipulated by the experimenter under as carefully controlled conditions** as the situation permits. A field experiment differs from a laboratory experiment in that it *always takes place in a natural setting* which may be a school, a factory, a hospital, a lesson, an army camp, and so on.

But a laboratory experiment is *always done in the contrived setting of a laboratory*. As a corollary/result it can be said that field experiment takes place in a *loose situation* unlike laboratory experiment that takes place in a *tightly controlled situation*.

A field experiment is a *compromise between control and generalization*. Organizational research by field experiment is rare because management generally do not like to make guinea pigs of their organizations.

Advantages

- Since field experiments involve studying phenomena in natural settings the *general liability of results of such studies is greater* than that of data from laboratory experiments.
- To the extent that the researcher employs an experimental design and is able to manipulate independent variables *casual references from field experimental data may be justified*.
- Field experiments are *well suited both to the testing of theory and to the solution of practical problems*. Studies seeking to determine which teaching methods get the best results are field experiments.

Limitations

- *Manipulation of independent variables and randomization* though conceivable are *not practicable in many field situations*.
- One *can not get the same degree of precision and control* in this method as is obtainable in a laboratory experiment.
- To the extent that a field experiment requires the researchers to maintain prolonged contact with system *the experimenter's objectivity in studying the system may suffer*.
- This method is *generally much more expensive than the laboratory experiment* method. It also requires a lot of imagination, patience and courtesy on the part of researcher to obtain the consent and cooperation of people in the organizations where research is to be done.

4. Personal Interview

Personal interview is a *face-to-face interview* with the respondent. It is a **two-way conversation initiated by an interviewer** to obtain information from a respondent. The differences in roles of interviewer and respondent are pronounced. They are typically strangers, and the topic and pattern of discussion are *generally controlled by the interviewer*.

The respondent/interviewee is asked to provide information with little hope of receiving any immediate/direct benefit from this cooperation. Yet, if the interview is carried out successfully; it is an excellent data collection technique.

Advantages

- *Depth and detailed information can be secured*
- *Interviewer can improve quality of information through adjustments of questions*
- *Interviewer can note condition of the interview*
- *Interviewer can probe more information with additional questions*
- *Interviewer can gather additional information through observation*
- *Interviewer can control the process than other methods*
- *Interviewer can make adjustments to the language of interview*

Disadvantages

- *Costly, both in money and time*
- *Respondents may be reluctant to talk with strangers*
- *Interviewers may be reluctant to visit unfamiliar respondents*
- *Interviews can be adversely affected by bias of interviewers*

5. Telephone Interview

Telephone interview can be *helpful in setting-up personal interviews and screening large populations* for unusual type of respondents. This type of interview can be used to improve the response rates of questionnaire survey by making prior notification call.

Advantages

- *Moderate cost in money and time*
- *Reduced bias than personal interview*
- *Access to respondent through low cost and efficient means*
- *Will almost always answered, if one exists at home*
- *It is the caller who determines the purpose, length and termination of calls*

Disadvantages

- *Respondent must be available by phone*
- *Probability of obsolete numbers and absence of phone in the household*
- *Limit in interview length; based on respondent's interest*
- *Not possible to use maps, illustrations or complex scales*
- *Limitation to complexity of questions and use of sorting technique*
- *Lower response rate than face-to-face interview*
- *Less complete than personal interview*

CHAPTER FIVE

DATA PRESENTATION AND ANALYSIS

Introduction

Data collected either through primary or secondary or both is/are required to be presented in a certain way for simplification of analysis process. After collecting data from the field, the researcher has to process and analyze them in order to arrive at certain conclusions which may or may not support the hypothesis which he had formulated towards the beginning of his research work. Planning for data processing must be done well in advance of field work as an integral part of the research design.

Chapter five of this module deals with data presentation, data analysis, elements of data analysis, types of data analysis, and hypothesis testing.

5.1. Data Presentation

After collecting data from the field, the researcher has to *process and analyze them in order to arrive at certain conclusions which may or may not support the hypothesis* which he had formulated towards the beginning of his research work. Planning for data processing must be done well in advance of field work as an integral part of the research design.

The following are the *stages through which the raw data must be processed* in order to ultimately deliver the final products.

1. Editing: Editing means *to look for and remove any errors, incompleteness or inconsistency in the data*. If the raw data are erroneous, incomplete, or inconsistent, these deficiencies will be carried through all subsequent stages of processing and will greatly distort the results of any inquiry. Therefore, at this stage, certain questions are specified for 100 percent editing because they are known to be especially troublesome or particularly critical to study objectives. The editor is responsible for seeing that the data are:

-  As accurate as possible
-  Consistent with other facts secured
-  Uniformly entered
-  As complete as possible
-  Acceptable for tabulation and
-  Arranged to facilitate coding and tabulation with regard to points or stages at which editing should be done, one can talk of field editing and control editing.

a. Field Editing: It consists in the *review of the reporting forms by the investigator for completing (translating or rewriting) what the later has written in abbreviated and/or in illegible form* at the time of recording the respondent's responses. This type of editing is *necessary in view of the fact that individual writing styles often can be difficult for other to decipher*.

This sort of editing should be done *as soon as possible* after the interview, preferable on the very day or on the next day. While doing field auditing, the investigator must *restrain himself and must not correct errors of omissions by simply guessing* what the informant would have said if the question had been asked.

b. Central Editing: This should take place *when all forms or schedules have been completed and returned to the office*. This type of editing implies that all forms should get a thought editing by a single editor in a small study and by a team of editors in case of a large enquiry. Editors must keep in view several points while performing their work, from among which the following are noticeable:

- They should be *familiar with instructions given to the interviewers and coders* as well as with the *editing instructions* supplied to them for the purpose
- While crossing out an original entry for one reason or another, they *should draw a single line on it so that same may remain legible*
- They *must make entries (if any) on the form in some distinctive color and that too in a standard form*
- They *should initial all answers which they change or supply*
- Editor's *initials and date of the editing should be placed on each completed form or schedule*.

2. Coding: Coding refers to the *process of assigning numerals or other symbols to answers* so that responses can be put in to a limited number of categories or classes.

Coding is necessary for efficient analysis and through it the several replies may be reduced to a small member of classes which contain the critical information required for analysis. Coding decisions should usually be taken at the designing stage of the questionnaire.

The following are important guidelines for coding:

- Codes should be *mutually exclusive*
- Set of categories should be collectively *exhaustive so that all responses should be classified in one or the other category*
- Separate categories should be *created for recording 'non-response' and 'no knowledge' response*.
- *Inter coder and intra-coder agreement tests should be conducted through out the entire coding process to check its reliability.*
- Ensure that *responses are being coded systematically*.

3. Classification: Most research studies result in a *large volume of raw data* which must be reduced in to homogenous groups for getting meaningful relationships. In this step, *data having common characteristics are placed in one class* and in this way the entire data get divided into a number of groups or classes. Classification can be of like following two types, depending upon the nature of the phenomenon involved:

a. Classification according to Attributes

Data are classified on the basis of *common characteristics which can either be descriptive or numerical*. Descriptive characteristics refer to *qualitative phenomenon which can not be measured quantitatively*; only their presence or absence in an individual item can be noticed. Data obtained in this way on the basis of certain attributes are known as **statistics of attributes** and their classification is said to be classification according to attributes.

Such classifications can be *simple or manifold* classification:

In simple classifications we consider *only one attribute and divide the universe in to two classes-one consisting of items possessing attributes and the other class consisting of items which do not possess the given attribute.*

In manifold classification we consider *two or more attributes simultaneously, and divide the data in to number of classes.*

b. Classification according to class-intervals

Unlike descriptive characteristics, the numerical characteristics *refer to quantitative phenomena which can be measured through some statistical units.* Data relating to income production, age, weight etc. come under this category. Such data are known as *statistics of variables and are classified on the basis of class intervals.*

4. Tabulation: When a *mass data has been assembled*, it becomes necessary for the researcher to *arrange the same in some kind of concise and logical order.* This procedure is referred to as tabulation. Thus, tabulation is the ***process of summarizing raw data and displaying the same in compact form for the further analysis.*** In the broader sense, tabulation is an orderly arrangement of data ***in columns and rows.***

Tabulation is essential because of the following reasons:

- It *conserves space and reduces explanatory and descriptive statement to a minimum*
- It *facilitates the process of comparison*
- It *facilitates the summation of items and the detection of errors and omissions, and*
- It *provides a basis for various statistical computations*

Tabulation can be done by hand or mechanical or electronic devices. The choice depends on the size and type of study, cost conditions, time pressures and the availability of tabulating machines or computers.

Generally accepted principles of tabulation include:

- Every table should have *clear, concise and adequate title* so as to make the table intelligible without reference to the text
- Every table should be *given distinct number to facilitate easy reference*
- The column headings and row *headings of the table should be clear and brief*
- *Units of measurement* under each heading or sub heading *must always be indicated*
- *Explanatory foot notes, if any, concerning the table should be placed directly beneath the table.*
- Source of data *must be indicated below the table*
- It is generally considered *better to approximate figures before tabulation* as the same would reduce unnecessary details in the table itself
- In order to emphasize the relative significance of certain categories, *different kinds of type, spacing and indentations may be used*
- *Abbreviations should be avoided to the extent possible and ditto marks should not be used in the table*
- *Miscellaneous and exceptional items, if any, should be usually placed in the last row of the table*

- Table should be made *as logical, clear, accurate and simple as possible*. Very large data should not be crowded in a single table.
- The arrangement of the categories in the table *may be chronological, geographical, alphabetical or according to magnitude to facilitate comparison*.

Above all, the table ***must suit the need and requirements of an investigation***.

5.2. Elements of Analysis

After data collection, proper tools and techniques should be used for classification and analysis of data. Tools of data classification include:

- *Frequency distribution*
- *Cumulative frequency distribution*
- *Relative frequency distribution*
- *Charts; pie chart, bar chart, stacked bar chart, histogram, frequency polygon and ogive curves*

The manner in which data can be analyzed *depends to a great extent upon the measurement and sampling procedure* followed in their collection. Depending upon these two components the analysis of all collected data ***can be either statistical or non statistical***. A statistical analysis is always more *precise and objective*. It also enables the readers of the study to evaluate the quality of the research. This is not possible in the case of non-statistical analysis which is *always qualitative and therefore less accurate*.

5.2.1. Types of Analysis

Analysis may be categorized as *descriptive analysis and inferential analysis*.

1. Descriptive Analysis: Is largely the *study of distributions of one variable*. This study provides us with *profiles of companies* work group, persons and other subjects on any of a multitude of characteristics such as size composition, efficiency, preferences etc.

This sort of analysis may be in respect of ***one variable (uni-dimensional analysis)*** or in respect of the ***two variables (bivariate analysis)*** or in respect of ***more than two variables (multivariate analysis)***.

I. Statistical Measures for Single Varate Analysis

Where the data consists of measurement of *only one variable, they are often presented either in the form of a frequency table or a time series*. In a frequency table one column gives observed values of a random variable X and the other gives the frequency of each value.

In a time series one column gives certain units of time and the other gives observed values of a variable as it varies from one time period to another.

A) Frequency Table

Frequency table is commonly analyzed in terms of its *four important characteristics* viz. **central tendency, dispersion, skewness and kurtosis**.

B) Time Series

Time series is analyzed in terms of *four important components* viz. **trend, seasonal variations, cyclical variations and irregular variations.**

1. Measures of Central Tenancy or Averages

These measures are so called because they *show a tendency of the distribution to concentrate at certain values, usually some where in the center of the distribution.* These include mean, median, mode, Quadratic mean and index number.

2. Measures of Dispersion

How the items in a series are distributed and how they scatter?

Measures of Dispersion are:

a. **Range** as a measure of dispersion represents a *difference between the values of entree items* i.e., largest and like smallest items of the data under review.

b. **Semi-interquartile range** is the *difference between the upper and lower quarrel* divided by 2.

c. **Mean Deviation** is the *average distance of the items* in a series from their average.

d. **Standard Devaluation**

3. Measures of Skewness

The data in a frequency distribution may fall in to *symmetrical and asymmetrical* patterns. The **measures of the direction and degree of asymmetry** are called measures of skewness. In a symmetrical distribution the mean medium and mode between any two of these values indicates the extent of skewness.

Thus the measures of skewness are:

a. Mean-Mode

b. Mean-Median

c. Median-Mode

4. Measures of Kurtosis

These measures *show the extent to which the distribution (when method and graph) is more peaked or less peaked than the normal curve.* If the terms are *more closely bunched around the mode* than normal, making the curve unusually peaked, we say that curve is *lepto kurtic*. If on the other hand, the curve is more *flat-topped* than normal, we say it is *platy kurtic*. The condition of *peakedness or of flat toppedness itself* is known as *kurtosis* or *excess*.

II. Statistical Measures for Bivariate Analysis

If we have the data on *two variables* i.e., *for every measurement* of a variable x, we have *corresponding value of a second variable Y*, the resulting pairs of values are called a bivariate population.

i. Correction techniques

- Karl Person's coefficient of correlation (simple linear correlation)
- Partial correlation
- Charles Superman's coefficient of correlation

- ii. Association of Attributes
- iii. Simple Regression

III. Statistical Measures for Multivariate Analysis

Much behavioral research is multivariate in nature and can not be done with a bi-variate approach. The determinants of phenomena like achievement, learning aggression, intelligence, certainty, risk taking, organizational productivity, group cohesiveness etc. are complex. **Many variables influence such phenomena, and multi-variable methods** are ways of studying multiple influences of several independent variables on one or more dependent variables.

Various statistical measures for multivariate analysis are:

- Multiple linear regression and correlation
- Discriminant analysis
- Factor analysis

5.3. Hypothesis Testing

The entire investigation is carried out by the researcher/research team according to the hypothesis formulated for the study. Hypothesis is the basis for the statement of the objectives of the study. It helps in the decision making with regard to the research design. Hypothesis formulation is not an end itself. The researchers **must test the hypothesis in appropriate manner viz., by statistical techniques or by an in depth field enquiries**. In lay man's parlance, hypothesis is a *kind of assumption that motivates or guides the researcher to proceed* with the research design and its implementation.

Hypothesis is the **statistical statement about the characteristics of population** made on the basis of sample evidence. A statistical hypothesis is **some assumption or statement, which may or may not be true, about a population or equivalently about the probability distribution characterizing the given population which we want to test on the basis of the evidence from a random sample**. Hypothesis can be formulated in either of the following two ways:

(i) Null Hypothesis (H_0): It states that *there is no much (significant) difference between the parameter and statistic*. In other words, H_0 states that the difference between sample statistic and the claimed population parameter is due to chance variation in sampling. Null hypothesis is *normally preferred in testing process*. It enables the researcher to test it.

The random selection of the samples from the given population makes the tests of significance valid for us. For applying any test of significance we first set up a *hypothesis-a definite statement about the population parameter(s)*. Such a statistical hypothesis, which is under test, is usually a hypothesis of no difference between statistic and parameter. Hence it is called null hypothesis. In the words of **R.A. Fisher** '*null hypothesis is the hypothesis which is tested for possible rejection under the assumption that it is true*'.

(ii) Alternative Hypothesis (H_a): It is used when **H_0 is false**. It is the *statement about the population that must be true if null hypothesis is false*.

Any hypothesis which is *complementary to the null hypothesis* is called an alternative hypothesis. It is important to explicitly state the alternative hypothesis in respect of any null hypothesis, because the acceptance or rejection of H_0 is meaningful only if it is being tested against a rival hypothesis.

Procedure for Hypothesis Testing

The first and foremost problem in any testing procedure is the setting up of the null hypothesis. As the name suggests, it is always taken as a hypothesis of no difference. The decision maker or researcher should always adopt the *neutral or null attitude* on the part of the researcher before drawing the sample is the basis of the null hypothesis. The following points may be borne in mind in setting the hypothesis:

1. If we want to test the significance of the difference between a statistic and the parameter or between two sample statistics then we set up the null hypothesis, **that the difference is not significant**. This means that the *difference is just due to fluctuations of sampling*.

2. **Setting the level of significance:** The hypothesis is examined on a predetermined level of significance. In other words the *level of significance can be either 5% or 1%* depending upon the purpose, nature of enquiry and size of the sample.

In hypothesis testing, *two kinds of errors are possible viz., Type I error and Type II error*.

Type I Error: Means *rejecting the null hypothesis* when it happens to be true.

Type II Error: Means *accepting null hypothesis* when it is false.

The following table briefly explains the type of errors.

Position of Hypothesis	Null Hypothesis-Accept	Alternative Hypothesis-Reject
H_0 TRUE	Correct Decision	Type: I Error
H_0 FALSE	Type II Error	Correct Decision

At the time of testing the hypothesis Type I error can be determined, at different levels of significance.

For instance, if the level of significance is 5%, it means that five cases out of 100 are rejecting the H_0 which is true. It is possible to reduce type I error by *lowering down the level of significance*. Both of the type of errors *cannot be reduced simultaneously*. We have to balance between them.

3. The next step in the **testing of hypothesis**, i.e. *calculation of Standard Error (SE)*. The standard deviation of the sampling distribution of a statistic is known as Standard Error. The concept of standard error (SE) is extremely useful in the testing of statistical hypothesis. Note that the SE is calculated differently for different statistical value.

4. **Calculation of significance ratio:** Significance ratio is symbolically described as 't'. It is calculated by dividing the difference between parameter and statistic by the standard error.

5. **Deriving the inference:** Compare the calculated value with critical value (table value). If the observed value is less it is insignificant and vice-versa.

CHAPTER SIX

DATA INTERPRETATION AND WRITING RESEARCH REPORT

Introduction

Data presented in a certain way should be interpreted in line with the research objectives, literature reviewed and research design. After being interpreted, the report of the findings of the research is written in grammatically meaningful, clear and understandable language. The research reports do have its own formal writing format though not usually identical. In this chapter of the module discussions regarding data interpretation and research report writing will be discussed.

6.1. Interpretation of Data

The most difficult task for individuals who are writing a research report for the first time is interpreting the findings to arrive at conclusions and then using these conclusions to formulate recommendations. The executive summary is the portion of the report that explains what the research found, what the data mean, and what action, if any, should be taken, based on the research.

The difficulties of this process are completely understandable, given that the researcher is often inundated with piles of computer printouts, stacks of questionnaires, hundreds of pages of cross tabulations, the results of hundreds of statistical tests, pages and pages of statistical analysis printouts, and a scratch pad full of notes on the project. There is, however, a ***systematic method*** that the researcher can follow to draw conclusions.

The ***research objectives and background stated*** early in the research process should serve as the *primary guide for interpreting findings and drawing conclusions*. These objectives should have been stated as specifically as possible, perhaps even with an explicit priority rank for each objective. Although the questionnaire should have been designed to touch on all facts of the objectives, specific bits of information about any one objective may be spread across the questionnaire.

Computer printouts often contain information in statistical order than in the order in which managers will use the data. Consequently, the researcher's first task is to pull together all the printouts and results that pertain to each of the various objectives one at a time.

Conclusions are generalizations that answer the research questions or that satisfy the research objectives. The conclusions are derived through the process of induction, or generalizing from small pieces of information.

The researcher should try to merge the information and then paraphrase it in a few descriptive statements that generalize the results. In short, the conclusion of a research report should be a statement or series of statements that communicate the results of the study to the reader but would not necessarily include any of the data derived from the statistical analysis.

6.2. Research Report Writing

The research task is not complete until the report has been written. A research report is the ***ultimate output of the research process***. It includes the following:

I. **Prefatory Item:** Items included as prefatory do not have direct bearing on the research itself. Instead *they are to assist the reader in using the research work* and may include:

1. **Letter of transmittal:** when relationship between the researcher and the client is formal, a letter of transmittal should be included.
2. **Title page:** The title page should include four items: *the title of the report, the date, for whom it is prepared, and by whom it is prepared.*
3. **Authorization Letter:** When the report is being sent to the public organization, it is common to include a letter of authorization *showing under whose authority the research was undertaken.*
4. **Executive Summary:** An executive summary can serve two purposes. It may be *report in miniature –covering all of the aspects in the body of the report* in abbreviated form. Or it could be a *concise summary of the major findings and conclusions, including recommendations.*
5. **Table of contents:** Include *major titles and subtitles with their respective page numbers.* If there are many tables, charts, or other exhibits, they should be listed in the contents.
6. **Acknowledgement:** Is a part whereby the *researcher thanks individuals and organizations* that supported/contributed to the research success in one way or the other.

II. **Introduction:** The introduction *prepares the reader for the report* by describing the following parts of the project:

1. *Problem Statement*
2. *Research Objectives*
3. *Background:* It may be of two types-(i) preliminary results of exploration from an experience survey, or another source or (ii) secondary data.

III. Methodology

In short reports and management reports, the methodology should not have a separate section. However, for technical report, it is an important section. It contains at least five parts.

1. *Sampling Design*
2. *Research Design*
3. *Data Collection*
4. *Data Analysis*
5. *Limitation*

IV. **Findings:** This is generally *longest and main section of the report.* It should be an **organized presentation of results** and not a clutter of prose, charts and tables.

V. Conclusion

- a. *Summary of conclusions*
- b. *Recommendations*

VI. **Appendices:** Represents *additional materials attached at the back to be referred* for detailed understandings for summary of points raised in main part of the research.

VII. **Bibliography:** Is lists of reference books or any other materials used in the research work with full description of the author, title of the book/material, year of publication, etc.

6.3. Guidelines for Writing the Research Report

The following guidelines are very important in research report writing:

1. *Develop your thinking*
2. *Divide your narration into paragraphs and use informative headings where ever necessary.*
3. *Use present tense and active voice.*
4. *Minimize the use of technical language or jargons.*
5. *Use visual aids in the form of tables and figures to illustrate the principal findings of the study.*
6. *Be objective*
7. *Treat data confidentially*
8. *Revise and re-write*

6.4. Different Steps in Report Writing

Research report writing involves the following steps:

1. *Logical analysis of the subject matter*

It is the first subject which is primarily concerned with the development of subject. Subject can be developed (a) - logically and (b)-chronologically.

2. *Preparation of final outline*

Outlines are frameworks upon which long written works are constructed.

3. *Preparation of the rough draft*
4. *Re-writing and polishing*
5. *Preparation of the final bibliography*
6. *Writing the final draft*

6.5. Presentation of Statistics in Research Report

The presentation of statistics in research report is a special challenge to writers. Four basic ways to present such data are:

1. A text paragraph
2. Semi tabular form
3. Tables
4. Graphics
 - a. *Line graphs*
 - b. *Stratum Charts (used for time series)*
 - c. *Pie Charts*
 - d. *Bar Charts*
 - e. *Pictographs and Geographics*
 - f. *3-D Graphics*