[redacted]

Lecture 1. Introduction to Academic Writing

1. What is academic writing?

Tertiary level students are supposed to write different forms of assignments during their academic studies (essay, paper, research paper, dissertation, article, lab/business report, etc). These assignments are referred to as "Academic writing" which follow certain conventions of structure, style and content. However, all of these assignments have the same goal and principles and address a specific type of audience i.e. "target reader" (Mennens MSc & Wilkinson MSc, 2002).

Although it may be seen as a torture by many students, academic writing assignment gives *you* an opportunity to investigate an issue and present your position based on the evidence of your research. It is your space to choose what seems to you as interesting subject, it is your own spot to stand up and convey your message, it also offers you the attention of an audience that is interested in reading what you think. Academic writing allows you to contribute to the academic debate; you evaluate the arguments of others and you suggest your own.

2. Characteristics of academic writing

In academic paper writing, you need to ask a good question then find answers to it. Discussing and interpreting your answers with logic and arguments show your understanding and appreciation of your topic and this is what earns you a good grade. The language in academic texts tends to be "precise, impersonal and objective" (Hartley, 2008: 3) in the sense that the writer avoids value judgments and biases and uses formal vocabulary, and references. Judgmental words such as *terrible, appalling, fantastic*, or *incredible* should be avoided. Heady (2007) lists the following characteristics of a good academic writing.

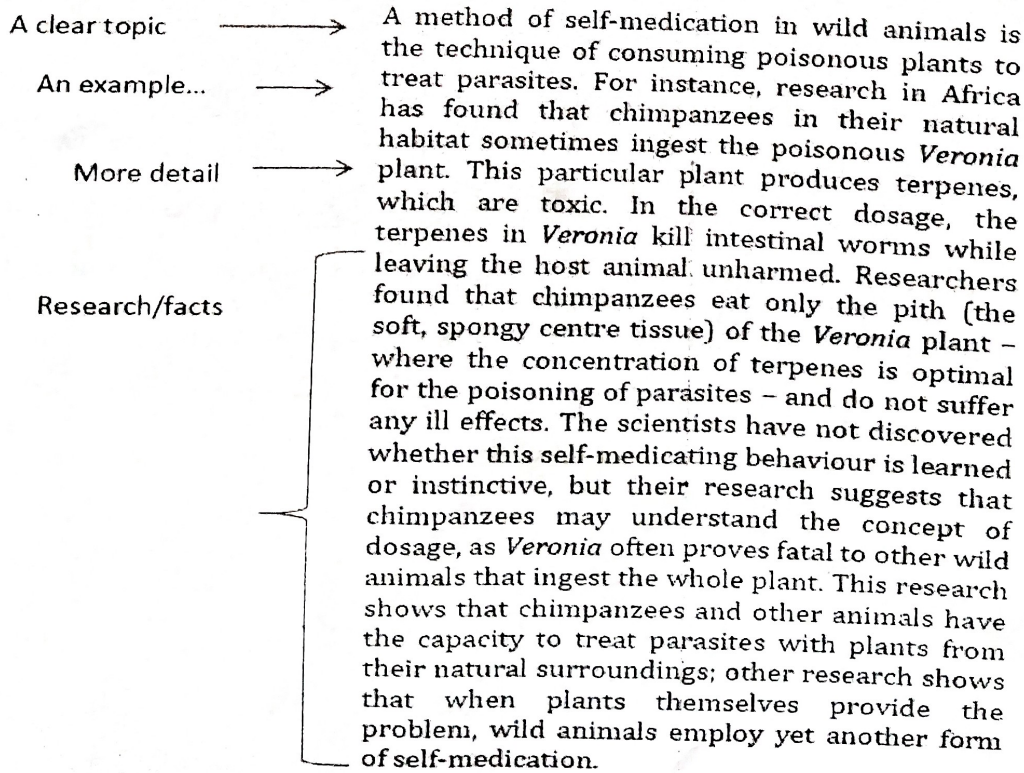
- It demonstrates good mechanical skills, including grammar, spelling, and punctuation.
- It is well organized, with main ideas introduced early on and defended, complicated, and refined through the paper.
- It is coherent and unified.
- It explores and explains worthwhile content.
- It is free from filler phrases, verbal tics, and space-wasters.
- It is aware of its audience.
- It situates itself within a discipline, discourse community, or scholarly field.

Academic writing is specific and deals with facts, not assumptions. Consider these two statements:

- *At university students are expected to write academically.*
- *At James Cook University, students are expected to write academically by using formal language, clear structure and referencing.*

It is based on critical judgments of ideas rather than an appeal of emotions. However, personal comments and viewpoints are expressed in some areas of research. Moreover, clarity is also necessary to convey the intended idea in a straightforward tone. Pretentious statements are not necessarily meaningful. Consider this statement: *"The research referred to herein showed a multiplicity of factors that contributed to the multiple findings which indicated..."*

Consider this examples:



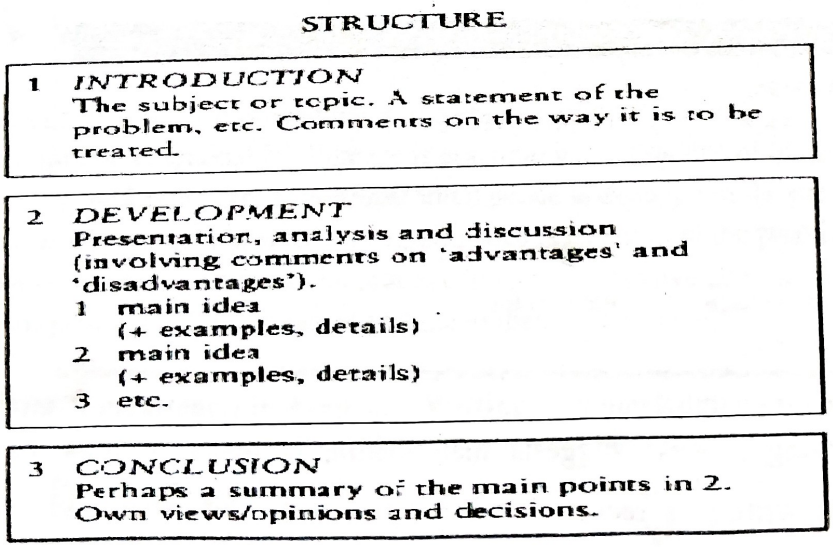
3. The purpose of academic writing

According to Bailey (2011: 3), most writers write for one of the following reasons:

- To report on a piece of research the writer has conducted
- To answer a question the writer has been given or chosen
- To discuss a subject of common interest and give the writer's view
- To synthesize research done by others on a topic

4. The structure of academic writing

Many academic written pieces are organized in similar structure that demonstrates the logical order and coherence of different parts. This structure depends on introduction-body- conclusion pattern of organization. The introduction sets the ground for the subject, states the problem, or/and introduces the topic and the way it is to be treated. The body (the development of ideas) presents, analyzes, and discusses the subject with necessary details and illustrations. The conclusion sums up what has been discussed, gives final comments on the topic, and leaves the reader with the sense of closure. The graph demonstrates the structure of academic writing pieces.



In writing your dissertation it is recommended to follow the structure and purposes of writing an academic research. Your purpose is to present, analyse, discuss and interprete your research findings in a way that reflects your personality and point of view as an academic researcher. It is therfore required not only to descripe and

report your own or other researchers' findings but also to synthesis these in such a way that they help to present a clear and logical argument.

These considerations are highly essential in your disseration mainly in your literature review. In literature review, your are not supposed to simply show how much you have read about the subject or report what others have written or found. The ultimate purpose is to relate your rsearch question (s) and supporting arguments to the existing literature.

5. Academic writing process

What distinguishes academic writing from other forms of writing is its "rules and practices" (Bowker.2007). These rules and practices are mainly related to a formal structure of ideas, referencing and citation techniques, writing mechanics (grammar, punctuation, and spelling) and argumentative and persuasive nature of composition. Therfore, to write a good academic paper you need to follow certain steps which constitute the writing process. Mennens Msc and Wilkinson Msc (2002. 3) distinguish seven steps in the writing process.

The writing process

1.	Thinking stage	Planning process
2.	Research stage	
3.	Outline stage	
4	Drafting stage	Transfer in a first draft output
5.	Revising stage	Revising & editing
6	Editing stage	
7	Final version stage	Final output

Although the writing process suggests that writing is linear, it must be recognized that academic writing is recursive (zigzag process). The usual case in writing is that you switch directions and you backtrack your ideas. You may work on an outline and you find it too broad, you may be working on a topic sentence and you realize that it could be your concluding idea, and you may eliminate whole sections while revising the final draft, etc.

It must be emphasized that academic writing is a skill like other skills as driving, painting, and dancing. It gets better through regular practice that leads to proficiency and expertise.

References

- Bailey, S. (2011). *Academic writing: a handbook for international students.* New York: Routledge.
- Bowker, N. (2007). *Academic writing: a guide to tertiary level writing.* New Zealand: Massey University
- Jordan, R. R. (1999). *Academic writing course: study skills in English.* England: Pearson Education Limited. Longman.
- Hartley, J. (2008). *Academic writing and publishing.* New York: Routledge.
- Heady, E. (2007). *Introduction to graduate writing.* Australia: Liberty University Graduate Writing Center.
- Mennens MSc, H. & Wilkinson MSc, B. (2002). *Academic writing skills.* University of Maastricht.

Classroom Practice

Practice 1: Credibility in academic writing

Audience often makes judgments on how well supported your ideas or arguments are, and whether that support is valid, relevant, sufficient and convincing.

➢ Which of the following statements reads as most credible and convincing? Why?

1. Emotional intelligence is essential in the practice of management.
2. In my opinion emotional intelligence is essential in the practice of management.
3. According to Smith (1967) emotional intelligence is essential in the practice of management.
4. Jones (2004) argues that emotional intelligence is essential in the practice of management. In his view successful management practice hinges on effective communication between people, and emotional intelligence can contribute to that.

Practice 2: preciseness in Academic Writing: Acknowledging exceptions and limitations

➢ How would you make these sentences more precise?

1. Narrative is the structure used for a novel or film.
2. Historians believe that history is the study of significant past events which have relevance for the present and future.
3. Knowledge of grammar improves the standard of writing.
4. Smokers die at a younger age than non-smokers.

Task 3: Formality: Formal and impersonal language

➢ Some of the language in the following examples is more appropriate for speaking than writing. Identify which expressions are too informal and personal.

1. **A)** When I look at the situation in emergency wards, with many staff leaving, it's hard not to worry about how many doctors will be available to treat patients in the future.
   B) If we consider the situation in emergency wards, with increasingly low staff retention rates, there are concerns about the capacity of hospitals to maintain adequate doctor to patient ratios.

2. **A)** It's so obvious that people were given jobs just because they were male or female. I don't think that is an acceptable approach and is even against the law.

   B) It appears that in a number of instances jobs were assigned on the basis of gender. Given the current anti-discrimination laws, this raises serious concerns.

➢ Rewrite the sentences in a more academic style using verbs from the list below. Note that you may need to change the verb tense.

investigate	assist
raise	discover
establish	increase
eliminate	

1. Systems analysts can **help out** managers in many different ways.
2. This program was **set up** to improve access to medical care.
3. Medical research expenditure has **gone up** to nearly $350 million.
4. Researchers have **found out** that this drug has serious side effects.
5. Exercise alone will not **get rid of** medical problems related to blood pressure.
6. Researchers have been **looking into** this problem for 15 years now.
7. This issue was **brought up** during the coroner's inquest.

Task 4: Clear sentences

➢ Look at the three texts below, all on the same topic. Which is the best text? Which is the worst text? Why?

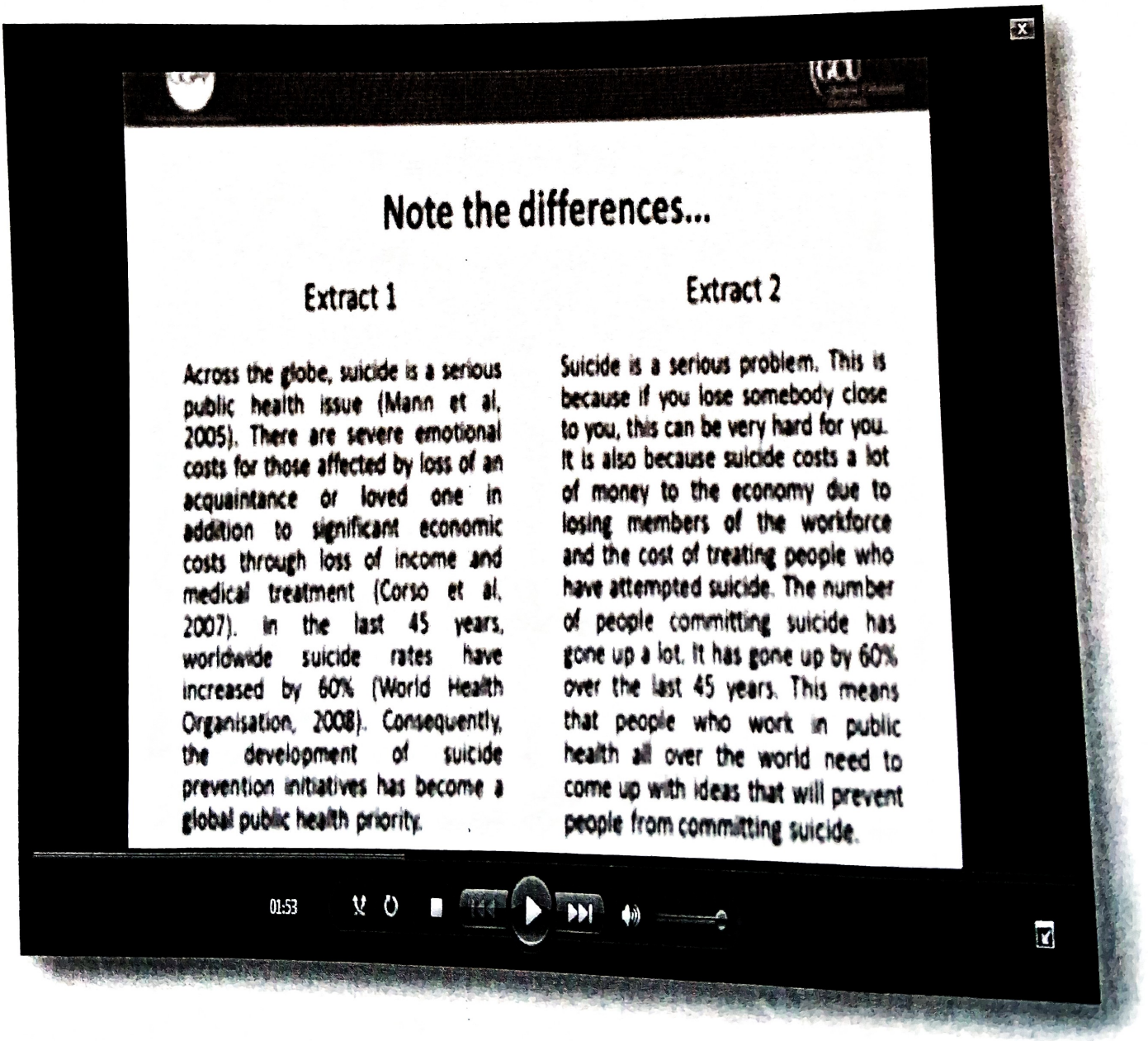
Text 1
Two canine cadavers with orthopedic abnormalities were identified which included a first dog that had an unusual deformity secondary to premature closure of the distal ulnar physis and a second dog that had a hypertrophic nonunion of the femur, and the radius and femur of both dogs were harvested and cleaned of soft tissues. (54 words)

Text 2

Two canine cadavers with orthopedic abnormalities were identified. The first dog had an unusual deformity. It was secondary to premature closure of the distal ulnar physis. The second dog had a hypertrophic nonunion of the femur. The radius and femur of both dogs were harvested. They were cleaned of soft tissues. (51 words; average 8.5 words per sentence)

Text 3

Two canine cadavers with orthopedic abnormalities were identified. The first dog had an unusual deformity secondary to premature closure of the distal ulnar physis; the second, a hypertrophic nonunion of the femur. The radius and femur of both dogs were harvested and cleaned of soft tissues. (46 words; average 15.3 words per sentence)



CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

Chapter three articulates methodology for the research. In the previous chapter two, literature pertaining to the study was reviewed and research gaps identified. This chapter discusses the criteria for determining the appropriate methodology for a study.

3.2 Types of Research

3.2.1 Basic Vs Applied research

a. **Basic or pure/fundamental research** is conducted to expand the boundaries of knowledge itself or to verify the acceptability of a given theory (Zikmund 2004, p.7). It aims to solve problems of a theoretical nature that have minimal impact on direct action, performance or policy decisions (Cooper and Schindler 2003). Found in institution of higher learning like middle level colleges and universities

b. **Applied research** is carried out to solve a current business problem faced by management in a business setting, needing a timely solution (Sekaran 2000, p.6). It is action oriented and it is found with research scholars, industries, NGO and government ministries.

3.2.2 "Evaluation" research

Its objective is measurement and appraisal of the extent to which a given activity, project or program has achieved its objectives".

3.2.3 "Performance-monitoring research"

Is a sub-set of evaluation research that regularly provides feedback for monitoring and management of a specific business activity (Zikmund 2003, p.10).

3.2.4 Qualitative and quantitative research

Researchers approach inquiry from a particular philosophical stance or world-view, which determines the purpose, design, and methods used and the interpretation of results (Blunt 1994). Data can be quantitative (numbers) or qualitative (words), with research using these two methods being complementary more than competitive (Malhotra 1993; Morgan 1988; Perry 1998). Qualitative research provides insights and understanding, while quantitative research tries to generalize those insights to a population (Perry 1998). Qualitative research is a generic term for investigative methodologies described as ethnographic, naturalistic, anthropological, field, or participant observer research. It emphasizes the importance of looking at variables in the natural setting in which they are found. Interaction between variables is important. Detailed data is gathered through open-ended questions that provide direct quotations. The interviewer is an integral part of the investigation (Jacob, 1988). This differs from quantitative research, which attempts to gather data by objective methods to provide information about relations, comparisons, and predictions and attempts to remove the investigator from the investigation (Smith, 1983).

Advantages

- Produces more in-depth, comprehensive information.
- Uses subjective information and participant observation to describe the context, or natural setting, of the variables under consideration, as well as the interactions of the different variables in the context. It seeks a wide understanding of the entire situation

Disadvantages

- The very subjectivity of the inquiry leads to difficulties in establishing the reliability and validity of the approaches and information
- Its scope is limited due to the in-depth, comprehensive data gathering approaches required.
- It is very difficult to prevent or detect researcher induced bias

Holistic Description

When conducting qualitative research, the investigator seeks to gain a total or complete picture. According to Stainback and Stainback (1988), a holistic description of events, procedures, and philosophies occurring in natural settings is often needed to make accurate situational decisions. This differs from quantitative research in which selected, pre-defined variables are studied.

Corroboration

The purpose of corroboration is not to confirm whether people's perceptions are accurate or true reflections of a situation but rather to ensure that the research findings accurately reflect people's perceptions, whatever they may be. The purpose of corroboration is to help researchers increase their understanding of the probability that their findings will be seen as credible or worthy of consideration by others (Stainback and Stainback, 1988).

Maintaining the Validity of Qualitative Research

- **Be a listener**. The subject(s) of qualitative research should provide the majority of the research input. It is the researcher's task to properly interpret the responses of the subject(s).
- **Record accurately**. All records should be maintained in the form of detailed notes or electronic recordings. These records should also be developed during rather than after the data gathering session.
- **Initiate writing early**. It is suggested that the researcher make a rough draft of the study before ever going into the field to collect data. This allows a record to be made when needed. The researcher is more prepared now to focus the data gathering phase on that information that will meet the specific identified needs of the project.
- **Include the primary data in the final report**. The inclusion of primary data in the final report allows the reader to see exactly the basis upon which the researcher's conclusions were made. In short, it is better to include too much detail than too little.
- **Include all data in the final report.** The researcher should not leave out pieces of information from the final report because she/he cannot interpret that data. In these cases, the reader should be allowed to develop his/her conclusions.
- **Be candid.** The researcher should not spend too much time attempting to keep her/his own feelings and personal reactions out of the study. If there is relevance in the researcher's feelings to the matter at hand, these feelings should be revealed.
- **Seek feedback.** The researcher should allow others to critique the research manuscript following the developmental process. Professional colleagues and research subjects should be included in this process to ensure that information is reported accurately and completely.
- **Attempt to achieve balance.** The researcher should attempt to achieve a balance between perceived importance and actual importance. Often, the information reveals a difference in anticipated and real areas of study significance.
- **Write accurately.** Incorrect grammar, misspelled words, statement inconsistency, etc. jeopardize the validity of an otherwise good study.

Characteristics of Qualitative and Quantitative Research

Point of Comparisons	Qualitative Research	Quantitative Research
Focus of research	Quality (nature, essence)	Quantity (how much, how many)
Philosophical roots	Phenomenology, symbolic interaction	Positivism, logical empiricism
Associated phrases	Fieldwork, ethnographic, naturalistic, grounded, subjective	Experimental, empirical, statistical
Goal of investigation	Understanding, description, discovery, hypothesis generating	Prediction, control, description, confirmation, hypothesis testing
Design characteristics	Flexible, evolving, emergent	Predetermined, structured
Setting	Natural, familiar	Unfamiliar, artificial
Sample	Small, non-random, theoretical	Large, random, representative
Data collection	Researcher as primary instrument, interviews, observations	Inanimate instruments (scales, tests, surveys, questionnaires, computers)
Mode of analysis	Inductive (by researcher)	Deductive (by statistical methods)
Findings	Comprehensive, holistic, expansive	Precise, narrow, reductionism

3.2.5 Descriptive Research/Survey research

Entail survey and fact finding inquiry. It purposes is to describe the state of affairs as it is in that particular time. Survey studies- assesses the characteristics of whole populations of people or situations. e.g. **Job Analysis** - Used to gather information to be used in structuring a training program for a particular job, **School Surveys** - Used to gather data concerned with internal or external characteristics of a school system, **Community Surveys** - Used to gather data concerned with internal or external characteristics of a community

3.2.6 Historical research

Procedures supplementary to observation in which the researcher seeks to test the authenticity of the reports or observations made by others. Researchers who are interested in reporting events and/or conditions that occurred in the past employ the historical method. An attempt is made to establish facts in order to arrive at conclusions concerning past events or predict future events.

Primary Sources of Information - Direct outcomes of events or the records of eyewitnesses

Secondary Sources of Information - Information provided by a person who did not directly observe the event, object, or condition

3.2.7 Developmental studies

Are concerned with the existing status and interrelationships of phenomena and changes that take place, as a function of time, e.g. **Growth Studies** - May be either longitudinal or cross-sectional. The longitudinal technique is the most satisfactory for studying human development. The cross-sectional technique is more commonly used because it is less expensive. **Trend Studies** - Used to make predictions from social trends, economic conditions, technological advances, etc. to future status and **Model or System Development** - Creative development of a model or system (paradigm) based on a thorough determination of the present situation or system and the goals sought

3.2.8 Analytical Research

Researcher analysis fact and information available to make a critical evaluation of phenomena, it explains the why things are they way they are. It goes beyond description e.g. why the number of students is increasing in a university

3.2.9 Conceptual Vs Empirical

- Conceptual-relate to obstruct ideas or theory and is used by philosophers to develop new concept or interpret existing concepts
- Empirical- relies on experience or observation, gives less attention to theories.

3.3 Research design

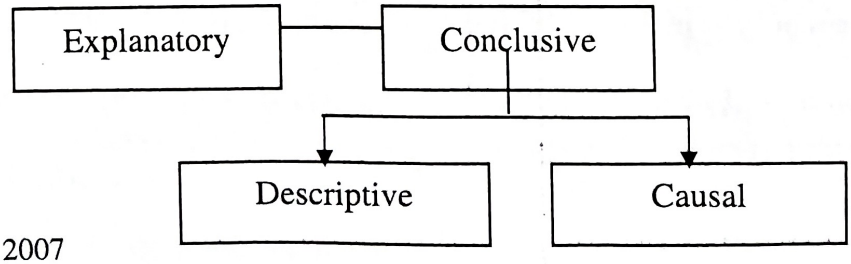
A research design is a master plan/ framework or blueprint specifying the methods and procedures for collecting and analyzing the needed information (Zikmund 2003). It specifies the details of the procedures necessary for obtaining the information needed to structure or solve the marketing research problems. The research design also specifies the research methods chosen determine the information needed as well as define the sampling method, sample size, measurement and data analysis processes (Kinnear, Taylor, Johnson and Armstrong, 1993).

Components of a good Research Design:

- Define the information needed
- Determine the type of research to be undertaken: exploratory, descriptive, or causal
- Specify the collection instruments and scaling procedures
- Specify the sampling process and sample size
- Develop a plan for data analysis
- Specify budgeting and project scheduling

Various methodologies are utilized for business research including exploratory, conclusive (descriptive and causal) approaches and are considered below.

Figure. Types of Research Designs



Source: Author 2007

Characteristic of a good design

a) Has power to detect relationship among variables
b) Appropriate for the research questions

c) Minimizes bias and maximizes the reliability
d) Has smallest errors
e) Yields maximum information and provide an opportunity for considering many different aspects of a problem

3.3.1. Exploratory Research design

Exploratory studies are conducted when the nature of the problem is not clear with the expectation that further research would be necessary to yield conclusive evidence. Exploratory research helps to crystallize a problem and identify information needs for future research (Zikmund 1997). Exploratory research is the means of seeking new insights, asking questions and assessing phenomena in a new light (Robson 2002).

It allows the researcher to familiarize him/herself with the problem or concept to be studied, and potentially generate hypotheses or research propositions to be tested. The output is qualitative and may serve as a basis for subsequent quantitative research (Zikmund 2003).

Justification for Exploratory Research design

According to Perry (1995, p.63) "Time and research constraints, necessitate the choice of only one major research methodology which is best suited to the research problem".

Exploratory research is usually conducted in an initial stage of the research process to primarily determine:

i) The dimensions of the research problem,
ii) Setting of priorities and follow up actions, selection of the best of alternative research methods available,
iii) The discovery of new ideas and contribution to the body of knowledge.

3.3.2 Conclusive research design

Objective is to test specific hypothesis and examine specific relationships. It's more formal and structured than exploratory research. Findings are considered to be conclusive in nature because they are used as input for managerial decision-making.

Characteristics:

- Information needed is clearly defined
- Research process is formal and structured
- Sample is large and representative
- Data analysis is mainly quantitative
- Findings/Results: Conclusive

Divide into: Descriptive and Casual

3.3.2.1 Descriptive research design

Descriptive design is used to obtain information concerning the current status of the phenomena to describe, "what exists" with respect to variables or conditions in a situation. The methods involved range from the survey, which describes the status quo, the correlation study that investigates the relationship between variables, to developmental studies, which seek to determine changes over time. "In descriptive research the problem is structured and well understood" (Ghauri and Gronhaug 2002, p.49). "Descriptive research portrays and accurate profile of persons events or situations" Robson (2002). This statement is echoed by Zikmund (2003, p.55) who states that, "The major purpose of descriptive research is to provide information on characteristics of a population or phenomenon". Accuracy is

particularly important in descriptive research. Descriptive studies are based on some previous understanding of the research problem. (Zikmund, 2003). "A descriptive study tries to discover answers to *who, what, when, where* and sometimes *how* questions." (Cooper and Schindler 2003, p.10), it also attempts to capture attitude or patterns of past behavior. Two types of descriptive research are cross-sectional studies and longitudinal studies.

- Cross-sectional studies- data is carried only once, its like snap shot
- Longitudinal studies- Data is carried out repetitively from a fixed sample, enables one to note the changes as they occur

A sub-set of descriptive research is "diagnostic analysis" where research findings are clarified by explanations respondents give for a behavior or attitude. (Zikmund, 2003).

Exploratory design	Descriptive design
1. Objective Provide insight and understanding of the problem **2. Characteristics** Uses non probability sampling Information needed is defined loosely Research process is flexible and unstructured Uses small sample Uses opened ended questionnaires Analysis of data is qualitative Findings are not conclusive	1. Objective Test specific hypothesis **2. Characteristics** Use probability sampling Information needed is clearly defined Research process is formal and structured Use large sample Uses closed ended questionnaires Analysis of data is quantitative Findings are conclusive. i.e. Used for managerial decision Making

3.3.2.2 Causal/ Experimental research

The primary purpose of causal research is the identification of cause-and-effect relationships between variables. Exploratory and descriptive researches normally precede cause and effect relationship studies (Zikmund 2003). Hence, in causal research the problems under scrutiny are structured (Ghauri and Gronhaug 2003) and it is typical to have an expectation of the relationship to be explained. Causal research attempts to establish that when we do one thing, another thing will follow and the relationship between the two variables may be symmetrical, reciprocal or asymmetrical (Zikmund 2003; Cooper 2003).

When the researcher is interested in delineating the important variables that are associated with the problem, it is called a correlational study" (Sekaran 2000, p.130). Concomitant variation occurs when two phenomena vary together. When the criterion of concomitant variation is not met, then no causal relationship exists (Zikmund 2003).

Appropriate for the following purposes:

- To understand which variables are the cause (independent variables) and which variables are the effect (dependent variables) of a phenomenon
- To determine the nature of the relationship between the causal variables and the effect to be predicted

The main method of causal research is experimentation

Table. Types of Business Research

Methods	**Features**	**Degree of uncertainty of research problem**
Exploratory	To gain background information, define terms, clarify problems and hypotheses and establish research priorities	Ambiguous
Descriptive	To describe and measure phenomena at a particular time	Aware of the problem.

Causal	To identify cause and effect relationships among variables	Clearly defined problem

Source: (Zikmund, 2000)

3.3.3 Case study

Emory (1995) defines a case study as a "study focusing on one organization selected from the total population of other organizations in the same industry". Case studies are detailed investigations of individuals, groups, institutions or other social units. The researcher conducting a case study attempts to analyze the variables relevant to the subject under study (Polit and Hungler, 1983). The principle difference between case studies and other research studies is that the focus of attention is the individual case and not the whole population of cases. Most studies search for what is common and pervasive. However, in the case study, the focus may not be on generalization but on understanding the particulars of that case in its complexity. A case study focuses on a bounded system, usually under natural conditions, so that the system can be understood in its own habitat (Stake, 1988).

Justification of Case Study design

According to Yin (1994), case study research is complex and multifaceted. Pursuing case study research requires three ingredients:

a) Capability to deal with a diversity of evidence
b) Ability to articulate research questions and theoretical propositions
c) Production of a research design

Case study design is a logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions.

Classification of Research Design

The main purpose of any research is to ensure the study will be relevant to the problem and will use economical procedures. Research designs can be classified in the following ways (Emory, 1995)

1. The degree of problem crystallization. i.e. extent to which your problem is well defined and well understood. On this problem crystallization the concern is with the degree, which the problem is well defined. A problem that is not well defined is said to have a low degree of problem crystallization whereas a problem that is well defined is said to have a high degree of problem crystallization. The degree of crystallization can help one to determine the type of research design to use. When the degree is low go for exploratory research design, when degree is high go for descriptive
2. The methods of data collection. i.e. which methods are you interested to use. If you are interested in using surveys, observations then go for descriptive design while if you are interested in using experiments go for causal research design
3. Researcher's control of variables. This classification is based on the researcher's ability to manipulate the variables. This results in experiment and ex post facto design. In experiment design, the researcher attempts to control and or manipulate the variables in the study. In ex post facto, investigators have no control over the variables in sense of being able to manipulate them. They can only report what has happened or what is happening. Usually, in this case, you go for descriptive design.
4. Topical scope- in this we have statistical and case study. In statistical design, the emphasis is breath other than depth and findings can be generalized based on sample and validity of the design. Case study emphasizes on full contextual analysis of pure events, all conditions and their interrelations (emphasis on depth other than breath). Findings cannot be generalized.
5. Research environment- does research occurs under actual environment or under other conditions. These results to field studies and laboratory studies. i.e. field studies can be descriptive or exploratory while laboratory study will be causal/experiment.

it's supposed to measure. How valid a test is depends on its purpose—for example, a ruler may be a valid measuring device for length, but isn't very valid for measuring volume. If a test is reliable, it yields consistent results.

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit "the bull's eye" of your research object? Researchers generally determine validity by asking a series of questions.

Starting with the research question itself, you need to ask yourself whether you can actually answer the question you have posed with the research instrument selected.

Questionnaire Validity

The validity of a questionnaire relies first and foremost on reliability. If the questionnaire cannot be shown to be reliable, there it cannot also be validity. The overriding principle of validity is that it focuses on how a questionnaire or assessment process is used. Reliability is a characteristic of the instrument itself, but validity comes from the way the instrument is employed.

The following ideas support this principle:

- As nearly as possible, the data gathering should match the decisions you need to make. This means if you need to make a priority-focused decision, such as allocating resources or eliminating programs, your assessment process should be a comparative one that ranks the programs or alternatives you will be considering.
- Gather data from all the people who can contribute information, even if they are hard to contact. For example, if you are conducting a survey of customer service, try to get a sample of all the customers, not just those who are easy to reach, such as those who have complained or have made suggestions.

Types of Measurement Validity

Face validity: Does it appear to measure what it's supposed to measure? There would be low face validity when the researcher is disguising intentions. . Face validity pertains to whether the test "looks valid" to the examinees who take it. The administrative personnel who decide on its use, and other technically untrained observers.

Content Validity: This approach measures the degree to which the test items represent the domain or universe of the trait or property being measured. In order to establish the content validity of a measuring instrument, the researcher must identify the overall content to be represented. Items must then be randomly chosen from this content that will accurately represent the information in all areas. By using this method the researcher should obtain a group of items, which is representative of the content of the trait or property to be measured.

Identifying the universe of content is not an easy task. It is, therefore, usually suggested that a panel of experts in the field to be studied be used to identify a content area. For example, in the case of researching the knowledge of teachers about a new curriculum, a group of curriculum and teacher education experts might be asked to identify the content of the test to be developed.

Criterion Validity: Is the measure consistent with what we already know and what we expect?

This approach is concerned with detecting the presence or absence of one or more criteria considered to represent traits or constructs of interest. One of the easiest ways to test for criterion-related validity is to administer the instrument to a group that is known to exhibit the trait to be measured. A panel of experts may identify this group. A wide range of items should be developed for the test with invalid questions culled after the control group has taken the test. Items should be omitted that are drastically inconsistent with respect to the responses made among individual members of the group. If the researcher has developed quality items for the instrument, the culling process should leave only those items that will consistently measure the trait or construct being studied. For example, suppose one wanted to develop an instrument that would identify teachers who are good at dealing with abused children. First, a panel of unbiased experts identifies 100 teachers out of a larger group that they judge to be best at handling abused children. The researcher develops 400 yes/no items that will be administered to the whole group of teachers, including those identified by the experts. The responses are analyzed and the items to which the expert identified teachers and other teachers responding differently are seen as those questions that will identify teachers who are good at dealing with abused children.

Predictive validity: Predicts a known association between the construct you're measuring and something else. Predictive validity is also a form of criterion validity. If the health status test can be shown to be able to predict the health of people not only when administered but also at some later time, then it would be said to have predictive validity. Obviously this is particularly important for health screening programmes, which attempt to predict later ill health from some form of present assessment; breast self-examination is an example.

Concurrent validity: Associated with pre-existing indicators, something that already measures the same concept.

Construct Validity: Shows that the measure relates to a variety of other measures as specified in a theory. For example, if we're using an Alcohol Abuse Inventory, even if there's no way to measure "abuse" itself, we can predict that serious abuse correlates with health, family, and legal problems.

Convergent validity is the degree to which multiple attempts to measure the same concept is in agreement. For testing convergent validity, we evaluated the item-to-total correlation; that is the correlation of each item to the sum

Discriminant Validity: is the degree to which measures of different concepts are distinct.

a) Threats to Internal validity

Internal validity addresses the "true" causes of the outcomes that you observed in your study because you are able to rule out extraneous variables, or alternative, often unanticipated, causes for your dependent variables.

There are many different ways that the internal validity of a study can be threatened or jeopardized. A list and brief comment of some of the more important ones are given below.

History: Outside events occurring during the course of the experiment or between repeated measures of the dependent variable may have an influence on the results. This does not make the test itself any less accurate.

Maturation: Change due to aging or development, either between or within groups/ the process of maturing which takes place in the individual during the duration of the experiment, which is not a result of specific events but of simply growing older, growing more tired, or similar changes. *Example*: Subjects become tired after completing a training session, and their responses on the Posttest are affected.

Measuring Instruments - Changes in instruments, calibration of instruments, observers, or scorers may cause changes in the measurements. *Example*: Interviewers are very careful with their first two or three interviews but on the 4th, 5th, 6th become fatigued and are less careful and make errors.

Pre-Testing: Experience of taking test has an influence on results. Experience refers either to mental or physical changes—a participant's attitude towards a topic may change because of a survey, which could affect results, or a participant's physiological response to a test may change after repeated measures.

Statistical Regression - Groups are chosen because of extreme scores of measurements; those scores or measurements tend to move toward the mean with repeated measurements even without an experimental variable. *Example*: Managers who are performing poorly are selected for training. Their average Posttest scores will be higher than their Pretest scores because of statistical regression, even if no training were given.

Selection bias/Differential Selection - Different individuals or groups would have different previous knowledge or ability, which would affect the final measurement if not taken into account. *Example*: A group of subjects who have viewed a TV program is compared with a group, which has not. There is no way of knowing that the groups would have been equivalent since they were not randomly assigned to view the TV program.

Mortality: Participants drop put of the test, making the groups un-equivalent. Also, who drops out and why? (Often it is the people who did most poorly on the test to begin with.)
Interaction: Two or more threats can interact. For example, a Selection-Maturation interaction: difference between ages of groups could cause groups to change at different rates. A group of young people may show more improvement in a test than a group of older people, but that could be because their brains are developing faster relative to their age.

Experimenter bias: Expectations of an outcome may inadvertently influence participant or cause the experimenter to view data in a different way.

Placebo Effect: Improvement due to expectation rather than the treatment itself can occur when participants receive a treatment that they consider likely to be beneficial.

Contamination: When the comparison group is in some way affected by, or affects, the treatment group, causing an increase of efforts. Also known as compensatory rivalry or the John Henry effect.

Interaction: Two or more threats can interact. For example, a Selection-Maturation interaction: difference between ages of groups could cause groups to change at different rates. A group of young people may show more improvement in a test than a group of older people, but that could be because their brains are developing faster relative to their age.

b) Threats to External validity

External validity addresses the ability to generalize your study to other people and other situations. These are factors that can affect how well your results apply to the target population. Can we generalize with confidence that this is true for the target population?

Selection bias: The sample is not representative of the population demographically/The selection of the subjects determines how the findings can be generalized. Subjects selected from a small group or one with particular characteristics would limit generalizability. Randomly chosen subjects from the entire population could be generalized to the entire population. *Example*: 11 corporations turn down Researcher, requesting permission to conduct experiment, but the 12th corporations grant permission. The 12th corporation is obviously different then the others because they accepted. Thus subjects in the 12th corporation may be more accepting or sensitive to the treatment

Reactive effects of experimental arrangements: Results could be because of the experimental setting, not the treatment. Therefore, the results might not be true for the target population. This is something to consider when controlling confounding variables—there is always a tradeoff between control and external validity. When designing an experiment, you should always explicitly think of what is most important; this varies for every design. Reactive effects of testing / pretest sensitization: While the sample gets a pre-test to establish a baseline of behavior, the target population isn't getting a pre-test, so might respond differently to the treatment.

Multiple treatment interference/ Pre-Testing: Giving treatments in the first place means that second treatments could change the participant. Even if the second treatment is effective, it might only be because of the interaction with the first treatment. This can be accounted for by using a Latin square, where all the groups get each treatment, but in different orders.

Experimental Procedures - The experimental procedures and arrangements have a certain amount of effect on the subjects in the experimental settings. Generalization to persons not in the experimental setting may be precluded. *Example*: Department heads realize they are being studied, try to guess what the experimenter wants and respond accordingly rather than respond to the treatment.

Hawthorne Effect: When members of the treatment group change in terms of the dependent variable because their participation in the study makes them feel special—so they act differently, regardless of the treatment

Tools of Experimental Design Used to Control Factors Jeopardizing Validity

Pre-Test - The pre-test, or measurement before the experiment begins, can aid control for differential selection by determining the presence or knowledge of the experimental variable before the experiment begins. It can aid control of experimental mortality because the subjects can be removed from the entire comparison by removing their pre-tests. However, pre-tests cause problems by their effect on the second measurement and by causing generalizability problems to a population not pre-tested and those with no experimental arrangements.

Control Group -The use of a matched or similar group, which is not exposed to the experimental variable, can help reduce the effect of History, Maturation, Instrumentation, and Interaction of Factors. The control group is exposed to all conditions of the experiment except the experimental variable.

Randomization - Use of random selection procedures for subjects can aid in control of Statistical Regression, Differential Selection, and the Interaction of Factors. It greatly increases generalizability by helping make the groups representative of the populations.

Tools of Experimental Design Used to Control Factors Jeopardizing Validity

- **Pre-Test** - The pre-test, or measurement before the experiment begins, can aid control for differential selection by determining the presence or knowledge of the experimental variable before the experiment begins. It can aid control of experimental mortality because the subjects can be removed from the entire comparison by removing their pre-tests.

However, pre-tests cause problems by their effect on the second measurement and by causing generalizability problems to a population not pre-tested and those with no experimental arrangements.

- **Control Group** -The use of a matched or similar group, which is not exposed to the experimental variable, can help reduce the effect of History, Maturation, Instrumentation, and Interaction of Factors. The control group is exposed to all conditions of the experiment except the experimental variable.
- **Randomization** - Use of random selection procedures for subjects can aid in control of Statistical Regression, Differential Selection, and the Interaction of Factors. It greatly increases generalizability by helping make the groups representative of the populations.
- **Additional Groups** - The effects of Pre-tests and Experimental Procedures can be partially controlled through the use of groups, which were not pre-tested or exposed to experimental arrangements. They would have to be used in conjunction with other pre-tested groups or other factors jeopardizing validity would be present.

3.5 Measurement concepts

- The process of assigning numbers of symbols to characteristics of objects, states or events according to certain specified rules.
- Measurement is the process of assigning numbers to represent the amount of a variable (ie, a characteristic, attribute, trait present in a person, object, situation under study). In fact, the measurement result is an observed score. Every observed score is made up of two parts: a true score and an obsrved score. The true score represents the actual amount of the variable present. The difference between the observed score and the true score is due to measurement error/non samplying error; the amount of error cannot be measured directly/which results solely from the manner in which the observations are made. The smaller the error score, the more closely the observed score reflects the true score or the actual amount of the variable present. Measurement results that contain little error are said to be reliable.

Sources of measurement error include

- The instrument (eg, improper calibration, variations in use),
- The environment (eg, room temperature, noise level),
- The researcher (eg, fatigue, mood), and
- Data processing (eg, striking the wrong key while entering data into the computer, mathematical errors in summing scores).

Scaling

- A scale is a device for assigning units of analysis to categories of a variable.
- Scaling involves generation of a continuum upon which measured objects are located.

Scales in Measurement

Nominal scale

- The numbers only serve as labels for identifying and classifying objects, properties or events.
- **Example**: Identification of respondents, brands, Attributes etc.
- **Permissible statistics:** percentages, mode, chi-square, etc.
- **Nominal scale is a**measurement consists of assigning items to groups or categories. No quantitative information is conveyed and no ordering of the items is implied. Nominal scales are therefore qualitative rather than quantitative. Religious preference, race, and sex are all examples of nominal scales

Some researchers actually question whether a nominal scale should be considered a "true" scale since it only assigns numbers for the purpose of categorizing events, attributes or characteristics. The nominal scale does not express any values or relationships between variables. Labeling men as "1" and women as "2" (which is one of the most common ways of labeling gender for data entry purposes) does not mean women are "twice something or other" compared to men. Nor does it suggest that 1 is somehow "better" than 2 (as might be the case in competitive placement).

Consequently, the only mathematical or statistical operation that can be performed on nominal scales is a *frequency* run or count. We cannot determine an average, except for the *mode* – that number which holds the most responses -, nor can we add and subtract numbers.

Ordinal scale: a scale in which data can be ranked, but in which no arithmetic transformations are meaningful. For example, wind speed might be measured as high, medium, or low, but we would not say that the difference between high and medium wind speed is equal to (or any arithmetic transformation of) the difference between a medium and low wind speed. In short, the distances between points on an ordinal scale are not meaningful. Ordinal scale uses likert scale

Measurements with ordinal scales are ordered in the sense that higher numbers represent higher values. However, the intervals between the numbers are not necessarily equal. For example, on a five-point rating scale measuring attitudes toward gun control, the difference between a rating of 2 and a rating of 3 may not represent the same difference as the difference between a rating of 4 and a rating of 5. There is no "true" zero point for ordinal scales since the zero point is chosen arbitrarily. The lowest point on the rating scale in the example was arbitrarily chosen to be 1. It could just as well have been 0 or -5.

Note

- The numbers are assigned to objects to indicate the relative extent to which the objects possess some characteristics. It allows you to determine whether an object has more or less of a characteristic than some other object, but not how much more or less.
- **Example**: quality rankings, preferences etc.
- **Permissible statistics:** percentile, quartile, median, rank-order correlation etc.

Interval Scale: an interval scale has the additional requirement of a series of equal intervals, indicating the degree of difference when comparing things. An example of this is the Celsius (centigrade) temperature scale where the difference between 10°C and 20°C is exactly the same as the difference between 30°C and 40°C, that is, a difference of 10°C. Interval measurement allows us to make precise claims about the measurable differences between observations in amount or size. We cannot, however, make statements such as "40°C is twice as hot as 20°C", even if it may seem like it on

such as hot day. The reason for this is that there is no absolute value of zero to indicate complete absence of the variable being measured. In the Celsius scale, 0°C is the temperature at which water freezes. There are much colder temperatures than 0°C, which are indicated by a minus sign in front, e.g. the outside temperature in Antarctica can be -50°C or more

Note

- The numbers are used to rank objects and also represent equal increments of the attribute being measured. The intervals between numbers can be compared but not the absolute values.
- **Example**: measurement of temperature, attitudes etc.
- **Permissible statistics:** measures of central tendency; mode, median, mean, standard deviation, product moment correlations, t-test and F-test etc.

Ratio Scale: "a ratio scale is an interval scale in which distances are stated with respect to a rational zero rather than with respect to, for example, the mean". A rational zero is a location on an interval scale deliberately chosen for reasons other than the current data. You are also allowed to take ratios among ratio scaled variables. Physical measurements of height, weight, and length are typically ratio variables. It is now meaningful to say that 10 m is twice as long as 5 m. This ratio hold true regardless of which scale the object is being measured in (e.g. meters or yards). This is because there is a natural zero.

Ratio scales should be used to gather quantitative information, and we see them perhaps most commonly when respondents are asked for their age, income, years of participation, etc. In order to respect the notion of equal distance between adjacent points on the scale, you must make each category the same size.

Note

- This scale possesses all the properties of the nominal, ordinal, and interval scales, and in addition, an absolute zero point. Thus, in ratio scales we can identify or classify objects, rank the objects, and compare intervals or differences.
- **Example**: sales, costs, market share, and number of customers.
- **Permissible statistics:** All types of statistical operations can be performed on the ratio scales.

Classification of scaling techniques

a. **Comparative scaling techniques**

1. **Paired comparison scaling**
   - The objects are presented to the respondent two at a time and the respondent has to choose between them according to some criterion
   - Number of comparisons = $\frac{n(n-1)}{2}$

   - *Limitations:*
     1. More than 5 comparisons create a problem.
     2. There may be violations of the assumptions of transitivity.
     3. The order in which the objects are presented may bias the results.
     4. In the market place there is hardly pairwise comparisons
     5. Respondents may prefer one object over others, but they may not like it in an absolute sense.

2. Rank Order Scaling

- Respondents are presented with several objects simultaneously and asked to rank order them according to some criterion.
- The technique is commonly used to measure preferences for brands as well as attributes.
- Note:
  1. Closely resembles the shopping environment.
  2. Takes less time and eliminates intransitive responses.
  3. Relatively easy to administer.
  4. Major disadvantages: Results may not be generalizable.

3. Constant Sum Scaling

- Requires the respondents to allocate (divide) a constant sum of units, such as points, among a set of stimulus objects with respect to some criterion to reflect the relative preference for each object.
- Widely used to measure the relative importance of attributes.
- Note:
  1. The scale allows for fine discrimination among stimulus objects without requiring too much time.
  2. Disadvantages:
     - Only a limited number of objects or attributes can be compared on such a scale.
     - Respondents may allocate more or fewer units than those specified

b. Non-comparative scaling techniques

- Respondents employ whatever rating standard seems appropriate to them when evaluating objects.

1. Continuous Rating Scale (Graphic Rating Scale)

- Respondents rate the objects by placing a mark at the appropriate position on a line that runs from one extreme of the criterion to the other.
  - Once the respondent has provided the ratings, the researcher divides the lines to as many categories as desired and assigns scores based on categories into which the ratings fall.
  - Note:
    i. They are easy to construct
    ii. However, scoring is cumbersome and unreliable.
    iii. Have limited use in marketing research.

3. Itemized Rating Scales

- Respondents are provided with a scale that has a number or brief description associated with each category.

i. Likert (summated) scale

- Requires a respondent to indicate a degree of agreement or disagreement with a variety of statements related to the attitude object.
- Consists of two parts:
  i. A declarative statement
  ii. A list of response categories ranging from "strongly agree" to "strongly disagree."

ii. Semantic Differential Scale

- Widely used to describe the set of beliefs that comprise a person's image of an organization or brand.
- An insightful procedure for comparing the images of competing brands, stores, or services used.
- Typically the respondent is asked to describe the organization/product by means of ratings (seven point rating scales) on a set of bipolar adjectives.

I. Non-comparative scale construction considerations

a. Number of scale categories
- Respondent's interest in the task and knowledge about the object.
- Mode of data collection
- Data analysis and use

b. Balance versus unbalanced scale
- Balanced scale: favorable categories equal unfavorable categories
- Unbalanced scale: favorable categories unequal to unfavorable categories

c. Odd versus even number of categories
- Odd number of categories: the middle scale position is generally designated as neutral or impartial.
- Category choice decision depends on whether some of the respondents may be neutral on the response being measured.

d. Forced versus non-forced choice
- Forced scale: the respondents are forced to express an opinion because a "no opinion" option is not provided.
- In general, a don't know category should be provided whenever respondents have insufficient experience to make a meaningful judgment.

e. Nature and degree of verbal description
- Scale categories may have verbal, numerical or pictorial descriptions.
- Labeling can be done on:
  - Every scale category
  - Some scale categories, or
  - To only extreme scale (polar) categories
- The strength of the adjective used to anchor the scale may influence the distribution of the responses.

f. Physical form of the scale
- Scales can be presented vertically or horizontally.
- Boxes, discrete lines, can express categories on a continuum and may or may not have numbers (negative or positive) assigned to them.

3.6 Population and sample

A population is the total collection of elements about which we wish to make some inferences (Cooper and Schindler 2000). But in some studies you can study a small group instead of the total population. Cooper and Schindler (2003 p.179) state that the basic idea of sampling is that by selecting some of the elements in a population, conclusions may be drawn about the entire population, Sekaran (2000 p.267) concurs with this view, stating that by "studying the sample, and understanding the characteristics of the sample, it would be possible to generalize the properties or characteristics to the population elements".

Sampling has several advantages including **lower costs, greater accuracy of results and faster speed of data collection.**

The ultimate test of a sample design is how well it represents the characteristics of the population it purports to represent. In measurement terms, the sample must be valid; validity depends on accuracy and precision. Accuracy is defined as the degree to which bias is absent from the sample. Precision is measured by the standard error of estimate; the smaller the standard error of estimate, the higher the precision of the sample.

- **Sampling frame-** a complete list of all elements of a population from which the sample is drawn

3.7 Sampling technique-

Methods used to arrive at the desire sample size. There are two methods of sampling; probability and non-probability sampling. Probability sampling is based on the concept of random selection while non-probability sampling is arbitrary and subjective. These are considered in turn.

1. Probability sampling

There are five types of probability sampling:

- Simple random sampling, systematic sampling. Stratified sampling, cluster sampling and double sampling

(a) Simple random sampling

Probability sampling procedure that ensures that each case in the population has an equal chance of being included in the sample, you start by assigning each item a unique number, and then you start picking the items. You can do this with/without replacement. This method is best used when you have an accurate and easily accessible sampling frame that lists the entire population (Saunders, Lewis and Thornhill, 2003 P. 162). It works well with small samples

b) Systematic sampling

Prob. sampling in which the initial sampling point is selected at random, and then cases are selected at regular interval; you need to calculate the sampling fraction= actual sample size/total population. It works equally well with small & large sample, its suitable for geographically disperse cases if you do not require face-to-face contact when collecting your data.

c) Stratified random sampling

Prob. Sampling procedure in which the population is divided into two or more relevant strata and a random sample (systematic or simple) is drawn from each of the strata.

d) Cluster sampling

Cluster sampling is the process by which a population is divided into groups or clusters of elements with some groups randomly selected for study. The cluster can be based on any naturally occurring grouping (Saunders, Lewis and Thornhill, 2003 P. 167).e.g. geographical area and type of manufacturing firm. In this technique it result to sample that represent the total population less accurately than stratified sampling

e) Double sampling/Multi stage cluster sampling

Double sampling, sequential or multiphase sampling is the process of collecting some information by sample and then using this information as the basis for collecting a sub-sample for further study. It's normally used to overcome problems associated with geographically disperse population when face to face contact is needed or where it's expensive and time consuming to construct a sampling frame for large geographical area.

Samplying error-is the differecne between the sample and the population that are due solely to the particular units that happened to have been selected. e.g If a sample of 100 ladies is measured and are all found to be taller than six feet. Samplying error can be caused by chance or samplying bias

Samplying bias-tendacy to favour the selection of units that have particular characeteristics. It results from poor sampling plan

2. Non-probability sampling

There are several types of non-probability sampling:

a) **Convenience/haphazard sampling**: involves selecting haphazard those cases that are easiest to obtain for your sample, such as the person interviewed at random in a shopping center for a television programme. i.e. where cases are the easiest to obtain. You continue with this until your desired sample size.

b) **Purposive /Judgmental sampling**: enable you to use your expert judgment to select cases that will best enable you to answer your research question/meet your objectives. It works well with small sample such as case study and when you want to select cases that are particularly informative.(Neuman,2000) This is done on the judgment of the researcher; it can be on extreme cases, heterogeneity (maximum variation), homogeneity (maximum similarity), critical cases and typical cases.

c) **Quota sampling**: ensures that certain groups/characteristics of the population are represented by the sample chosen.

d) **Snow balling**- non-probability sampling procedure in which subsequent respondents are obtained from information provided by initial respondents.

- **Sample size**- the selected element to be studied/subset of a population. To ensure that the sample accurately represents the population, the researcher must clearly define the characteristics of the population, determine the required sample size and choose the best method for selecting members of the sample from the larger population (Cooper, 2000).

3.8 Selecting Your Sample

Perhaps the most frequently asked question concerning sampling is, "What size sample do I need?" The answer to this question is influenced by a number of factors, including the purpose of the study, population size, the risk of selecting a "bad" sample, time available, budget and the allowable sampling error.

Strategies for determining sample size

There are several approaches to determining the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables, and applying formulas to calculate a sample size. Each strategy is discussed below (Glenn D. 1992).

a) Using a Census for Small Populations

One approach is to use the entire population as the sample. Although cost considerations make this impossible for large populations, a census is attractive for small populations (e.g., 200 or less). A census eliminates sampling error and provides data on all the individuals in the population. In addition, some costs such as questionnaire design and developing the sampling frame are "fixed," that is, they will be the same for samples of 50 or 200. Finally, virtually the entire population would have to be sampled in small populations to achieve a desirable level of precision.

b) Using a Sample Size of a Similar Study

Another approach is to use the same sample size as those of studies similar to the one you plan. Without reviewing the procedures employed in these studies you may run the risk of repeating errors that were made in determining the sample size for another study. However, a review of the literature in your discipline can provide guidance about "typical" sample sizes, which are used.

c) Using Published Tables

A third way to determine sample size is to rely on published tables, which provide the sample size for a given set of criteria.

d) Using Formulas to Calculate a Sample Size

Although tables can provide a useful guide for determining the sample size, you may need to calculate the necessary sample size for a different combination of levels of precision, confidence, and variability. In some situation, such as experimental research, it is necessary for you to calculate the precise minimum sample size you require (Saunders, Lewis and Thornhill, 2003 P. 466). This is based on: How confident you need to be that the estimate is accurate (the level of confident in the estimate). How accurate the estimate needs to be (the margin of error that can be tolerated).

The proportion of responses you expect to have some particular attribute. You need to collect a pilot sample of about 30 observations and from this to infer the likely proportion from your survey. Once you have all the information you substitute it into the formula

$n=p\% * q\% * [z/e\%]^2$

Where n is the minimum sample size required
p% is the proportion belonging to the specified category
q% is the proportion not belonging to the specified category
z is the z value corresponding to the level of confidence required (see table below)
e% is the margin of error required

Example

To answer a research question you need to estimate the proportion of a total population of 4000 home care clients who receive a visit from their home care assistant at least once a week. You have been told that you need to be 95% certain that 'estimate' is accurate (the level of confidence in the estimate); this corresponds to a z score of 1.96 (In table above). You have also been told that 'estimate' needs to be accurate to within plus or minus 5% of the true percentage (the margin of error that can be tolerated)
You still need to estimate the proportion of responses that receive a visit from their home care assistant at least once a week. From your pilot survey you discover that 12 out of the 30 clients receive a visit at least once a week-in other words that 40% belong to the specified category. This means that 60% do not. These figures can then be substituted into the formula:

Table 1 Levels of confidence and associated Z values

Level of confidence	Z value
90%	1.65
95%	1.96
99%	2.57

$n=40*60*(1.96/5)^2$
$=2400*(0.392)^2$
$=2400*0.154$

=369.6

Where your population is less than 10,000 a smaller sample size can be used without affecting the accuracy. This is called adjusted minimum sample size. Calculated as follows
n^1 =n/1+ (n/N)

Where n^1 is the adjusted minimum sample size n is the minimum sample size (as calculated) and N is the total population

As the total population of home care clients is 4000 the adjusted minimum sample size can now be calculated.

n^1=369.6/1+ (369.6/4000)
=369.6/1+0.092
= 369.6/1.092
=338.46
Because of the small total population you need a minimum sample of only 339. However, this assumes a response rate of 100%

Other considerations
In completing this discussion of determining sample size, there are three additional issues. First, the above approaches to determining sample size have assumed that a simple random sample is the sampling design. More complex designs, e.g., stratified random samples, must take into account the variances of subpopulations, strata, or clusters before an estimate of the variability in the population as a whole can be made.

Another consideration with sample size is the number needed for the data analysis. If descriptive statistics are to be used, e.g., mean, frequencies, and then nearly any sample size will suffice. On the other hand, a good sample, e.g., 200-500, is needed for multiple regressions, analysis of covariance, or log-linear analysis, which might be performed for more rigorous state impact evaluations. The sample size should be appropriate for the analysis that is planned.

In addition, an adjustment in the sample size may be needed to accommodate a comparative analysis of subgroups (e.g., such as an evaluation of program participants with non-participants). Sudman (1976) suggests that a minimum of 100 elements is needed for each major group or subgroup in the sample and for each minor subgroup, a sample of 20 to 50 elements is necessary. Similarly, Kish (1965) says that 30 to 200 elements are sufficient when the attribute is present 20 to 80 percent of the time (i.e., the distribution approaches normality). On the other hand, skewed distributions can result in serious departures from normality even for moderate size samples (Kish, 1965 p.17). Then a larger sample or a census is required.

Finally, the sample size formulas provide the number of responses that need to be obtained. Many researchers commonly add 10% to the sample size to compensate for persons that the researcher is unable to contact. The sample size also is often increased by 30% to compensate for non-response. Thus, the number of mailed surveys or planned interviews can be substantially larger than the number required for a desired level of confidence and precision.

3.9 Data Collection Methods and Procedure

3.9.1 Data Collection Methods

In this section, the researcher should describe the major methods for collecting data from the subjects. The major methods for obtaining data in a study may include:

- Personal Interviews,
- Questionnaires
- Observation techniques
- Focus Groups

Questionnaire and interview as data-gathering tools

Questionnaire

A **questionnaire** is a means of eliciting the feelings, beliefs, experiences, perceptions, or attitudes of some sample of individuals. As a data collecting instrument, it could be structured or unstructured.

The questionnaire is most frequently a very concise, preplanned set of questions designed to yield specific information to meet a particular need for research information about a pertinent topic. The research information is attained from respondents normally from a related interest area. The dictionary definition gives a clearer definition: A questionnaire is a written or printed form used in gathering information on some subject or subjects consisting of a list of questions to be submitted to one or more persons.

Objectives:

1. Must translate the information needed into a set of specific questions that the respondents can and will answer.
2. Must uplift, motivate and encourage the respondent to become involved in the interview, to cooperate, and to complete the interview.
3. Should minimize response error

Advantages

Economy - Expense and time involved in training interviewers and sending them to interview are reduced by using questionnaires.
Uniformity of questions - Each respondent receives the same set of questions phrased in exactly the same way. Questionnaires may, therefore, yield data more comparable than information obtained through an interview.
Standardization - If the questions are highly structured and the conditions under which they are answered are controlled, then the questionnaire could become standardized.

Disadvantages

Respondent's motivation is difficult to assess, affecting the validity of response.
Unless a random sampling of returns is obtained, those returned completed may represent biased samples.

Factors affecting the percentage of returned questionnaires

Length of the questionnaire.
Reputation of the sponsoring agency.
Complexity of the questions asked.
Relative importance of the study as determined by the potential respondent.
Extent to which the respondent believes that his responses are important.
Quality and design of the questionnaire.
Time of year the questionnaires are sent out.

The questionnaire is said to be the most "used and abused" method of gathering information by the lazy man. Because often it is poorly organized, vaguely worded, and excessively lengthy.

Overcoming unwillingness to answer:

a. Provide a list of answer categories
b. Explain the sponsor of the study
c. Explain why the data are needed.

- Place the sensitive topics ate the end of the questionnaire.
- Preface the question with a statement that the behaviour of interest is common. For example: "Recent studies show that most Kenyans live in debt."
- Ask the question using third-person technique.
- Hide the question in a group of other questions that respondents are willing to answer.

Two types of questionnaires

- Structured questions */Closed or restricted form* - calls for a "yes" or "no" answer, short response, or item checking; is fairly easy to interpret, tabulate, and summarize. Specify the set of response alternatives and the response format.

May be multiple-choice or dichotomous.

a. Multiple-choice questions

- The researcher provides a choice of answer categories.
- The categories should be mutually exclusive and exhaustive.

Advantages:

- Interviewer bias is reduced
- Coding and processing of data is less costly
- Suitable particularly for self-administered questionnaires

Disadvantages:

- Requires considerable effort to design
- It is difficult to obtain information on alternatives not listed.
- Have potential for order bias.

b. Dichotomous questions

- A dichotomous question has only two response alternatives, such as a yes or no, or agrees or disagrees.

- *Open or unrestricted form* - calls for free response from the respondent; allows for greater depth of response; is difficult to interpret, tabulate, and summarize.

Advantages:

- Enable the respondents to express general attitudes and opinions that can help the researcher interpret their responses to structured questions.
- Respondents are free to express any views. Hence, are useful in exploratory research.

Disadvantages:

- Potential for interviewer bias is high. The data depend on the skills of the interviewers.
- Coding of responses is costly and time consuming.
- Not very suitable for self-administered questionnaires, respondents tend to be briefer in writing than in speaking.

Characteristics of a good questionnaire

- Deals with a significant topic, a topic the respondent will recognize as important enough to justify spending his time in completing. The significance should be clearly stated on the questionnaire or in the accompanying letter.
- Seeks only that information which cannot be obtained from other sources such as census data.
- As short as possible, only long enough to get the essential data. Long questionnaires frequently find their way into wastebaskets.
- Attractive in appearance, neatly arranged, and clearly duplicated or printed.
- Directions are clear and complete, important terms are defined, each question deals with a single idea, all questions are worded as simply and clearly as possible, and the categories provide an opportunity for easy, accurate, and unambiguous responses.
- Questions are objective, with no leading suggestions to the desired response.
- Questions are presented in good psychological order, proceeding from general to more specific responses. This order helps the respondent to organize his own thinking, so that his answers are logical and objective. It may be wise to present questions that create a favorable attitude before proceeding to those that may be a bit delicate or intimate. If possible, annoying or embarrassing questions should be avoided.
- Easy to tabulate and interpret. It is advisable to pre-construct a tabulation sheet, anticipating how the data will be tabulated and interpreted, before the final form of the question is decided upon. Working backward from a visualization of the final analysis of data is an important step in avoiding ambiguity in questionnaire form. If mechanical tabulating equipment is to be used, it is important to allow code numbers for all possible responses to permit easy transfer to machine-tabulation cards.

Questionnaire Design process

i. Specification of the information needed
ii. Specification of the type of interviewing method
iii. Determination of the content of individual questions
iv. Designing of the questions
v. Deciding on the question structure
vi. Determining the question wording
vii. Determining the order of questions
viii. Determining questionnaire form and layout
ix. Pre-testing the questionnaire

i. **Specification of the Information Needed**

1. Review the components of the problem and the approach, particularly:
   a. The research questions
   b. Hypotheses
2. Prepare a set of dummy tables describing how the analysis will be structured once the data have been collected.
3. Identify the target population

Rules for proper construction of a questionnaire

- Determining the Order of Questions. Opening questions should be interesting, simple, and not threatening. In some instances, they can be used to filter respondents One is how the question and answer choice order can encourage people to complete your survey. The other issue is how the order of questions or the order of answer choices could affect the results of your survey.

- Effect on subsequent questions. Questions asked early in a sequence can influence the responses to subsequent questions. As a rule of thumb, general questions should precede the specific questions.

- Ideally, the early questions in a survey should be easy and pleasant to answer. These kinds of questions encourage people to continue the survey. In telephone or personal interviews they help build rapport with the interviewer.

- Difficult questions comprise of questions that are sensitive, embarrassing, complex, or dull. Whenever possible leave difficult or sensitive questions until near the end of your survey. Any rapport that has been built up will make it more likely people will answer these questions. If people quit at that point anyway, at least they will have answered most of your questions.

- Rating scales higher numbers should mean a more positive or more agreeing answer.

- Keep the questionnaire as short as possible.

- Reassure your respondent that his or her responses will be kept confidential.
- Type of information. The type of information obtained in a questionnaire may be classified as:

    a) Basic information: relates directly to the research problem.
    b) Classification information: consisting of socioeconomic and demographic characteristics
    c) Identification information: includes name, address, and telephone number.

- Include a cover letter with all questionnaires, which includes your name and telephone number for the respondent to call if they have any questions. Include instructions on how to complete the questionnaire. The most effective cover letters and invitations include the following elements: Ask the recipient to take the survey. Explain why taking it will improve some aspect of the recipient's life (it will help improve a product, make an organization better meet their needs, make their opinions heard). Appeal to the recipient's sense of altruism ("please help"). Ask the recipient again to take the survey.
- You may want to leave a space for the respondent to add their name and title. Some people will put in their names, making it possible for you to re-contact them for clarification or follow-up questions.
- Avoid technical terms and acronyms, unless you are absolutely sure that respondents know they mean.
- Make sure your questions accept all the possible answers. A question like "Do you use regular or premium fuel in your car?" does not cover all possible answers
- Be aware of cultural factors.
- Reproduction of the Questionnaire. The questionnaire should have a professional appearance. Splitting a question into separate pages should be avoided. Vertical columns should be used for individual questions. Avoid crowding the questions to conserve space. Directions or instructions for individual questions should be placed as close to the question as possible.
- Leave your demographic questions (age, gender, income, education, etc.) until the end of the questionnaire. By then the interviewer should have built a

rapport with the interviewee that will allow honest responses to such personal questions.

- Determining Questionnaire Form and Layout. It is good practice to divide the questionnaire into several parts. The questions in each part should be numbered, particularly when branching questions are used. Grouping together questions on the same topic also makes the questionnaire easier to answer. The questionnaires themselves should be numbered serially.
- Do not have an interviewer ask a respondent's gender, unless they really have no idea.
- Determining the Question Wording. Guidelines to reduce wording problems:

  i) Define the issue: Consider: who, what, when, where, why, and way (6 Ws)
  ii) Use ordinary words: consider the level of education and understanding of the respondents
  iii) Use unambiguous words: the words used in a questionnaire should have a single meaning that is known to the respondents.
  iv) Avoid emotionally charged words or leading questions/ biasing questions that point towards a certain answer. "What do you think of the XYZ proposal?" than from "XYZ proposal okay?"

- Leave a space at the end of a questionnaire entitled "Other Comments." Sometimes respondents offer casual remarks that are worth their weight in gold and cover some area you did not think of, but which respondents consider critical.
- Determination of the Content of Individual Questions Is the question necessary? Consider the contribution of the question to the information needed or serve some specific purpose.

Source: http://psych.athabascau.ca/html/aupr/tools.shtml

Personal Interview

An **interview** is a direct face-to-face attempt to obtain reliable and valid measures in the form of verbal responses from one or more respondents. It is a conversation in which the roles of the interviewer and the respondent change continually.

Advantages

- Allows the interviewer to clarify questions.
- Can be used with young children and illiterates.
- Allow the informants to respond in any manner they see fit.
- Allows the interviewers to observe verbal and non-verbal behavior of the respondents.
- Means of obtaining personal information, attitudes, perceptions, and beliefs.
- Reduces anxiety so that potentially threatening topics can be studied.

Disadvantages

- Unstructured interviews often yield data too difficult to summarize or evaluate.
- Training interviewers, sending them to meet and interview their informants, and evaluating their effectiveness all add to the cost of the study.

Structured interviews are rigidly standardized and formal.

- The same questions are presented in the same manner and order to each subject.
- The choice of alternative answers is restricted to a predetermined list.
- The same introductory and concluding remarks are used.
- They are more scientific in nature than unstructured interviews.
- They introduce controls that permit the formulation of scientific generalizations.

Limitation of the structured interviews - Collecting quantified, comparable data from all subjects in a uniform manner introduces rigidity into the investigative procedures that may prevent the investigator from probing in sufficient depth.

Unstructured interviews are flexible.

- They have few restrictions.
- If preplanned questions are asked, they are altered to suit the situation and subjects.
- Subjects are encouraged to express their thoughts freely.
- Only a few questions are asked to direct their answers.
- In some instances, the information is obtained in such a casual manner that the respondents are not aware they are being interviewed.

- **Advantages** of the unstructured interview:
- One can penetrate behind initial answers.
- One can follow up unexpected clues.
- One can redirect the inquiry into more fruitful channels.
- It is very helpful in the exploratory stage of research.
- **Disadvantages** of the unstructured interview:
- Difficult to quantify the accumulated qualitative data.
- One usually cannot compare data from various interviews and derive generalizations that are universally applicable because of the non-uniform tactics employed.
- Unstructured interviews are not ordinarily employed when testing and verifying hypotheses.

Factors to be considered before interviewing

- Determine when to interview.
- Determine if the respondent is telling the truth.
- Consideration for sources of bias.

Four specific sources of error

- Errors in asking questions occur whenever an inappropriate question is asked where the response to the question will not satisfy the objectives of the investigation.
- Errors in probing occur when the interviewer does not allow the respondent sufficient time to respond or when he anticipates what the response will be.
- Errors in motivating respondents can be a source of invalidity. Unless respondents are motivated by interviewers to answer questions to the best of their ability, they are likely to be uncooperative.

- Errors in recording responses occur when the interviewer records the respondent's answers inaccurately by omitting information.

Evaluation of a Questionnaire or Interview Script

- Is the question necessary? How will it be used? What answers will it provide? How will it be tabulated, analyzed, and interpreted?
- Are several questions needed instead of one?
- Do the respondents have the information or experience necessary to answer the questions?
- Is the question clear?
- Is the question loaded in one direction? Biased? Emotionally toned?
- Will the respondents answer the question honestly?
- Will the respondents answer the question?
- Is the question misleading because of unstated assumptions?
- Is the best type of answer solicited?
- Is the wording of the question likely to be objectionable to the respondents?
- Is a direct or indirect question best?
- If a checklist is used, are the possible answers mutually exclusive, or should they be?
- If a checklist is used, are the possible answers "exhaustive"?
- Is the answer to a question likely to be influenced by preceding questions?
- Are the questions in psychological order?
- Is the respondent required to make interpretations of quantities or does the respondent give data which investigator must interpret?

Direct Observation

Direct observation is a measuring instrument used to measure such traits as self-control, cooperativeness, truthfulness, and honesty. In many cases, systematic direct observation of behavior is the most desirable measurement method. An investigator identified the behavior of interest and devises a systematic procedure for identifying, categorizing, and recording the behavior in either a natural or "staged" situation.

Five Types of Participant Observation

- External Participation constitutes the lowest degree of involvement in observation. Observing situations on television or videotape can do this type of observation.
- Passive Participation means the researcher is present at the scene of action but does not interact or participate. The researcher finds an observation post and assumes the role of a bystander or spectator.
- Balanced Participation means that the researcher maintains a balance between being an insider and being an outsider. The researcher observes and participates in some activities, but does not participate fully in all activities.
- Active Participation means that the researcher generally does what others in the setting do. While beginning with observation to learn the rules, as they are learned the researcher becomes actively engaged in the activities of the setting.
- Total Participation means the researcher is a natural participant. This is the highest level of involvement and usually comes about when the researcher studies something in which he or she is already a natural participant.

Conference

The Conference technique is a face-to-face discussion of a topic of interest.

- Experts are brought together at a common site.
- The group brainstorms to generate as many ideas on the problem as possible. The only rule regarding this step is that there are no negative reactions to any suggestions.
- The experts then evaluate and rate the suggestions.
- The most popular responses are determined, and an arbitrary number are chosen based on natural breaks or logic.
- Finally, the group discusses the strengths and weaknesses of the top suggestions and ranks the final choices.

One major drawback to this method of data gathering is the influence of personalities as a strong factor in determining consensus.

Delphi Technique: the Delphi technique is used in the planning process, especially with appraising the future political, economic, and social environment, ascertaining the role of the organization in this environment, and anticipating and perceiving the needs and requirements of client groups.

The Delphi technique is a means of securing expert convergent opinion without bringing the experts together in face-to-face confrontation. This opinion of experts is usually gained through the use of successive questionnaires and feedback with each round of questions being designed to produce more carefully considered group opinions.

Procedure

- A questionnaire is mailed to respondents who remain anonymous to one another. The first questionnaire may call for a list of opinions involving experienced judgment, a list of predictions, or a list of recommended activities.
- On the second round, each expert receives a copy of the list and is asked to rate or evaluate each item by some such criterion as importance, probability of success, etc.
- The third questionnaire, which includes the list and ratings, indicates the consensus, if any, and asks the experts either to revise their opinion or specify their reasons for remaining outside the consensus.
- The fourth questionnaire includes lists, ratings, consensus, and minority opinions. It provides the final chance for revision of opinions.

Advantages

- It allows planners to get the views in a broad perspective rather than from an isolated point of view.
- Delphi in combination with other tools is a very potent device for teaching people to think about the future of education in much more complex ways than they ordinarily would.
- It is a useful instrument even for a general teaching strategy.
- It is a planning tool, which may aid in probing priorities held by members and constituencies of an organization.
- Delphi saves time and travel, which are required to bring people together for a conference.
- Delphi prevents personality biases from affecting the results.

Disadvantages

- Interpretation of the participants' responses and the meaning of the importance of the factors in planning are difficult.
- It is unknown how the findings can be generalized to Delphis which cover a 30 year extension into the future.
- Delphi at present can render no rigorous distinction between reasonable judgment and mere guessing.
- It is difficult to determine the amount of bias injected into the results by the person administering the Delphi.

Nominal Group Technique

The committee chairman reiterates that the role of everyone present is to contribute his perceptions, expertise, and experience to the identification of priority problems. He emphasizes that the purpose is to identify and describe priority problems and needs. He indicates that each member is to work individually without interacting verbally with each other. The committee chairman distributes the problem or need identification form to the members and ask them to respond in writing to the questions or statement on the form, giving an example of the kind of response.

- Without discussion, silently and independently, each member lists on the form the problems and/or needs for approximately 10 minutes. The chairman enforces silence by requesting that those who have stopped writing not talk with others and think more deeply for other possible items.
- The recorder now asks each member to state an item from his or her list. The items are recorded until all lists have been included. Discussion of items in not allowed and no concern is given to overlap of items at this time. However, members are encouraged to generate new ideas on their forms based on items presented by other group members.
- The group now discusses for approximately 20 minutes the items listed for the purpose of clarification, elaboration, combination of items, or addition of new items.
- Without discussion and acting independently, each group member should select and prioritize the items believed to be most critical. The recorder asks for each member to give the items selected in priority order. The most critical items are determined by the total amount of interest and votes. Discussion of voting and priority items continues until a consensus is reached.

Focus Groups Discussion (FGD)

A focus group is an organized discussion session. A panel of people meets for a short duration to exchange ideas, feelings, and experiences on a specific topic. A trained facilitator, using group dynamics principles, guides participants through the meeting. Increasingly used in social and business research, focus group meetings enable a researcher to gain much information in a relatively short period of time (Morgan & Kruger 1993).

Focus groups have been a mainstay in private sector marketing research for the past three decades. More recently, public sector organizations are beginning to discover the potential of these procedures. Educational and nonprofit organizations have traditionally used face-to-face interviews and questionnaires to get information. Unfortunately, these popular techniques are sometimes inadequate in meeting information needs of decision makers. The focus group is unique from these other procedures; it allows for group interaction and greater insight into why certain opinions are held. Focus groups can improve the planning and design of new programs, provide means of evaluating existing programs, and produce insights for developing marketing strategies.

Characteristics

- Involve people. It must be small enough for everyone to have opportunity to share insights and yet large enough to provide diversity of perceptions. Focus groups are typically composed of 6 to 10 people, but the size can range from as few as 4 to as many as 12.
- Conducted in series. Multiple groups with similar participants are needed to detect patterns and trends across groups.
- Possess certain characteristics. Participants are reasonably homogeneous and unfamiliar with each other.
- Provide data. Focus groups pay attention to the perceptions of the users and consumers of solutions, products, and service. They are not intended to develop consensus, to arrive at an agreeable plan, or to make decisions about which course of action to take.
- Produce qualitative data.

Advantages

- It is a socially oriented research procedure.
- The format allows the moderator to probe.
- Discussions have high face validity.
- Discussions can be relatively low cost.
- The format can provide speedy results.
- Focus groups enable the researcher to increase the sample size of qualitative studies.

Limitations

- The researcher has less control in the group interview as compared to the individual interview.
- Data are more difficult to analyze.
- The technique requires carefully trained interviewers.
- Groups can vary considerably.
- Groups are difficult to assemble
- The discussion must be conducted in an environment conducive to conversation.

Types of Focus Group Questions

- Opening Question. This is the round robin question that everyone answers at the beginning of the focus group. It is designed to be answered rather quickly (within 10-20 seconds) and to identify characteristics that the participants have in common. Usually it is preferably for these questions to be factual as opposed to attitude or opinion-based questions.
- Introductory Questions. These questions introduce the general topic of discussion and/or provide participants an opportunity to reflect on past experiences and their connection with the overall topic. Usually these questions are not critical to the analysis and are intended to foster conversation and interaction among the participants.
- Transition Questions. These move the conversation into the key questions that drive the study. The transition questions help the participants envision the topic in a broader scope. They serve as the logical link between the introductory questions and the key questions. The participants are becoming aware of how others view the topic.
- Key Questions. These questions drive the study. Typically, there are two to five questions in this category. These are usually the first questions to be developed and also the ones that require the greatest attention in the subsequent analysis.
- Ending Questions. These questions bring closure to the discussion, enable participants to reflect back on previous comments, and are critical to analysis. These questions can be of

three types:

Telephone Surveys- surveying by telephone is the most popular interviewing method.

Advantages

- People can usually be contacted faster over the telephone than with other methods. If the Interviewers are using CATI (computer-assisted telephone interviewing), the results can be available minutes after completing the last interview.
- You can dial random telephone numbers when you do not have the actual telephone numbers of potential respondents.
- CATI software, such as The Survey System, makes complex questionnaires practical by offering many logic options. It can automatically skip questions, perform calculations and modify questions based on the answers to earlier questions. It can check the logical consistency of answers and can present questions or answers choices in a random order (the last two are sometimes important for reasons described later).
- Skilled interviewers can often elicit longer or more complete answers than people will give on their own to mail, email surveys (though some people will give longer answers to Web page surveys). Interviewers can also ask for clarification of unclear responses.
- Some software, such as The Survey System, can combine survey answers with pre-existing information you have about the people being interviewed.

Disadvantages

- Many telemarketers have given legitimate research a bad name by claiming to be doing research when they start a sales call. Consequently, many people are reluctant to answer phone interviews and use their answering machines to screen calls.
- The growing number of working- women often means that no one is at home during the day.
- You cannot show or sample products by phone.

Mail Surveys

Advantages

- Mail surveys are among the least expensive.
- This is the only kind of survey you can do if you have the names and addresses of the target population, but not their telephone numbers.
- The questionnaire can include pictures - something that is not possible over the phone.
- Mail surveys allow the respondent to answer at their leisure, rather than at the often-inconvenient moment they are contacted for a phone or personal interview. For this reason, they are not considered as intrusive as other kinds of interviews.

Disadvantages

- Time, mail surveys take longer than other kinds. You will need to wait several weeks after mailing out questionnaires before you can be sure that you have gotten most of the responses.
- In populations of lower educational and literacy levels, response rates to mail surveys are often too small to be useful.

Computer Direct Interviews

These are interviews in which the Interviewees enter their own answers directly into a computer. They can be used at malls, trade shows, offices, and so on. The Survey System's optional Interviewing Module and Interview Stations can easily create computer-direct interviews. Some researchers set up a Web page survey for this purpose.

Advantages

- The virtual elimination of data entry and editing costs.
- You will get more accurate answers to sensitive questions.
- The elimination of interviewer bias. Different interviewers can ask questions in different ways, leading to different results. The computer asks the questions the same way every time.
- Response rates are usually higher. Computer-aided interviewing is still novel enough that some people will answer a computer interview when they would not have completed another kind of interview.

Disadvantages

- The Interviewees must have access to a computer or one must be provided for them.
- As with mail surveys, computers direct interviews may have serious response rate problems in populations of lower educational and literacy levels. This method may grow in importance as computer use increases.

Email Surveys

Email surveys are both very economical and very fast. More people have email than have full Internet access. This makes email a better choice than a Web page survey for some populations. On the other hand, email surveys are limited to simple questionnaires, whereas Web page surveys can include complex logic.

Advantages

- Speed. An email questionnaire can gather several thousand responses within a day or two.
- There is practically no cost involved once the set up has been completed.
- You can attach pictures and sound files.
- The novelty element of an email survey often stimulates higher response levels than ordinary "snail" mail surveys.

Disadvantages

- You must possess (or purchase) a list of email addresses.
- Some people will respond several times or pass questionnaires along to friends to answer. Many programs have no check to eliminate people responding multiple times to bias the results.
- Many people dislike unsolicited email even more than unsolicited regular mail. You may want to send email questionnaires only to people who expect to get email from you.
- You cannot use email surveys to generalize findings to the whole populations. People who have email are different from those who do not, even when matched on demographic characteristics, such as age and gender.

- Email surveys cannot automatically skip questions or randomize question or answer choice order or use other automatic techniques that can enhance surveys the way Web page surveys can.

Summary of Survey Methods

Your choice of survey method will depend on several factors. These include:

Speed	Email and Web page surveys are the fastest methods, followed by telephone interviewing. Mail surveys are the slowest.
Cost	Personal interviews are the most expensive followed by telephone and then mail. Email and Web page surveys are the least expensive for large samples.
Internet Usage	Web page and Email surveys offer significant advantages, but you may not be able to generalize their results to the population as a whole.
Literacy Levels	Illiterate and less-educated people rarely respond to mail surveys.
Sensitive Questions	People are more likely to answer sensitive questions when interviewed directly by a computer in one form or another.

3.9.2 Research Procedure

A detailed description of the steps taken in the administration of the data collection tools should be provided for the purposes of replicability. The researcher should be aware of social desirability bias [the tendency for people to give answers that they believe (consciously /unconsciously) will make them look good rather than those that are accurate e.g. people tend to under report their participation in activities that others might disapprove like driving when drug] The researcher should be also prepared to deal with people who respond 'I do Not Know'. The researcher should provide a complete account of the research process including

- Pilot testing,
- Scheduling of the subjects or participants,
- Distribution and collection of the instruments
- Timing of interviews or questionnaire

3.10 Data Analysis Methods

The researcher should identify and describe appropriate data analysis methods for the study.

- Quantitative approaches in terms of descriptive statistics or inferential statistics should be described.
- Descriptive statistics include frequencies, measures of central tendencies (mean, medium or mode) and measures of dispersion (standard deviation, range or variance).
- Inferential statistics involve measurement or relationships and differences between or among the variables. Inferential statistics include correlation, regression and analysis of variance among others.
- Data presentation methods in terms of tables, graphs or charts should also be described in this section.
- Qualitative data should be summarized and categorized according to common themes and presented in frequency distribution tables

The word "statistics" is used in several different senses. In the broadest sense, "statistics" refers to a range of techniques and procedures for analyzing data, interpreting data, displaying data, and making decisions based on data. A second usage, "statistic" is defined as a

numerical quantity (such as the mean) calculated in a sample. Such statistics are used to estimate parameters.

What is data Analysis?

Data Analysis is defined as the whole process, which starts immediately, after data collection and end at point of interpretation of the processes results (Obure 2002)

The whole process includes data sorting, data editing, data coding, data entry, data cleaning, data processing and interpretation of the results.

1. Data Sorting-involves the rearrangement of the collected data/questionnaires to bring some order allowing systematic handling. It's the beginning of detection, correction and avoidance of errors occurring as a result of mix-ups.
2. Data Editing-Involves reading through the filled questionnaires (primary data), records to spot any inconsistencies and/or errors, which occurred during data collection. The objective is to identify problems with the instruments owing to apparent misunderstanding by the enumerators or the respondents: to detect any questionnaires that may have been faked by the enumerators. Its also helps to correct mistakes that may have occurred due to the slip of the pen. It makes the task of coding easier and help in achieving reliable results.
3. Data coding-Process of creation of dummy variables names (short names assigned to each study variable). These entire dummies are in turn assigned numeric values that can be processed or understood by SPSS for windows. The code allows the researcher to minimize errors during data entry and processing and provides easy interpretations of results.
4. Data Entry-the actual keying of data according to the assigned codes. It requires a high degree of keenness and patience. You need to have the principle of Garbage in Garbage out) GIGO) in mind.
5. Data Cleaning-Involve conducting a final check on the data file for accuracy, erroneous data, completeness and consistency. It enables you to avoid going back to the original questionnaires too many times to correct errors when you are at the middle of Analysis
6. Data Processing-subjected the prepared data to SPSS processor which then manipulates/ computes/processes the data and output results. You must decide what is the best statistical tool to be used in your hypothesis testing
7. Interpretation of results-Its deriving some understanding from the output relative to the subject matter of the researcher. Its from the derived understanding that conclusions are made

Hypothesis testing is a statistical inferential procedure in which a statement based on some experimental or observational study is formulated, tested, and then put through a decision process. The decision process either accepts or rejects the statement. It is the null hypothesis that is actually tested, not the research hypothesis. The object of the test is to see whether the null hypothesis should be rejected or accepted. If the null hypothesis is rejected, that is taken as evidence in favor of the research hypothesis, which is called as the **alternative hypothesis (denoted by H_a)**. In usual practice we do not say that the research hypothesis has been "proved" only that it has been supported.

More precisely, the hypothesis testing procedure can be broken down into three steps:

1. Formulation/specification of a (hypothetical) statement. The hypothetical statement formed is called the null hypothesis ***(Ho),*** or. Accompanying the null hypothesis is the alternative hypothesis ***(Ha).***

2. Appropriate statistical technique is selected to test the hypothesis e.g. correlation studies, regression Analysis, chi-square test, T-test and F-Test
3. Deciding whether to accept or reject the statement. Once the value of the test statistic is obtained, it is used to find a corresponding probability of obtaining such a statistic given that ***Ho*** is true. When a statement (whether it is null hypothesis or the alternative hypothesis) is accepted, it merely says that, statistically, there is not enough evidence to reject the statement. Acceptance of a hypothetical statement does not prove that the underlying statement is true.
4. Calculating the value of the test statistics and performing the test/Testing of the statement. This is usually the most mathematical part of the procedure. Then apply an appropriate test statistic using values obtained from the study. There are many test statistics, depending on the nature of the study.
5. Stating your conclusion from the perspective of the original research problem or questions.

Level of significance- In normal English, "significant" means important, while in Statistics "significant" means probably true (not due to chance). A research finding may be true without being important. When statisticians say a result is "highly significant" they mean it is very probably true. They do not (necessarily) mean it is highly important.

Significance levels show you how likely a result is due to chance. The most common level, used to mean something is good enough to be believed, is .95. This means that the finding has a 95% chance of being true. However, this value is also used in a misleading way. No statistical package will show you "95%" or ".95" to indicate this level. Instead it will show you ".05," meaning that the finding has a five percent (.05) chance of not being true, which is the converse of a 95% chance of being true. To find the significance level, subtract the number shown from one. For example, a value of ".01" means that there is a 99% (1-.01=.99) chance of it being true

Confidence limits: The limits (or range) within which the hypothesis should lie with specified probabilities are called the confidence limits or fiducial limits. It is customary to take these limits as 5% or 1% levels of significance. If sample values lies between the confidence limits, the hypothesis is accepted; if it does not, the hypothesis is rejected at the specified level of significance.

Errors in Testing Of Hypothesis

In testing any hypothesis, we get only two results: either we accept or we reject it. We do not know whether it is true or false. Hence four possibilities may arise.

1. The hypothesis is true but test rejects it (Type I error)
2. The hypothesis is false but test accepts it (Type II error)
3. The hypothesis is true and test accepts it (correct decision)
4. The hypothesis is false and test rejects it (correct decision)

In a statistical hypothesis testing experiment, a Type I error (alpha) is committed when the null hypothesis is rejected though it is true.

A Type II error (beta) is committed by not rejecting (i.e. accepting) the null hypothesis, when it is false.

Tests for testing of Hypothesis

1. **Correlation studies**- to determine the extent of the relationship between two or more variables. The coefficient of correlation can be positive and negative correlation. Correlation analysis is a statistical technique that evaluates the relationship between two variables; i.e., how closely they match each other in terms of their individual mathematical change. The question addressed is: if one variable (X) moves or changes in a certain direction does the second variable (Y) also move or change in a similar or complementary direction? Correlation Coefficient- is a measure of the strength of the linear relationship between two variables *x* and *y*.

2. **Regression Analysis**- it's the process of estimating the coefficient of linier equation, it involves one or more independent variables that best predict the value of the dependent variable. e.g. you can try to predict a salesperson's total yearly sales (the dependent variable) from independent variable such as age, education and years of experience. The goal of regression analysis is to determine the values of parameters for a function that cause the function to best fit a set of data observations that you provide. In *linear regression*, the function is a linear (straight-line) equation. For example, if we assume the value of an automobile decreases by a constant amount each year after its purchase, and for each mile it is driven, the following linear function would predict its value (the dependent variable on the left side of the equal sign) as a function of the two independent variables which are age and miles: Value = price + de-page*age + dep-miles*miles Where *value*, the dependent variable, is the value of the car, *age* is the age of the car, and *miles* are the number of miles that the car has been driven. The regression analysis performed by NLREG will determine the best values of the three parameters, *price*, the estimated value when age is 0 (i.e., when the car was new), *de-page*, the depreciation that takes place each year, and *dep-miles*, the depreciation for each mile driven. The values of *dep-age* and *dep-miles* will be negative because the car loses value as age and miles increase.

3. **Chi-square test**-compares the observed and expected frequencies in each category to test either that all categories have the same proportion of values or that each category going, a user-specified proportion of values. e.g. Chi-square can be used to test if a bag of jelly beans contain equal proportion of blue, brown, green and red beans. You could also test to see whether the bag contains 50% blue, 20% brown, 20% green and 10% red beans.

4. **One sample T-test**- it tests whether the mean of a single variable differs from a specified constant. e.g. A researcher might want to test whether the average I.Q score for a group of students differ from 100
5. **Independent T-test**- Compares means of two groups of cases ideally, for this test, the subjects should be randomly assigned to two groups so that any difference is due to the treatment of or lack of treatment of the group and not other factors. This is not the case if you compare average income fro males and females for persons are not randomly assigned to be male or female
6. **Paired sample T-test**-Compares the mean of two variables for a single group. It computes the difference between values of the variable for each case and test whether the average differs from zero. In a study of high blood pressure, all patients are measured at the beginning of the study, given a treatment and measured again
7. **F-Test**- An F-test (Snedecor and Cochran, 1983) is used to test if the standard deviations of two populations are equal/whether two samples are drawn from different populations have the same standard deviation, with specified confidence level. Samples may be of different sizes. This test can be a two-tailed test or a one-tailed test. The two-tailed version tests against the alternative that the standard deviations are not equal. The one-tailed version only tests in one direction that is the standard deviation from the first population is either greater than or less than (but not both) the second population standard deviation. The choice is determined by the problem. For example, if we are testing a new process, we may only be interested in knowing if the new process is less variable than the old process.