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

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

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

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.

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.

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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.

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.

- 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".

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.

=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:

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.

- 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

- 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.

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

- 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

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.

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).***

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.