TOPIC FIVE - RESEARCH DESIGNS

Definition of research design

Kerlinger, N.F (1986) defines research design as

> "The plan and structure of investigation so conceived as to obtain answers to research questions. The plan is overall scheme or program of the research. It includes an outline of what the investigator will do from writing hypotheses and their operational implications to the final analysis of data….a research design expresses both the structure of the research problem and the plan of investigation used to obtain empirical evidence on relations of the problem"

Therefore a research design is the strategy for a study and the plan by which the strategy is to be carried out. It specifies the methods and procedures for the collection, measurement, and analysis of data.

Research designs- it is the arrangement of conditions for collecting and analyzing data in a manner that aims to combine the research purpose with economy in the procedure. It is a strategy specifying which approach will be used for gathering and analyzing data. It constitutes the blue print for the collection, measurement and analysis of data. It is an outline of what the researcher will do from writing a hypothesis to the final analysis of data. It is a plan that specifies the sources and type of information relevant to the research problem. It is an advanced planning of the methods to be adopted for collecting the relevant data and the techniques to be used in their analysis keeping in view the objective of the research and the availability of staff, time and money.

A research design makes the following decisions:

1. What is the study about?
2. Why is the study being made?
3. Where will the study be carried out?
4. What type of data is required?
5. Where can the required data are found?
6. What period of time will the study include?
7. What will be the sample design?
8. What techniques of data collection will be used?
9. How will the data be analyzed?
10. In what style will the report be prepared?

BASIC TERMS IN RESEARCH DESIGNS

1. population

This is an entire group of individuals, events or objects having common observable characteristics. It is an aggregate of all that conforms to a given specification. It is of two types:

a) Target population (universe) it is the population in which a researcher generalizes his results. It is one which may be scattered over a wide geographical area. For Example, all universities in Kenya (generalizability).
b) Access population- it is a more narrowly defined and manageable population.

It is one in which the researcher can easily reach in his study.

It must be comparable to the target population and must possess the same characteristics as the target population to enable generalizability.

Example all Christian universities in Kenya (accessible)

2. population validity

It is the establishment of the fact that accessible population is representative of the target population.

3. sampling

it is the process of selecting a number of individuals in such a way that the individuals selected represents the large group from which they were selected.

4. sample

It is a smaller group obtained from the accessible population through sampling.
This is because it is time consuming and expensive to deal with all the members of an accessible population.
It is an optimum number of cases or subjects or individuals to be studied by a researcher. This number is called a sample size.
Example 500 MBA students in KCA University

5. sampling error

it is a discrepancy or big difference between sample characteristics and population characteristics.

6. variable

It is a measurable characteristic that assumes difference characteristics among the subjects.
For example gender female, male
Age 20-25, 25-30.
A variable may be:

Independent variable- it is manipulated in order to determine their influence or effect on other variables. They are also known as predictor. For example influence of income on saving habits

Dependent variable – it indicates the total influence arising from the effects of the independent variable. They are also known as criterion variables. For example influence of hours studied on performance

Extraneous variable - These are extra variable that were not intended to form part of the study. They are also known as *confounding variable* because they confound the effect of independent variable on the dependent variable. In any relationship the total effect or influence on the dependent variable should be purely due to independent variable but not some extraneous variables.

These extraneous variables are controlled for in study three ways:

- Build the extraneous variable into the study.
- Remove its effect by statistical procedures.
- Hold one of the variables constant and consider one category of the variable.

NB
When a possible extraneous variable is build into the study, it is known as a control variable and it increases the validity of the research.

a) Control variable

It is a blocking or covariate variable.
It blocks the extraneous variables that were not intended to be part of the study.

7. experiment

it is a process of examining the truth of a statistical hypothesis relating to some research problem.

8. experimental group

This is the study group exposed to some special conditions to determine the effect of that condition.

9. treatment

It is that special condition under which the experiment group is exposed to.

10. **control group**
    - It is a comparative group used during an experiment which is not exposed to any treatment or condition.
    - It is left in its usual conditions.

For example 50 students are randomly selected to take up a course in research, the group is then divided randomly into two groups by assigning 25 to group A (regular program) and group B (parallel program)
Group A is exposed to some special condition such as learning with the aid of computers
Group B is not exposed to some special condition therefore is a control group.
If both groups are exposed to computers they both become experimental groups.

ESSENTIALS OF RESEARCH DESIGN

The design:

- Is an activity and time based plan
- Is always based on the research question
- Guides the selection of sources and types of information
- Is a framework for specifying the relationships among the study's variables
- Outlines procedures for every research activity.

CLASSIFICATIONS OF DESIGNS

Research can be classified using eight different descriptors as shown in the table below:

Category	Options
The degree to which the research questions has been crystallized	➢ Exploratory study ➢ Formal study
The method of data collection	➢ Monitoring ➢ Interrogation / communication
The power of the researcher to produce effects in the variables under study	➢ Experimental ➢ Ex post facto
The purpose of the study	➢ Descriptive ➢ Causal
The time dimension	➢ Cross-sectional ➢ Longitudinal
The topical scope – breath and depth of the study	➢ Case ➢ Statistical study
The research environment	➢ Field setting ➢ Laboratory research ➢ Simulation
The participants perceptions of research activity	➢ Actual routine ➢ Modified routine

1. Degree to which the research questions has been crystallized

A study may be viewed as exploratory study or formal study. The essential distinctions between these two options are the degree of structure and the immediate objective of the study.

- **Exploratory studies** tend toward loose structures with the objective of discovering future research tasks. Its immediate purpose is to develop hypotheses or questions for further study.
- **Formal study** begins where the exploration leaves off- it begins with a hypothesis or research question and involves precise procedures and data source specifications. Its goal is to test the hypotheses or answer the research questions posed.

2. **Method of data collection**

- **Monitoring:** It includes studies in which the researcher inspects the activities of a subject or the nature of some material without attempting to elicit responses from anyone e.g. an observation of the actions of a group of decision makers.

- **Interrogation / communication**: the researcher questions the subjects and collects their responses by personal or impersonal means. The collected data may result from
    i. Interview or telephone conversations
    ii. Self-administered or self-reported instruments sent through the mail, left in convenient locations, or transmitted electronically or by other means
    iii. Instruments presented before and / or after a treatment or stimulus condition in an experiment.

3. **Researcher control of variables**

- **Experimental**: the researcher attempts to control and / or manipulate the variables in the study. It is appropriate when one wishes to discover whether certain variables produce effects in other variables. Experimentation provides the most powerful support for a hypothesis of causation.
- **Ex post facto**: Investigators have no control over the variables in the sense of being able to manipulate them. They can only report what has happened or what is happening. It is important that the researcher's using this design do not influence the variables since doing so will introduce bias. The researcher is limited to holding factors constant by judicious selection of subjects according to strict sampling procedures and by statistical manipulation of findings.

4. **Purpose of the study**

- **Descriptive study**: it is a research that is concerned with finding out who, what, where, when, or how much.
- **Causal study**: It is concerned with learning why i.e. how one variable produces changes in another. It tries to explain the relationships among variables.

5. **The time dimension**

- **Cross-sectional studies**: they are carried out once and represent a snapshot of one point in time.
- **Longitudinal studies**: are repeated over an extended period. It tracks changes over time.

6. **The topical scope**

- **Statistical studies:** they are designated for breadth rather than depth. They attempt to capture a population's characteristics by making inferences from a sample's characteristics. Hypotheses are tested quantitatively. Generalizations about findings are presented based on the representativeness of the sample and the validity of the design.

- **Case studies:** they place more emphasis on a full contextual analysis of fewer events or conditions and their interrelations. Although hypotheses are often used, the reliance on qualitative data makes support or rejection more difficult. An emphasis on detail provides valuable insight for problem solving, evaluation and strategy. This detail is secured from multiple sources of information. It allows evidence to be verified and avoids missing data.

7. **The research environment**

- **Field setting**: it is where the research occurs under actual environmental conditions
- **Laboratory research:** it is where the research occurs under staged or manipulated conditions
- **Simulation:** To simulate is to replicate the essence of a system or process. Simulations are increasingly used in operations research. The major characteristics of various conditions and relationships in actual

situations are often represented in mathematical models. Role-playing and other behavioural activities may also be viewed as simulations.

8. Participants' perceptions

The usefulness of a design may be reduced when people in a disguised study perceive that research is being conducted. Participants' perceptions influence the outcomes of the research in subtle ways. There are three levels of perception:

- Participants perceive no deviations from everyday routines
- Participants perceive deviations, but as unrelated to the researcher.
- Participants perceive deviations as researcher-induced.

In all research environments and control situations, researchers need to be vigilant to effects that may alter their conclusions. Participant's perceptions serve as a reminder to classify one's study by type, to examine validation strengths and weaknesses and to be prepared to qualify results accordingly.

MAJOR TYPES OF RESEARCH DESIGN

(a) Exploratory studies

Exploration is particularly useful when researchers lack a clear idea of the problems they will meet during the study. Through exploration researchers develop concepts more clearly, establish priorities, develop operational definitions and improve the final research design. Other factors that necessitate the use of exploration are

- To save time and money
- If the area of investigation is new
- Important variables may not be known or thoroughly defined
- Hypothesis for the research may be needed
- A researcher can explore to be sure if it is practical to do a formal study in the area.

Despite its obvious value, researchers and managers give exploration less attention that it deserves. Exploration is sometimes linked to old biases about qualitative research i.e. subjective ness, non-representativeness and non-systematic design.

When we consider the scope of qualitative research, several approaches are adaptable for exploratory investigations of management questions:

- In-depth interviewing – usually conversational rather than structured.
- Participant observation – to perceive first hand what participants in the setting experience
- Films, photographs and videotapes – to capture the life of the group under study.
- Case studies – for an in-depth contextual analysis of a few events or conditions
- Document analysis – to evaluate historical or contemporary confidential or public records, reports, government documents and opinions.

Where these approaches are combined, four exploratory techniques emerge with wide applicability for the management researcher: -

i. Secondary data analysis
ii. Experience surveys
iii. Focus groups
iv. Two-stage designs

An exploratory research is finished when the researchers have achieved the following:

- Established the major dimensions of the research task
- Defined a set of subsidiary investigative questions that can be used as a guide to a detailed research design.
- Developed several hypotheses about possible causes of a management dilemma. Learned that certain other hypotheses are such remote possibilities that they can be safely ignored in any subsequent study.

- Concluded additional research is not needed or is not feasible.

(b) Descriptive Studies

It is the process of collecting data in order to test hypotheses or to answer questions concerning the current status of the subjects in the study. It determines and reports the way things are. It attempts to describe such things as possible behaviour, attitudes, values and characteristics.

(c) Causal Research

It is used to explore relationships between variables. It determines reasons or causes for the current status of the phenomenon under study. The variables of interest cannot be manipulated unlike in experimental research.

Advantages of causal study

- Allows a comparison of groups without having to manipulate the independent variables
- It can be done solely to identify variables worthy of experimental investigation
- They are relatively cheap.

Disadvantages of causal study

- Interpretations are limited because the researcher does not know whether a particular variable is a cause or result of a behaviour being studied.
- There may be a third variable which could be affecting the established relationship but which may not be established in the study.

(d) Correlation Methods

It describes in quantitative terms the degree to which variables are related. It explores relationships between variables and also tries to predict a subject's score on one variable given his or her score on another variable.

Advantages of the correlational method

- Permits one to analyze inter-relationships among a large number of variables in a single study.
- Allows one to analyze how several variables either singly or in combination might affect a particular phenomenon being studied.
- The method provides information concerning the degree of relationship between variables being studied.

Disadvantages of the correlational method

- Correlation between two variables does not necessarily imply causation although researchers often tend to interpret such a relationship to mean causation.
- Since the correlation coefficient is an index, any two variables will always show a relationship even when commonsense dictates that such variables are not related.
- The correlation coefficient is very sensitive to the size of the sample.

THE SAMPLE DESIGN

Sample –it is a process of selecting a sufficient number of elements from the population.
It is a definite plan for obtaining a sample from a given population.
Therefore the study of a sample and its properties or characteristics can be generalized as the properties and characteristics of the population elements in other words it is a relationship between a sample and population.

SAMPLE	POPULATION
SATISTICS	CHARACTERISTICS
1. Sample mean	1. Population mean
2. Sample standard deviation	2. Population standard deviation
3. Variation in the sample	3. Population variance

STEPS IN DETERMINING A SAMPLING DESIGN

1. Determine the type of universe (population) a researcher must first define the objects to be studied in the universe. For example type of students in KCA University, number of employees in an organization.
2. Determine the sampling unit. A unit may be on borders, library users in KCA University.
3. Determine the sampling source list. A source list is also known as a sampling frame. It contains the name of all the items of a universe. For example registrars office, human resource, directory, census, voters registration list. A source list must be comprehensive, correct, reliable and appropriate because the degree of generalization of a sample or study depends on the accuracy of the sampling frame. If a sample is drawn from an incomplete sampling source then the finding of the study may be generalized beyond the sample. However when the sampling source does not exist or when it takes too much time and resources to complete then a researcher may decide on any other method of selecting a sample so long as the procedure is described in detail.
4. Determine the size of the sample - These are the number of items to be selected from the universe to constitute a sample. This size should neither be excessively large or too small. An optimum sample is one which is efficient, representative, reliable and flexible.

NB - When a target population is too small then a researcher is advised to include the whole population for his study.

NB - When deciding on the sample size a researcher must determine the desired acceptable level of confidence, but where time and resources allow a researcher should take big sample as possible this is because a smaller sample does reproduce the main characteristics of the accessible population to an acceptable degree. This may lead to a sampling error in social science research.

The formula for obtaining a sample size is:

$$n = \frac{Z^2 pq}{d^2}$$

where

n = the desired sample size
z = the standard normal deviate at the required confidence level.
P = the proportion in the target population estimated to have characteristics being measured.
Q = 1 – p
D = the level of statistical significance set.

If the target population is less than 10,000 the following formula is used to determine the sample size;

$$n_f = \frac{n}{(1+n)/N}$$

Where

n_f = the desired sample size(when the population is less than 10,000)
n = the desired sample size(when the population is greater than 10,000)
N = the estimate of the population size.

While determining the sample size the extent of precision and confidence desired are important factors to consider.

Precision – this is how close our estimate is to the true population characteristics. The closer we want our sample results to reflect, the population characteristics, the greater the precision aimed at, and the greater the precision required the larger the sample size needed especially when the variation in the population itself is large.

Confidence – it refers to how certain we are that our estimates will really hold true for the population. This is the level of certainty with which we can sate our sample estimates of the population parameters based on our sample statistics will hold true.
The level of confidence can range from 0-100 but 95% is the accepted level for most business researchers.
It is denoted as:

$P < 0.05$

1. parameters of interest - These are the main characteristics a researcher is interested in for his research for example nationality, a Christian group, an income group
2. budgetary constraints - This cost constraints will certainly have a major impact upon decision relating to the size of the samples and non-probability samples will be relatively cheaper than a probability sample.

CRITERIA FOR SELECTING A SAMPLE DESIGN

A researcher must keep in view factors that may cause incorrect findings or inferences due to a sampling procedure.

Criteria for selecting a sampling procedure

Two costs are involved in a sampling analysis i.e. the cost of collecting the data and the cost of an incorrect inference resulting from the data. Two causes of incorrect inferences are systematic bias and sampling error.

a) Sampling error - This is a random variation in the sample estimates around the true population parameters. They are the major differences between population characteristics and the sample characteristics.
   How to control sampling error - They decrease with an increase in the sample size and are smaller in case of homogenous groups.

b) Systematic bias - These are errors in the sampling procedures and they cannot be reduced or eliminated by increasing the sample size unlike in the sampling error.
   How to control systematic bias - They can only be detected and corrected.

A systematic bias results from errors in the sampling procedures and it cannot be reduced or eliminated by increasing the sample size. Systematic bias is the result of the following factors:-

- Inappropriate sampling frame
- Defective measuring device
- Non-respondents
- Indeterminancy principle – individuals act differently when kept under observation.
- Natural bias in reporting data e.g. government tax – downward bias, social organizations – upward bias.

Sampling errors are the random variations in the sample estimates around a true population parameter. It decreases with the increase in the size of the sample and it happens to be of a smaller magnitude in case of a homogenous population. While selecting a sampling procedure, the researcher must ensure that the procedure causes a relatively small sampling error and helps to control the systematic bias in a better way. It's the difference between a sample statistic and its corresponding population parameter. The sampling distribution of the sample means is a probability distribution of possible sample means of a given sample size.

Causes of systematic bias

a. Inappropriate sampling frame.
b. Defective measuring design.
c. Interview schedule, questionnaire
d. Non-response
e. Indeterminacy principle.
f. Natural bias in reporting.

Steps in sampling design

Identification of the: -

- Relevant population
- Type of universe i.e. finite or infinite
- Parameters of interest
- Sampling frame
- Type of sample i.e. probabilistic or non-probabilistic
- Size of the sample needed

Characteristics of a good sample design

- Must result in a truly representative sample
- Must result in a small sampling error
- Must be viable in the context of funds available for the research study
- Must ensure that systematic bias is controlled in a better way
- Must be such that the results of the sample study can be applied in general for the universe with a reasonable level of confidence.

The methodology section of a research study describes the procedures that are to be followed in conducting the study. The techniques of obtaining data are developed.
Population: It's a complete set of individuals, cases or objects with some observable characteristics.
A census is a count of all the elements in a population.
Sample: A sample is a subset of a particular population. The target population is that population to which a researcher wants to generalize the results of the study. There must be a rationale for defining and identifying the accessible population from the target population.
Sampling; It's the process of selecting a sample from a population.

Reasons for sampling

- Cost
- Time: Greater speed of data collection
- Destructive nature of certain tests
- Greater accuracy of results
- Physical impossibility of checking all items in the population.
- Availability of population elements.

Characteristics of a good sample

- *Accuracy*: It's the degree to which bias is absent from the sample. An unbiased sample is the one in which the underestimators and the overestimators are balanced among the members of the sample.
- *Precision of estimate*: Precision is measured by the standard error of estimate a type of standard deviation measurement. The smaller error of estimate, the higher is the preciseness of the sample.

Factors that influence the sample size

- **Dispersion / variance:** The greater the dispersion or variance within the population, the larger the sample must be to provide estimation precision.
- **Precision of the estimate:** the greater the desired precision of the estimate, the larger the sample must be.
- **Interval range:** The narrower the interval range, the larger the sample must be.
- **Confidence level:** The higher the confidence level in the estimate, the larger the sample must be.
- **Number of subgroups:** The greater the number of subgroups of interest within a sample, the greater the sample size must be, as each subgroup must meet minimum sample size requirements.
- If the calculated sample size exceeds 5% of the population, sample size may be reduced without sacrificing precision.

TYPES OF SAMPLE DESIGNS

There are two categories of sample designs;

1. Probability/ random sampling designs.
2. Non-probability/ biased sampling designs.

1. Probability sampling designs

(a) Simple random sampling
(b) Systematic sampling
(c) Cluster sampling
(d) Stratified sampling

2. Non- probability sampling designs

(a) Purposive sampling
(b) Snowball sampling
(c) Convenience sampling
(d) Quota sampling

NB

A researcher makes a choice between the above two major designs depending on:

a) The generalizability required.
b) Demands of time.
c) Resources.
d) Purpose of the study.

Characteristics of probability sampling

1. They are based on random sampling.
2. Their goal is to select a reasonable number of subjects, objects or cases that represent the target population.
3. They provide accurate information about groups that are too large to study in the entirety.
4. They provide an efficient system of capturing in a small group the variations or heterogeneity that exists in the target population.
5. Their goal is to obtain a representative sample.
6. Every sample or items in the accessible population has an equal chance of being selected.
7. The random selection of items reduces/eliminates the sampling bias.

- **Advantages**

1. Random sampling allows generalizability to a larger population with a margin of error that is statistically determinable.
2. It allows the use of inferential statistics. This are statistics indices calculated on the sample that can be evaluated to determine the degree to which they accurately represent the population parameters.
3. It is representative of the whole population.
4. It reduces biasness and systematic errors.
5. It ensures the law of statistical regularities. This means if a sample is selected randomly it will have the same characteristics as the whole population.

PROBABILITY SAMPLING

Types of probability sampling

a) Simple random sampling.

It is also known as restricted sampling.
Each and every item in the population has an equal chance of being included in the sample.
A researcher writes numbers on pieces of paper, puts them in a container shakes and draws them out as lottery without replacement.
N/B
Computers can also generate random numbers instead of using containers. For example suppose out of 1000 elements in the population only 100 is needed as a sample. Then 100 pieces of paper will be drawn out of the container.

- The 1st piece drawn will have 1/1000 chance of being drawn
- The 2nd piece drawn will have 1/999 chance of being drawn
- Therefore each piece of paper has the same chance/probability of being drawn.

Advantages

1. It has the least bias.
2. It offers the most generalizability.

Disadvantages

1. It is expensive.
2. It is cumbersome.
3. It is not appropriate in large enquiries or geographically dispersed population.
4. An updated list of the population or a sampling frame may not always be available.

b) Systematic sampling.

It involves drawing out every nth element in the population. Thereafter every nth element in the source list is selected for inclusion in the sample.
NB
A list of all the members of the source list/sampling frame are written down and then randomized according to a certain pattern. However his method is only used when the population/source list is known.
For example to select a sample of 35 households from a total population of 260 houses. In a particular locality a researcher first chooses a random number from no 7-14-21-28.
In market surveys, consumer attitude survey etc systematic sampling designs are used and the telephone directory serves as a source list.

A case study

A human resource manger wants to access the reaction of employees to an improved medical scheme that requires a modest increase in the premiums to be paid by the employees for their families. The human resource can access the enthusiasm for the new scheme by using a systematic sampling design.
The company records will provide the population frame and every nth employee can be sampled.

Disadvantages

It has an inbuilt systematic bias.

c) Cluster sampling

It is a useful design when heterogeneous group is to be studied at one time.
It is also appropriate when the population is very large or scattered over a wide geographical area.
The population is first divided into groups or clusters and then one whole cluster is randomly selected to be included in the sample. All the members in the selected cluster form the sample.

For example a doctor waiting to sample patients suffering from malaria in Kenya may find it time consuming and expensive to try and list all malaria patients hospitalized in Kenya. He may therefore cluster Kenya into districts. He will compile all the district hospitals and then select one or two district hospital depending on the required sample size. Then all the patients in the districts selected will be included.

Case study
A human resource manager is interested in knowing why staff resign. Cluster sampling will be appropriate for this study where the human resource can conduct exit interviews of all the members leaving the company the company and resigning on different days.

Disadvantages
Though it is convenient and not costly it does not offer much efficiency in terms of precision or confidence of results.

d) Stratified sampling

It involves the process of segregating or forming groups known as strata followed by a random selection from each stratum.
The population is first divided into groups or stratus that is relevant, appropriate and meaningful to the context of the study.
Thereafter a researcher randomly selects stratus appropriate for his study and then subjects from each stratum are chosen for inclusion into the sample.
For example A CEO of a company is concerned about low multinational levels and absenteeism rate among the employees. The population can be stratified according to job levels or departments to conduct a study as to why employees don't come to work.

Case study
A human resource manger of a firm wants to offer stress management seminars to the personnel who experience high levels of stress. He fills that three groups are most prone to stress finance, marketing and customer care.

NON-PROBABILITY SAMPLING

Characteristics

1. the elements in the population do not have any probabilities attached to their being chosen as sample subjects in other words the elements do not have an equal chance of being selected.
2. The findings from the study of the sample can not be confidently generalized to the whole population.
3. It is appropriate when a researcher is more concerned about obtaining information in a quick and inexpensive way and he is less concerned with generalizabilty.
4. Items are selected deliberately or purposively and the judgment of the researcher is supreme.

Disadvantages

1. Personal element or judgment enters into selection process for example only selecting a sample that yields favorable results.
2. It is a biased sampling.
3. Items do not have an equal chance of being selected.
4. Sampling errors cannot be estimated.
5. It is hardly adopted in large enquiries.
6. Results cannot be generalized to the whole population.

Types of non probability sampling

a) Convenience sampling

It is also known as volunteer or accidental sampling. It is the collection of information from members of the population who are conveniently available to provide it.
Cases of observation are selected as they become available to the researcher.
It is the best method of getting basic information quickly and efficiently however it should be used knowing that the results are not generalizable at all.

Case study

The accounts manager has established a new accounting system that maximally utilizes computer knowledge. Before making further changes he would like to get a view of how the accounts people react to the new system without making it seem like he has doubts about their acceptability.
Convenience sampling would be appropriate for the study where he may casually talk to the first five accounts personnel that walk into his office and gauge their reactions.

b) Purposive sampling

Instead of obtaining information from those who are most readily or conveniently available it might sometimes become necessary to obtain information from specific target groups.

Example

Targeting people who can provide the desired information either because they are the only ones or they conform to some criteria set by the researcher.
This is known as purposive sampling.
Items are deliberately or purposively selected and the judgment of the researcher plays a very important role.
Therefore subjects are hand picked because they are informative or they possess the required characteristics.

Disadvantages

1. It is hardly adopted in large enquiries.
2. Sampling error cannot be estimated.
3. Every element does not have a chance of being selected.
4. Personal element has a great chance of entering into the selection process.

Types of purposive sampling

I. Judgment sampling

It involves the choice of subjects who are most advantageously placed or in the best position to provide the information required.

If a researcher wants to find out what it takes for women mangers to make it to the top. The only people who can give first hand information are the women who have risen to the position of CEO and other top important executives.

This method is used when limited number or category of people have the information that is sought.

Case study

A pharmaceutical company wants to trace the effects of a new drug on patients with specific health problems such as sickle cell anemia, arthritis etc it will then conduct groups of volunteers who consent to test the drug. This is judgment sampling because data is collected from appropriate special group.

II. Quota sampling

It is sampling that ensures that certain groups are adequately represented in the study through the assignment of quotas.

A quota is fixed for each sub-group based on the total number of each group in the population.

Case study

A company, considering operating a kindergarten facility on its site. Before taking further steps it wants to get the reaction of four groups to the idea:

- Employees who are parents of the kindergarten age children where both parents are working.
- Employees of kindergarten age children but only one parent is working.
- Single parent's with kindergarten age children.
- All those without kindergarten age children.

Quota sampling would be appropriate for this study where employees from each of the above quotas will be selected for the study.

c) Snowball non- probability sampling.

The initial subject with the desired characteristics is first identified purposively. The few identified subjects name others that they know have the required characteristics until the researcher gets the number of cases he wants. It is a useful method when the population possessing the characteristics under study is not well known and there is no need to find the subjects.

Example

To study some aspects of Kenya's nationalist movement a researcher first identifies a few people who participated in the Mau Mau upraising. These few identified may assist in identifying the others they know until the researcher gets the sample size he needs. It refers to the techniques of the procedure the researcher would adopt in selecting items for the sample.

Factors to consider in developing a sample design

1. Type of universe; finite or infinite
2. Sampling unit; geographic: state, district or village, construction unit: house, flat. Social unit: family, club, school or individual.
3. Source list: sampling frame- contains all the names of all items of a universe. The list should be comprehensive, correct, reliable and appropriate.
4. The size of the sample. Should be efficient, representative, reliable and flexible.
5. Parameters of interest
6. Budgetary constraint
7. Sampling procedure.

The central limit theorem

If samples of a particular size are selected from any population, the sampling distribution of the sample mean is approximately a normal distribution. The approximation improves with larger samples.

Point estimates and confidence intervals

- Point estimate is the value computed from sample information that is used to estimate the population parameter.
- Confidence interval is a range of values constructed from sample data so the parameter occurs within that range at a specified probability (level of confidence).

The standard error of the mean (σ_x) - The standard error is a measure of the variability of the sampling distribution of the sample mean. Its size is affected by

- Standard deviation: the larger the standard deviation, the larger the standard error.
- Sample size: as the sample size increases, the standard error decreases.

The standard error of the mean $\sigma_x = \frac{\sigma}{\sqrt{n}}$

Confidence interval for a mean $x \pm z\frac{s}{\sqrt{n}}$

TYPES OF RESEARCH DESIGNS

1) non experimental
2) experimental

NON EXPERIMENTAL

- descriptive
- diagnostic
- exploratory
- observation

Characteristics of non-experimental research designs

I. There is no control group.
II. There is no experiment group.
III. There is no random assignment of variables.
IV. There is no treatment.

EXPERIMENTAL RESEARCH DESIGNS

Characteristics

1. There must be a control group.
2. There must be an experiment group.
3. There must be random assignment of variables.
4. There must treatment.
5. There must be manipulation of independent variable.
6. There must be a hypothesis

Principles of experimental research designs

1. **Randomization.**

It is when a researcher randomly assigns treatment to selected experiment units to control the effect of extraneous factors. Randomization protects assignment against extra factors thereby reducing and better experimenting, making the results more realistic and valid.

2. **Principle of replication.**

it requires that an experiment is repeated more than once for better results. This increases the statistical accuracy and precision of the study.

3. **Principle of replication.**

This principle eliminates the variability in the experiment due to extraneous variable.
Therefore an experiment unit is first divided into parts that are equal to the number of treatments.
The treatments are then randomly assigned to these parts of the experiment unit.
Local control helps in identifying other extraneous variables so that their contribution may be measured.
They may be measured and controlled.

Types of experimental research designs

1. informal research design/not sure/ quasi
2. formal research design/ true/ pure

1. Informal research design/not sure/ quasi

- Before after without control
- After only with control

2. Formal research design/ true/ pure

- Before-after with control
- Solomon four groups

1. Informal research design/not sure/ quasi

1. before –after without control

It is also called pre-test, post test without control.
Topic: to study the effect of donor funding on the Kenyan economy
It is informal because it has no control group.

Steps

a) select a single test area i.e. Kenya
b) measure the dependent variable i.e. Kenyan economy
c) introduce treatment and measure dependent variable again i.e. IMF donor funding (treatment) Kenyan economy (dependent)
d) determine the treatment effect (effect of donor funding on Kenyan economy)

2. After only with control

Steps

a) Select two groups
    1. test group(Kenya)
    2. control group(Ghana)
b) Introduce treatment into the test area only and no treatment in control group.
c) Measure the dependent variable in both areas at the same time.

2. Formal research design/ true/ pure

1. Before-after with control

Steps

a) Select two groups
   i. Test group/ experiment group
   ii. Control group
b) measure the dependent variable in both groups at the same time
c) Introduce treatment only in the test group.
d) Measure dependent variable in both groups at the same time.

- Test area: measure dependent variable========== measure the dependent variable
- Control group: measure dependent variable ======== measure the dependent variable.

2. Solomon four group - It is a combination of all the above

Steps

a) Select two experiment groups and two control groups.
b) Measure dependent variable in only one experiment group before treatment
c) Introduce treatment into both experiment groups.
d) Measure dependent variable in both experiment groups at the same time.

GROUP	PRE-TEST	TREATMENT	POST TEST
• Experiment Group	measure dependent variable	==========	measure dep.variable
• Control group	measure dep. Variable	==========	measure dep.Variable
• Experiment Group	XXX	==========	measure dep. variable
• Control group	XXX	==========	measure dep.variable