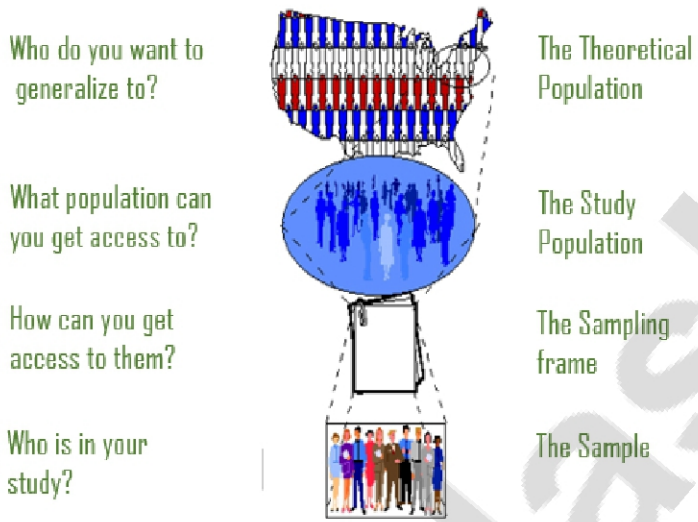

Target Population

Target population refers to the ENTIRE group of individuals or objects to which researchers are interested in generalizing the conclusions. The target population usually has varying characteristics and it is also known as the theoretical population.

Accessible Population

The accessible population is the population in research to which the researchers can apply their conclusions. This population is a subset of the target population and is also known as the study population. It is from the accessible population that researchers draw their samples

Sampling frame:

In the most straightforward case, such as the sentencing of a batch of material from production (acceptance sampling by lots), it is possible to identify and measure every single item in the population and to include any one of them in our sample. However, in the more general case this is not possible. There is no way to identify all rats in the set of all rats. Where voting is not compulsory, there is no way to identify which people will actually vote at a forthcoming election (in advance of the election)

As a remedy, we seek a *sampling frame* which has the property that we can identify every single element and include any in our sample.

The sampling frame must be representative of the population

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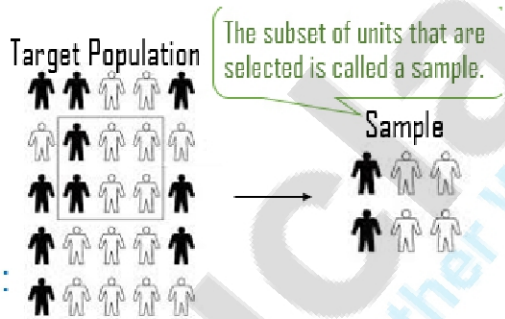
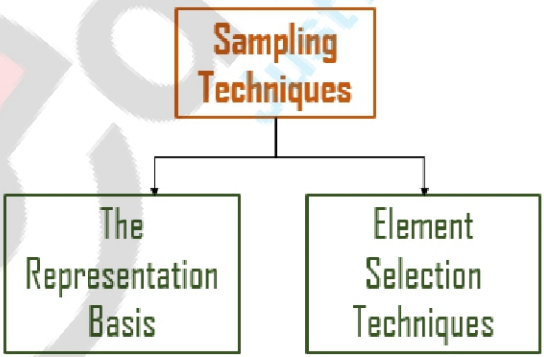
For example, you want to do a study: **the average height of all men between age 20 to 30 in Mumbai**, then the **target and theoretical population** is all men between age 20 to 30; and your **study population** would be say all men between age 20 to 30 in Bandra Govt Colony.

Sample Design

Sampling is a means of selecting a subset of units from a target population for the purpose of collecting information. This information is used to draw inferences about the population as a whole. The subset of units that are selected is called a sample. The sample design encompasses all aspects of how to group units on the frame, determine the sample size, allocate the sample to the various classifications of frame units, and finally, select the sample.



Types: There are different types of sample designs based on two factors viz., the representation basis and the element selection technique.



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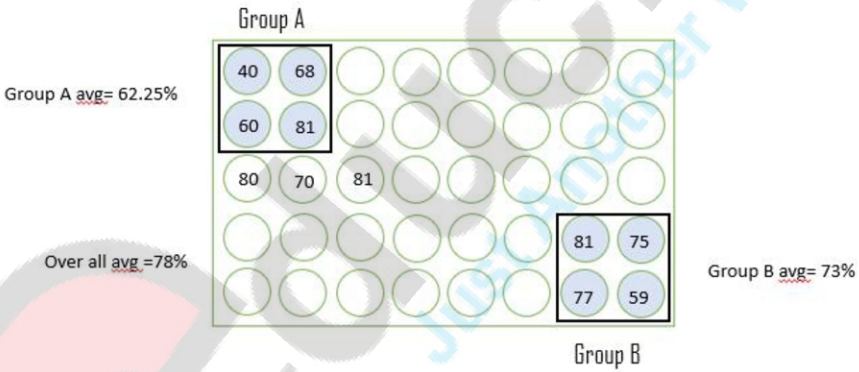
Sampling Error

We have one diagram here in which every dot is depicting a child that are learning in school and they have to give UT1, UT2 then 1st Term and 2nd Term. I am allotting marks to them supposing that these marks are scored by them.

Now whole circles will become population, and subset of this population will become a sample. Now in this population I have marked two sample areas. Naming them as Group A and Group B. Now we will try to find out the average of group A and B then

It would differ significantly and then if we take the avg of complete population and it would again differ but under research we try to optimize our sample in such a way that it is a best representation that means the values are closest approximation to the real value.

For Ex: in this figure if the avg of group A is 62% and Group B is 73% which is closer to the overall avg of the population so it will be the best sample. Therefore when we select the sample we must always select a proper sample. But if we choose Group A as a sample to represent Total population then it could be **error of biasness**. To remove this biasness what we can do is, we will increase the sample size.



By increasing the sample size I am trying to bring my result more closer to the actual result of the total population.

Sampling errors are the random variations in the sample estimates around the true population parameters. Since they occur randomly and are equally likely to be in either direction, their nature happens to be of compensatory type and the expected value of such errors happens to be equal to zero. Sampling error decreases with the increase in the size of the sample, and it happens to be of a smaller magnitude in case of homogeneous population. Sampling error can be measured for a given sample design and size. The measurement of sampling error is usually called the

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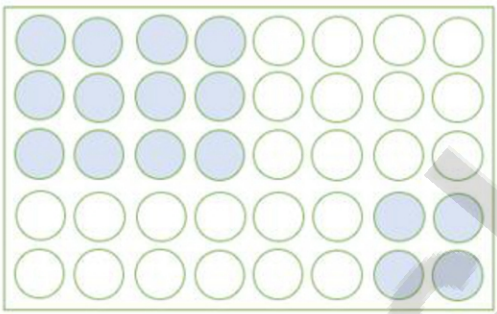
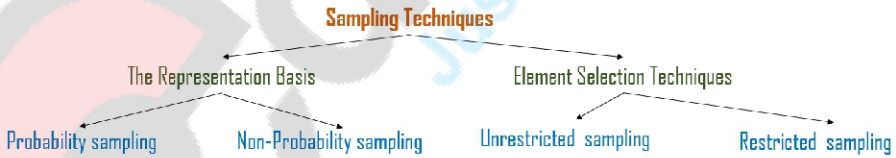
improved. But increasing the size of the sample has its own limitations viz., a large sized sample increases the cost of collecting data and also enhances the systematic bias. Thus the effective way to increase precision is usually to select a better sampling design which has a smaller sampling error for a given sample size at a given cost. In practice, however, people prefer a less precise design because it is easier to adopt the same and also because of the fact that systematic bias can be controlled in a better way in such a design. In brief, while selecting a sampling procedure, researcher must ensure that the procedure causes a relatively small sampling error and helps to control the systematic bias in a better way.



Sampling error decreases with the increase in the size of the sample

Design Sampling Methods/Techniques

On the representation basis, the sample may be probability sampling or it may be non-probability sampling.



Probability sampling is based on the concept of random selection, whereas non-probability sampling is 'non-random' sampling.

A **probability sampling** scheme is one in which every unit in the population has a chance (greater than zero) of being selected in the sample, and this probability can be accurately determined.

When every element in the population *does* have the same probability of selection, this is known as an 'equal probability of selection' (EPS) design. Such designs are also

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On element selection basis, the sample may be either

1. Unrestricted

2. Restricted

When each sample element is drawn individually from the population at large, then the sample so drawn is known as 'unrestricted sample'.

Whereas all other forms of sampling are covered under the term 'restricted sampling'.

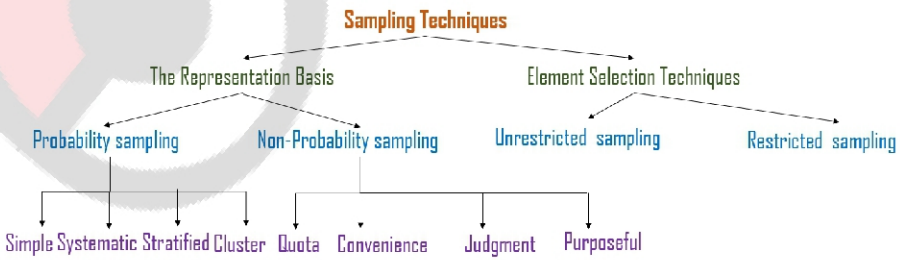
Let's say there are 6 balls here and we have to pick ball. So there is equal chance for each ball to be selected that is called probability sampling.

Simple Random Sampling: It is very simple, let's say you have Ten balls and you want to pick a ball you can simple pick one of the ball that is called simple random sampling.

Systematic Random Sampling: Suppose I want to select your classmates for making a group for assigning a project and to avoid any kind of confusion and biasness I will select every third student such sampling is called systematic sampling.

Stratified Random Sampling: Here we can see 3 colored dots violet, red and green which represents the population. Now we do is when we classify **strata** we will put all violet in one , all red in one and all green in one, and from each of these we pick out 3 -3 elements for sampling. Here we are creating a **strata** well defined network. So, we can define a strata like student age<20, 20<age<25 and third is >25. **Strata means class or level**

Cluster Random Sampling: Cluster sampling is done when the area is wide spread. From the city itself, we have form 4 clusters based on direction like Northern, Southern, Eastern and Western. It is not possible to study each in individually. Out of those suppose I pick out 2 clusters like Northern and Western.



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Quota Sampling: I have 3% quota in jobs for Jews, 4% quota for minority and 10% quota for woman what is that mean. If I have to fill 100 vacancies then I would take 3 who are Jews, I would take 4 who are from minority group and 10 who are woman. So total 3+4+10=17 is filled so remaining is 100-17=83 seats would be open to other candidate, so, that is not giving equal chance to everyone, so it becomes non-probability sampling.

Convenience Sampling: When population elements are selected for inclusion in the sample based on the ease of access, it can be called convenience sampling. Researcher selects any member of the population who are conveniently and readily available.

If a researcher wishes to secure data from, say, gasoline buyers, he may select a fixed number of petrol stations and may conduct interviews at these stations. This would be an example of convenience sample of gasoline buyers.

Judgment Sampling: In judgement sampling the researcher's judgement/ intuition is used for selecting items which he considers as representative of the population. For example: BY researcher's experience, that in Pune Most of the colleges are offering courses for the students who are having partial visibility, blind students rather than in Mumbai then researcher will definitely select students from Pune for study sample, as he/she may get maximum sample size from Pune rather than Mumbai.

Purposeful Sampling: A **purposive sample** is a non-probability sample that is selected based on characteristics of a population and the objective of the study. Purposive sampling is also known as judgmental, selective, or subjective sampling.

This type of sampling can be very useful in situations when you need to reach a targeted sample quickly, and where sampling for proportionality is not the main concern.

Here the criteria for inclusion must be identified before drawing the sample.

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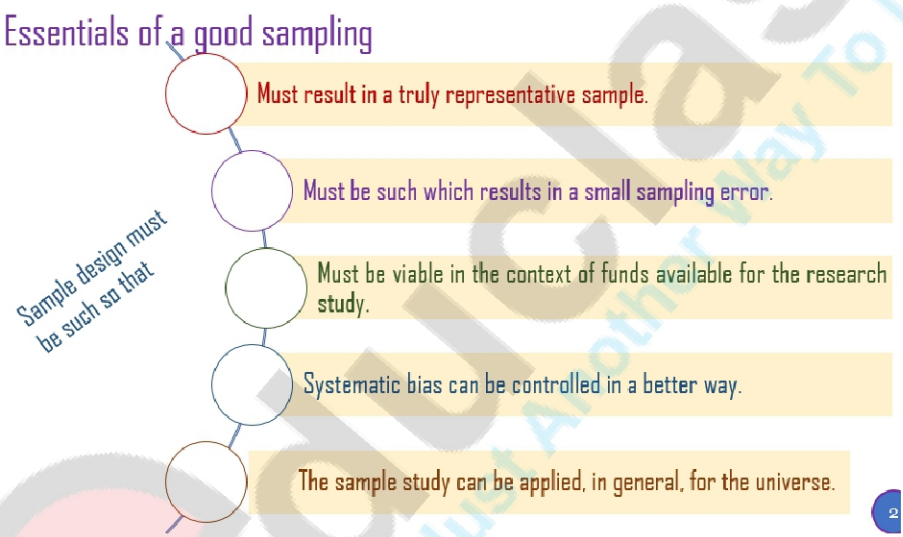
Sampling

Sampling is the process of learning about the population, i.e., all the units of the universe, on the basis of a sample drawn from it. It requires selection of the sample, collection and analysis of information and making an inference about the population.

For example, if the objective of the study is to ascertain consumer satisfaction, it is not possible to get the necessary information from all the consumers. The researcher may, therefore, select a sample of 500 or 1000 consumers from the market and proceed to collect the required information from them.

Essentials of sampling



The following are some of the essentials of sampling.

1. The sample selected should be representative of the entire population. This may be achieved by using the random sampling method.

2. The size of the sample must also be adequate. The larger the size of the sample, the greater will be the accuracy of the results.

3. All the units of the universe should have the same chance of getting selected. The researcher should not use his judgement in selecting the sample.

4. There should be no basic difference in the nature of the units of the universe.

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Advantages of Sampling

The following are some of the advantages of sampling.

1. A sample study is less time consuming. This is because it considers only a portion of the universe.

2. It is also less expensive as information has to be collected only from a limited number of respondents.

3. The results of the sample study may be more accurate. This is possible because the number of units to be considered is less. The researcher, therefore, can take every possible care to get accurate and complete information from the respondents.

4. It is also possible to get more detailed information from every respondent, as only few respondents need to be interviewed.

5. For certain studies, sample method alone can be used. For example, if a producer of bricks wants to test the breaking strength of the bricks made in his factory, such a test can be done only by using the sample method.

Drawbacks of Sampling

The following are some of the drawbacks of sampling.

1. If the sample is not representative of the population, it will affect the results.

2. The study results will also get affected if the sample size is inadequate.

3. There is chance for the bias element entering the process of sample selection. This again will affect results.

4. Sampling method cannot be used if each unit of the universe is heterogeneous.

Factors determining Sample Size

The following are some of the factors that determine size of sample.

1. If the size of the population is large, the size of the sample should also be large.

2. If the time and money available for the study are limited the researcher may have to settle for a small sample size.

3. If the researcher expects a higher degree of accuracy in results, he may have to go in for a larger sample size.

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4. A large sample size may be required if the units of the universe are heterogeneous. On the other hand, if all the population units are homogeneous, a small sample size may be enough.

5. If the nature of the sample is a simple random sample, the sample size needs to be large. On the other hand, if it is stratified random sample, a small sample-size may be enough.

6. For an intensive and more detailed study, small sample is suitable.

Sampling Errors

Sampling errors may fall under two categories:

1. Biased Errors and
2. Unbiased Errors

Biased Errors

Biased errors may arise due to the bias in the selection of the samples. Example: Deliberate selection of the random sample. The other causes of bias may be stated as follows:

1. Deliberate selection of the representative sample.
2. Non-existence of randomness.
3. Substitution of an item in place of the one intended. For example, in the case of systematic sampling, if it is decided to contact the 1st, 5th, 10th, 15th household and so on in a locality, if the researcher contacts the 9th or the 14th household, as the 10th or the 15th cannot be approached, error creeps in.

Unbiased errors

Unbiased errors arise due to chance differences. For example, if a producer of bulbs checks 10 bulbs, in a batch of 100 bulbs, at random and all the 10 are faulty.

Non-Sampling Errors

Such errors occur due to any of the following causes:

1. Faulty Questionnaire or Schedule

2. Improper responses from the respondents.

3. Lack of trained enumerators.

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A good sample is one which satisfies all or few of the following conditions:

1. **Representativeness:** When sampling method is adopted by the researcher, the basic assumption is that the samples so selected out of the population are the best representative of the population under study. Thus good samples are those who accurately represent the population. Probability sampling technique yield representative samples. On measurement terms, the sample must be valid. The validity of a sample depends upon its accuracy.
2. **Accuracy:** Accuracy is defined as the degree to which bias is absent from the sample. An accurate (unbiased) sample is one which exactly represents the population. It is free from any influence that causes any differences between sample value and population value.
3. **Size:** A good sample must be adequate in size and reliable. The sample size should be such that the inferences drawn from the sample are accurate to a given level of confidence to represent the entire population under study.

The size of sample depends on number of factors. Some important among them are:

1. **Homogeneity or Heterogeneity of the universe:** Selection of sample depends on the nature of the universe. It says that if the nature of universe is homogeneous then a small sample will represent the behavior of entire universe. This will lead to selection of small sample size rather than a large one. On the other hand, if the universe is heterogeneous in nature then samples are to be chosen as from each heterogeneous unit.
2. **Number of classes proposed:** If a large number of class intervals to be made then the size of sample should be more because it has to represent the entire universe. In case of small samples there is the possibility that some samples may not be included.
3. **Nature of study:** The size of sample also depends on the nature of study. For an intensive study which may be for a long time, large samples are to be chosen. Similarly, in case of general studies large number of respondents may be appropriate one but if the study is of technical in nature then the selection of large number of respondents may cause difficulty while gathering information.

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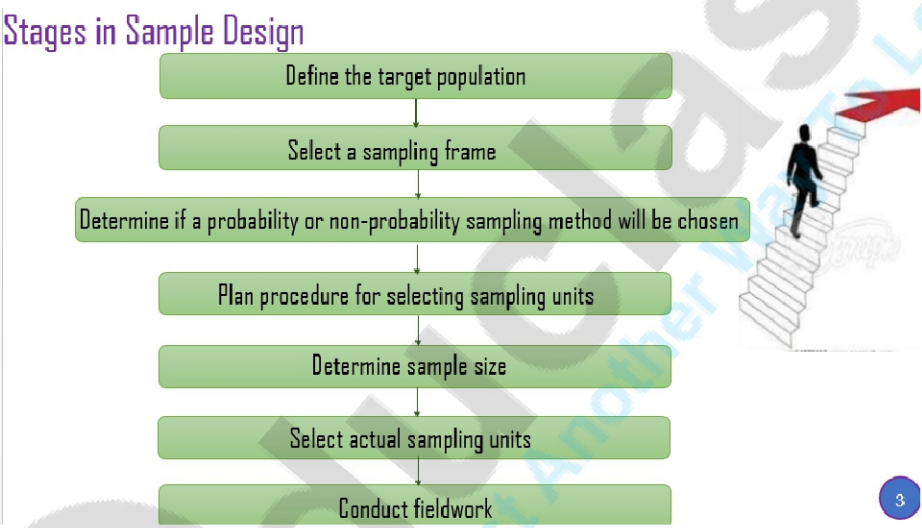
Steps in Sampling Process

An operational sampling process can be divided into seven steps as given below:

- Defining the target population.
- Specifying the sampling frame.
- Specifying the sampling unit.
- Selection of the sampling method.
- Determination of sample size.
- Specifying the sampling plan.
- Selecting the sample.



Defining the Target Population:

Defining the population of interest, for business research, is the first step in sampling process. In general, target population is defined in terms of element, sampling unit, extent, and time frame. The definition should be in line with the objectives of the research study. For ex, if a kitchen appliances firm wants to conduct a survey to ascertain the demand for its micro ovens, it may define the population as 'all women above the age of 20 who cook (assuming that very few men cook)'. However this definition is too broad and will include every household in the country, in the population that is to be covered by the survey. Therefore the definition can be further refined and defined at the sampling unit level, that, all women above the age 20, who cook and whose monthly household income exceeds Rs.20,000. This reduces the target population size and makes the research more focused. The population definition can be refined further by specifying the area from where the researcher has

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A well defined population reduces the probability of including the respondents who do not fit the research objective of the company. For ex, if the population is defined as all women above the age of 20, the researcher may end up taking the opinions of a large number of women who cannot afford to buy a micro oven.

Specifying the Sampling Frame:

Once the definition of the population is clear a researcher should decide on the sampling frame. A sampling frame is the list of elements from which the sample may be drawn. Continuing with the micro oven ex, an ideal sampling frame would be a database that contains all the households that have a monthly income above Rs.20,000. However, in practice it is difficult to get an exhaustive sampling frame that exactly fits the requirements of a particular research. In general, researchers use easily available sampling frames like telephone directories and lists of credit card and mobile phone users. Various private players provide databases developed along various demographic and economic variables. Sometimes, maps and aerial pictures are also used as sampling frames. Whatever may be the case, an ideal sampling frame is one that entire population and lists the names of its elements only once.

A sampling frame error pops up when the sampling frame does not accurately represent the total population or when some elements of the population are missing another drawback in the sampling frame is over –representation. A telephone directory can be over represented by names/household that have two or more connections.

Specifying the Sampling Unit:

A sampling unit is a basic unit that contains a single element or a group of elements of the population to be sampled. In this case, a household becomes a sampling unit and all women above the age of 20 years living in that particular house become the sampling elements. If it is possible to identify the exact target audience of the business research, every individual element would be a sampling unit. This would present a case of primary sampling unit. However, a convenient and better means of sampling would be to select households as the sampling unit and interview all females above 20 years, who cook. This would present a case of secondary sampling unit.

Selection of the Sampling Method:

The sampling method outlines the way in which the sample units are to be selected. The choice of the sampling method is influenced by the objectives of the business research, availability of financial resources, time constraints, and the nature of the problem to be investigated. All sampling methods can be grouped under two distinct heads, that is, probability and non-probability sampling.

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Determination of Sample Size:

The sample size plays a crucial role in the sampling process. There are various ways of classifying the techniques used in determining the sample size. A couple those hold primary importance and are worth mentioning are whether the technique deals with fixed or sequential sampling and whether its logic is based on traditional or Bayesian methods. In non-probability sampling procedures, the allocation of budget, thumb rules and number of sub groups to be analyzed, importance of the decision, number of variables, nature of analysis, incidence rates, and completion rates play a major role in sample size determination. In the case of probability sampling, however, formulas are used to calculate the sample size after the levels of acceptable error and level of confidence are specified. The details of the various techniques used to determine the sample size will be explained at the end of the chapter.

Specifying the Sampling Plan:

In this step, the specifications and decisions regarding the implementation of the research process are outlined. Suppose, blocks in a city are the sampling units and the households are the sampling elements. This step outlines the modus operandi of the sampling plan in identifying houses based on specified characteristics. It includes issues like how is the interviewer going to take a systematic sample of the houses. What should the interviewer do when a house is vacant? What is the recontact procedure for respondents who were unavailable? All these and many other questions need to be answered for the smooth functioning of the research process. These are guide lines that would help the researcher in every step of the process. As the interviewers and their co-workers will be on field duty of most of the time, a proper specification of the sampling plans would make their work easy and they would not have to revert to their seniors when faced with operational problems.

Selecting the Sample:

This is the final step in the sampling process, where the actual selection of the sample elements is carried out. At this stage, it is necessary that the interviewers stick to the rules outlined for the smooth implementation of the business research. This step involves implementing the sampling plan to select the sampling plan to select a sample required for the survey.

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Research Design

A research design is a broad plan that states objectives of research project and provides the guidelines what is to be done to realize those objectives. It is, in other words, a master plan for executing a research project.

The word 'design' has various meanings. But, in relation to the subject concern, it is a pattern or an outline of research project's workings. It is the statement of essential elements of a study that provides basic guidelines of conducting the project. It is same as the blue print of architect's work.

The research design is similar to broad plan or model that states how the entire research project would be conducted. It is desirable that it must be in written form and must be simple and clearly stated. The real project is carried out as per the research design laid down in advance.

Definitions:

1. We can define the term as:

Research design is a broad framework that states the total pattern of conducting research project. It specifies objectives, data collection and analysis methods, time, costs, responsibility, probable outcomes, and actions.

2. More clearly, research design can be defined as:

A research design is a broad plan that states objectives of research project and provides the guidelines what is to be done to realize those objectives. It is, in other words, a master plan for executing a research project.

Contents of Research Design:

The most common aspects involved in research design include at least followings:

- Statement of research objectives, i.e., why the research project is to be conducted
- Type of data needed
- Definition of population and sampling procedures to be followed
- Time, costs, and responsibility specification
- Methods, ways, and procedures used for collection of data
- Data analysis – tools or methods used to analyze data
- Probable output or research outcomes and possible actions to be taken based on those outcomes

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Types of Research Designs:

The research design is a broad framework that describes how the entire research project is carried out. Basically, there can be three types of research designs – exploratory research design, descriptive research design, and experimental (or causal) research design. Use of particular research design depends upon type of problem under study.

Exploratory Research Design:

This design is followed to discover ideas and insights to generate possible explanations. It helps in exploring the problem or situation. It is, particularly, emphasized to break a broad vague problem statement into smaller pieces or sub-problem statements that help forming specific hypothesis.

The hypothesis is a conjectural (imaginary, speculative, or abstract) statement about the relationship between two or more variables. Naturally, in initial state of the study, we lack sufficient understanding about problem to formulate a specific hypothesis. Similarly, we have several competitive explanations of marketing phenomenon. Exploratory research design is used to establish priorities among those competitive explanations.

The exploratory research design is used to increase familiarity of the analyst with problem under investigation. This is particularly true when researcher is new in area, or when problem is of different type.

This design is followed to realize following purposes:

1. Clarifying concepts and defining problem
2. Formulating problem for more precise investigation
3. Increasing researcher's familiarity with problem
4. Developing hypotheses
5. Establishing priorities for further investigation

Exploratory research design is characterized by flexibility to gain insights and develop hypotheses. It does not follow a planned questionnaire or sampling. It is based on literature survey, experimental survey, and analysis of selected cases. Unstructured interviews are used to offer respondents a great deal of freedom. No research project is purely and solely based on this design. It is used as complementary to

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Descriptive Research Design:

Descriptive research design is typically concerned with describing problem and its solution. It is more specific and purposive study. Before rigorous attempts are made for descriptive study, the well-defined problem must be on hand. Descriptive study rests on one or more hypotheses.

For example, "our brand is not much familiar," "sales volume is stable," etc. It is more precise and specific. Unlike exploratory research, it is not flexible. Descriptive research requires clear specification of who, why, what, when, where, and how of the research. Descriptive design is directed to answer these problems.

Causal or Experimental Research Design:

Causal research design deals with determining cause and effect relationship. It is typically in form of experiment. In causal research design, attempt is made to measure impact of manipulation on independent variables (like price, products, advertising and selling efforts or marketing strategies in general) on dependent variables (like sales volume, profits, and brand image and brand loyalty). It has more practical value in resolving marketing problems. We can set and test hypotheses by conducting experiments.

Test marketing is the most suitable example of experimental marketing in which the independent variable like price, product, promotional efforts, etc., are manipulated (changed) to measure its impact on the dependent variables, such as sales, profits, brand loyalty, competitive strengths product differentiation and so on.

Significance of Research Design in Research Methodology

- Research design is significant simply because it allows for the smooth sailing of the various research operations, thus making research as efficient as possible producing maximum information with nominal expenses of effort, time and money.

- Just as for better, economical and attractive construction of a home, we require a blueprint (or what is typically known as the map of the home) well planned and prepared by an expert architect, in the same way we require a design or a plan in advance of data collection and analysis for our research study.
- It means advance planning of the techniques to be implemented for accumulating the appropriate data and the strategies to be employed in their analysis, keeping

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- Preparation of the design must be carried out meticulously as any error in it may upset the complete project.
- Research design, actually, has a great significance and impact on the reliability of the results achieved and as such constitutes the firm base of the entire edifice of the research work.

- Even then the necessity for a well-planned design is at times not realized by many people.
- The significance which this problem warrants is not given to it.
- Because of this many researches do not serve the purpose for which they are undertaken.
- The truth is, they may even provide misleading conclusions.

- Thoughtlessness in developing the research project may lead to rendering the research exercise futile.
- It is, for that reason, crucial that an efficient and appropriate design should be prepared before beginning research operations.

- The design assists the researcher to organize his ideas in a form whereby it will be possible for him to watch out for flaws and inadequacies.
- This type of design can also be given to others for their comments and critical evaluation.
- In the absence of such a strategy, it will likely be challenging for the critic to supply a comprehensive review of the offered study.

Need and Importance of Research Design

- Research design carries an important influence on the reliability of the results attained.
- It therefore provides a solid base for the whole research.
- It is needed due to the fact that it allows for the smooth working of the many research operations.
- This makes the research as effective as possible by providing maximum information with minimum spending of effort, money and time.

- For building of a car, we must have a suitable blueprint made by an expert designer.
- In a similar fashion, we require a suitable design or plan just before data collection and analysis of the research project.
- Planning of design must be carried out cautiously as even a small mistake might

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- The design helps the investigator to organize his ideas, which helps to recognize and fix his faults, if any.

- In a **good research design**, all the components go together with each other in a coherent way.
- The theoretical and conceptual framework must with the research goals and purposes.
- In the same way, the data gathering method must fit with the research purposes, conceptual and theoretical framework and method of data analysis.

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