LL.M.2.Sem.

RESEARCH. METHODOLOGY.
CHAPTER- Research techniques.

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An introduction to research methods

Research methods are specific procedures for collecting and analyzing data. Developing your research methods is an integral part of your research design. When planning your methods, there are two key decisions you will make.

First, decide how you will **collect data**. Your methods depend on what type of data you need to answer your research question:

- **Qualitative vs. quantitative**: Will your data take the form of words or numbers?
- **Primary vs. secondary**: Will you collect original data yourself, or will you use data that has already been collected by someone else?
- **Descriptive vs. experimental**: Will you take measurements of something as it is, or will you perform an

you take measurements of something as it is, or will you perform an experiment?

Second, decide how you will **analyze the data**.

- For quantitative data, you can use statistical analysis methods to test relationships between variables.
- For qualitative data, you can use methods such as thematic analysis to interpret patterns and meanings in the data.

Table of contents

Methods for collecting data

Data is the information that you collect for the purposes of answering your research question. The research methods you use depend on the type of data you need.

Qualitative vs. quantitative data

Your choice of qualitative or quantitative data collection depends on the type of knowledge you want to develop.

For questions about ideas, experiences and meanings, or to study something that can't be described numerically, collect qualitative data.

If you want to develop a more mechanistic understanding of a topic, or your research involves hypothesis testing, collect quantitative data.

Qualitative

Pros:

- Flexible – you can often adjust your methods as you go to develop new knowledge.
- Can be conducted with small samples.

Cons:

- Can't be analyzed statistically or generalized to broader populations.
- Difficult to standardize research.

Quantitative

Pros:

- Can be used to systematically describe large collections of things.
- Generates reproducible knowledge.

Cons:

- Requires statistical training to analyze data.
- Requires larger samples.

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You can also take a mixed methods approach, where you use both qualitative and quantitative research methods.

Primary vs. secondary data

Primary data is any original information that you collect for the purposes of answering your research question (e.g. through surveys, observations and experiments). Secondary data is information that has already been collected by other researchers (e.g. in a government census or previous scientific studies).

If you are exploring a novel research question, you'll probably need to collect primary data. But if you want to synthesize existing knowledge, analyze historical trends, or identify patterns on a large scale,

trends, or identify patterns on a large scale, secondary data might be a better choice.

Primary

Pros:

- Can be collected to answer your specific research question.
- You have control over the sampling and measurement methods.

Cons:

- More expensive and time-consuming to collect.
- Requires training in data collection methods.

Secondary

Pros:

- Easier and faster to access.
- You can collect data that spans longer timescales and broader geographical locations.

Cons:

- No control over how data was generated.
- Requires extra processing to make sure it works for your analysis.

Descriptive vs. experimental data

In descriptive research, you collect data about your study subject without intervening. The validity of your research will depend on your sampling method.

In experimental research, you systematically intervene in a process and measure the outcome. The validity of your research will depend on your experimental design.

To conduct an experiment, you need to be able to vary your independent variable, precisely measure your dependent variable,

systematically intervene in a process and measure the outcome. The validity of your research will depend on your experimental design.

To conduct an experiment, you need to be able to vary your independent variable, precisely measure your dependent variable, and control for confounding variables. If it's practically and ethically possible, this method is the best choice for answering questions about cause and effect.

Descriptive

Pros:

- Allows you to describe your research subject without influencing it.
- Accessible – you can gather more data on a larger scale.

Cons:

- No control over confounding variables.
- Can't establish cause and effect

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- No control over confounding variables.
- Can't establish cause and effect relationships.

Experimental

Pros:

- More control over confounding variables.
- Can establish cause and effect relationships.

Cons:

- You might influence your research subject in unexpected ways.
- Usually requires more expertise and resources to collect data.

Examples of data collection methods

Research methods for collecting data

Experiment

Primary or secondary?: Primary

Qualitative or quantitative?: Quantitative

When to use: To test cause-and-effect relationships.

Survey

Primary or secondary?: Primary

Qualitative or quantitative?: Quantitative

When to use: To understand general characteristics of a population.

Interview/focus group

Interview/focus group

Primary or secondary?: Primary

Qualitative or quantitative?: Qualitative

When to use: To gain more in-depth understanding of a topic.

Observation

Primary or secondary?: Primary

Qualitative or quantitative?: Either

When to use: To understand how something occurs in its natural setting.

Literature review

Primary or secondary?: Secondary

Qualitative or quantitative?: Either

When to use: To situate your research in an existing body of work, or to evaluate trends

When to use: To situate your research in an existing body of work, or to evaluate trends within a research topic.

Case study
Primary or secondary?: Either
Qualitative or quantitative?: Either
When to use: To gain an in-depth understanding of a specific group or context, or when you don't have the resources for a large study.

Methods for analyzing data

Your data analysis methods will depend on the type of data you collect and how you prepare it for analysis.

Data can often be analyzed both quantitatively and qualitatively. For

Data can often be analyzed both quantitatively and qualitatively. For example, survey responses could be analyzed qualitatively by studying the meanings of responses or quantitatively by studying the frequencies of responses.

Qualitative analysis methods

Qualitative analysis is used to understand words, ideas, and experiences. You can use it to interpret data that was collected:

- From open-ended survey and interview questions, literature reviews, case studies, and other sources that use text rather than numbers.
- Using non-probability sampling methods.

Qualitative analysis tends to be quite flexible and relies on the researcher's judgement, so you have to reflect carefully

on your choices and assumptions.

Quantitative analysis methods

Quantitative analysis uses numbers and statistics to understand frequencies, averages and correlations (in descriptive studies) or cause-and-effect relationships (in experiments).

You can use quantitative analysis to interpret data that was collected either:

- During an experiment.
- Using probability sampling methods.

Because the data is collected and analyzed in a statistically valid way, the results of quantitative analysis can be easily standardized and shared among researchers.

researchers.

Examples of data analysis methods

Research methods for analyzing data

Statistical analysis

Qualitative or quantitative?: Quantitative

When to use: To analyze data collected in a statistically valid manner (e.g. from experiments, surveys, and observations).

Meta-analysis

Qualitative or quantitative?: Quantitative

When to use: To statistically analyze the results of a large collection of studies.

Can only be applied to studies that collected data in a statistically valid manner.

Thematic analysis

Qualitative or quantitative?: Qualitative

When to use: To analyze data collected from interviews, focus groups or textual sources.

To understand general themes in the data and how they are communicated.

Content analysis

Qualitative or quantitative?: Either

When to use: To analyze large volumes of textual or visual data collected from surveys, literature reviews, or other sources.

Can be qualitative (i.e. frequencies of words) or quantitative (i.e. meanings of words).

When you conduct research about a group of people, it's rarely possible to collect data from every person in that group. Instead, you select a sample. The sample is the group of individuals who will actually participate in the research.

To draw valid conclusions from your results, you have to carefully decide how you will select a sample that is representative of the group as a whole. There are two types of sampling methods:

- **Probability sampling** involves random selection, allowing you to make statistical inferences about the whole group.
- **Non-probability sampling** involves non-random selection based on convenience or other criteria, allowing you to easily collect initial data.

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You should clearly explain how you selected your sample in the methodology section of your paper or thesis.

Table of contents

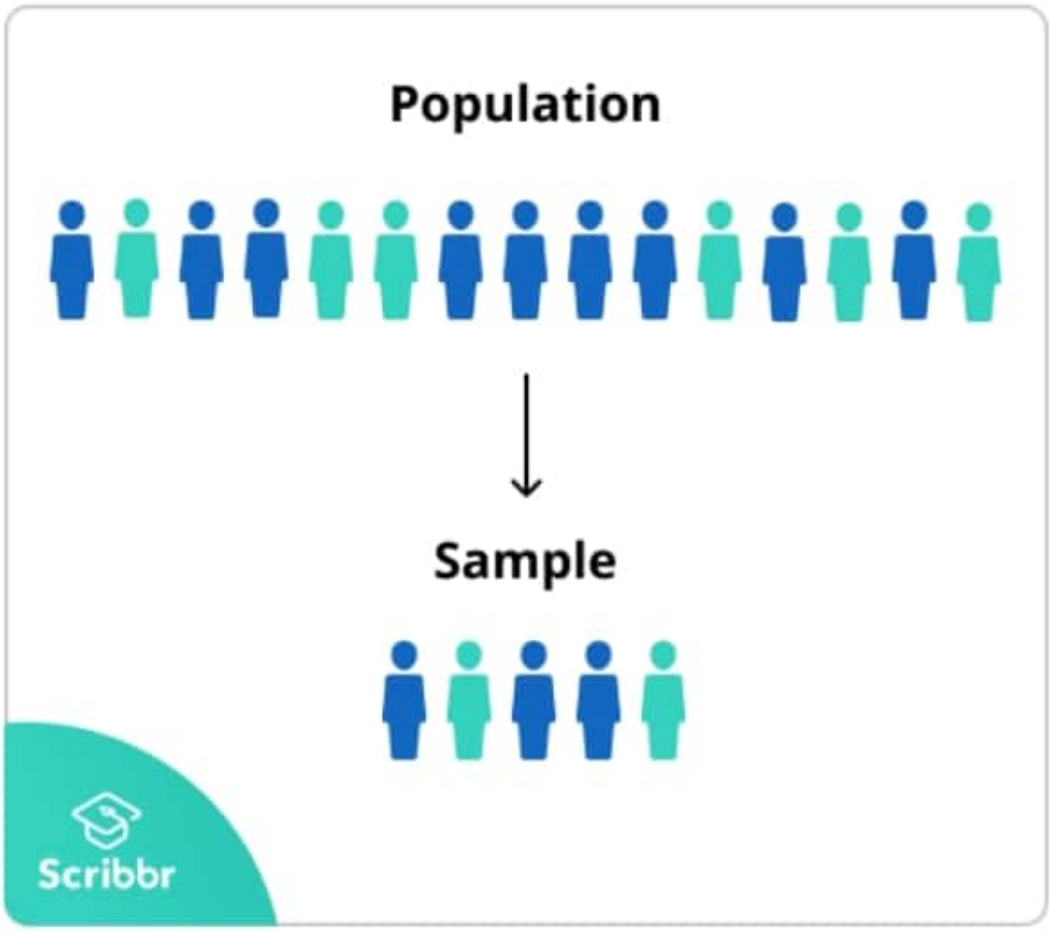
Population vs sample

First, you need to identify the target population of your research.

population of your research.

- The **population** is the entire group that you want to draw conclusions about.
- The **sample** is the specific group of individuals that you will collect data from.

The population can be defined in terms of geographical location, age, income, and many other characteristics.



It can be

very broad or quite narrow: maybe you want to make inferences about the whole adult population of your country; maybe your research focuses on customers of a certain company, patients with a specific health condition, or students in a single school.

It is important to carefully define your target population according to the purpose and practicalities of your project.

If the population is very large, demographically mixed, and geographically dispersed, it might be difficult to gain access to a representative sample.

Sampling frame

The sampling frame is the actual list of individuals that the sample will be drawn from. Ideally, it should include the entire target population (and nobody who is not

target population (and nobody who is not part of that population).

> **Example**
>
> You are doing research on working conditions at Company X. Your population is all 1000 employees of the company. Your sampling frame is the company's HR database which lists the names and contact details of every employee.

Sample size

The number of individuals in your sample depends on the size of the population, and on how precisely you want the results to represent the population as a whole.

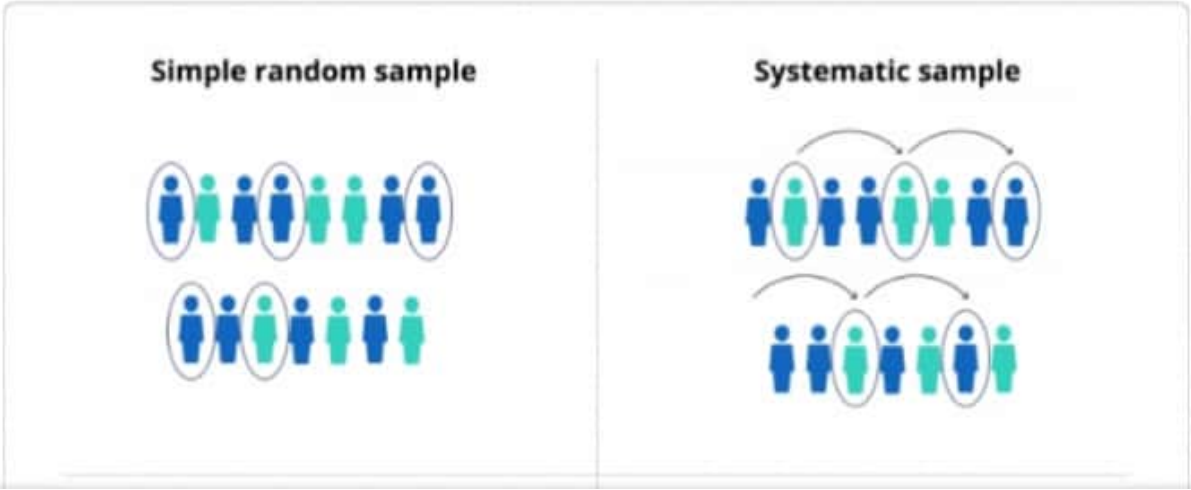
You can use a sample size calculator to determine how big your sample should be. In general, the larger the sample size, the

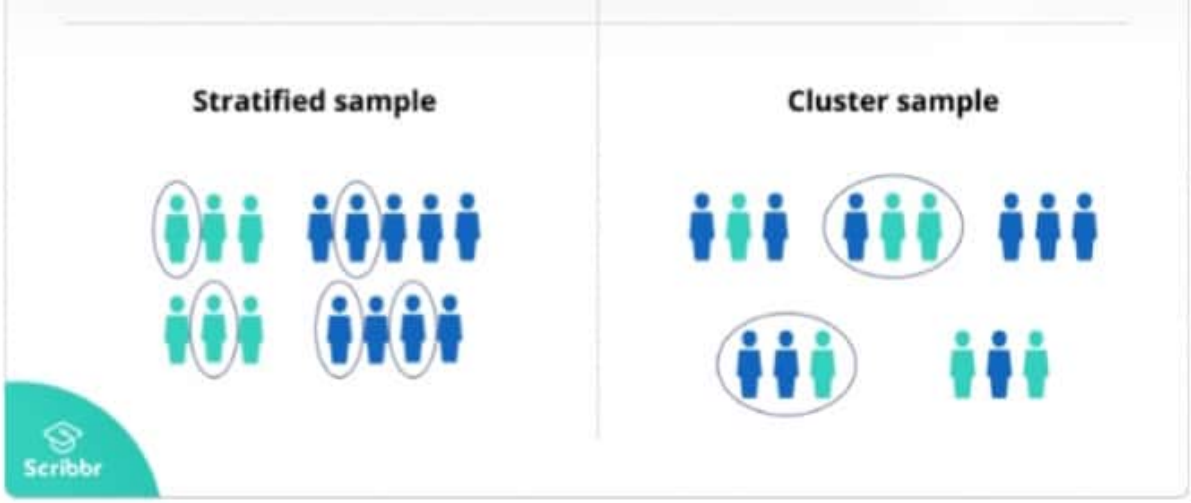
In general, the larger the sample size, the more accurately and confidently you can make inferences about the whole population.

Probability sampling methods

Probability sampling means that every member of the population has a chance of being selected. If you want to produce results that are representative of the whole population, you need to use a probability sampling technique.

There are four main types of probability sample.





1. Simple random sampling

In a simple random sample, every member of the population has an equal chance of being selected. Your sampling frame should include the whole population.

To conduct this type of sampling, you can use tools like random number generators or other techniques that are based entirely on chance.

Example

You want to select a simple random sample of 100 employees of Company X. You assign a number to every employee in the company

every employee in the company database from 1 to 1000, and use a random number generator to select 100 numbers.

2. Systematic sampling

Systematic sampling is similar to simple random sampling, but it is usually slightly easier to conduct. Every member of the population is listed with a number, but instead of randomly generating numbers, individuals are chosen at regular intervals.

Example

All employees of the company are listed in alphabetical order. From the first 10 numbers, you randomly select a starting point: number 6. From number 6 onwards, every 10th person on the list is selected (6, 16, 26, 36, and so on), and you end up

> From number 6 onwards, every 10th person on the list is selected (6, 16, 26, 36, and so on), and you end up with a sample of 100 people.

If you use this technique, it is important to make sure that there is no hidden pattern in the list that might skew the sample. For example, if the HR database groups employees by team, and team members are listed in order of seniority, there is a risk that your interval might skip over people in junior roles, resulting in a sample that is skewed towards senior employees.

3. Stratified sampling

This sampling method is appropriate when the population has mixed characteristics, and you want to ensure that every characteristic is proportionally represented in the sample.

in the sample.

You divide the population into subgroups (called strata) based on the relevant characteristic (e.g. gender, age range, income bracket, job role).

From the overall proportions of the population, you calculate how many people should be sampled from each subgroup. Then you use random or systematic sampling to select a sample from each subgroup.

Example

The company has 800 female employees and 200 male employees. You want to ensure that the sample reflects the gender balance of the company, so you sort the population into two strata based on gender. Then you use random sampling on

company, so you sort the population into two strata based on gender. Then you use random sampling on each group, selecting 80 women and 20 men, which gives you a representative sample of 100 people.

4. Cluster sampling

Cluster sampling also involves dividing the population into subgroups, but each subgroup should have similar characteristics to the whole sample. Instead of sampling individuals from each subgroup, you randomly select entire subgroups.

If it is practically possible, you might include every individual from each sampled cluster. If the clusters themselves are large, you can also sample individuals from within each cluster using one of the techniques above.

If the clusters themselves are large, you can also sample individuals from within each cluster using one of the techniques above.

This method is good for dealing with large and dispersed populations, but there is more risk of error in the sample, as there could be substantial differences between clusters. It's difficult to guarantee that the sampled clusters are really representative of the whole population.

Example

The company has offices in 10 cities across the country (all with roughly the same number of employees in similar roles). You don't have the capacity to travel to every office to collect your data, so you use random sampling to select 3 offices – these are your clusters.