Introduction To Methods Of DATA COLLECTION

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Book Title: **Introduction to Methods of Data Collection**

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PREFACE

This innovative book gives students and researchers alike an indispensable introduction to the key theoretical issues and practical data collection methods.

It demonstrates how to gather and use qualitative, quantitative, and mixed data sets by using clear definitions, relevant interdisciplinary examples from around the world, and up-to-date suggestions for further reading.

In this book 5 chapters are contributed:

1. Data Collection Tools

2. A Study on the Techniques for Data Collection in Social Science Research

3. Research Methodology: Data Collection Methods

4. Research Design Perspective and Methodological Approaches

5. A Study on Qualitative, Quantitative Methods

This stimulating, practical guide, which can be read as individual concepts or as a whole, will be a valuable resource for students and research professionals.

CONTENT

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1. Data Collection Tools

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Abstract:

Decision-making is an everyday process and for this we need correct data, therefore data is an integral part of our daily lives. However, data on which any decision is based needs to be collected in a strategic manner that it fulfills the desired outcome and aids in future decision-making. Data needs to be precise and clear for ambiguous data would lead to wrong ideas. Collection of data is a very systematic process and there are many ways of doing it, sometimes the researcher uses previously collected data and other times the researcher goes into primary ways of collection of data for the very specific research problem.

Keywords:

Data collection, observation, questionnaire, social scaling, psychological tests.

Objectives: In this chapter the following concepts are discussed.

- What is Data?
- Importance of Data.
- Various tools of Data Collection.
- Advantages and Disadvantages associated with each tool.

1.1 Definition of Data:

Data is defined as, "An information that has been translated into a form that is efficient for movement or planning." According to Cambridge dictionary, Data is defined as, " An information, especially facts or numbers collected to be examined and considered and used to help in decision- making".

1.2 Importance of Data:

- **Improve People's Lives -** Data helps to improve quality of life for people by improving quality is first and foremost among the reasons why organizations should be using data. By allowing measuring and taking action, an effective data system can enable organizations to improve the quality of people's lives.
- **Make Informed Decisions** - Data is equal to knowledge. Good data provides indisputable evidence, and with proper evidence or knowledge, decision-making can be done justifiably and timely.

- H**elps in responding to challenges before time** - Effective quality monitoring will allow organizations to be proactive rather than reactive and will support the organization to maintain best practices over time.
- **Measure the effectiveness of a given strategy** - A strategy's effectiveness can be identified on the data on which it is based. Timely gathered data can be very beneficial by overcoming any challenge faced by data.
- **Find Solutions To Problems -** Data allows organizations to more effectively determine the cause of problems. Data allows organizations to visualize relationships between what is happening in different locations, departments, and systems.
- **Back up Arguments -** Data is a key component to systems advocacy. Utilizing data will help present a strong argument for systems change.
- **Data increases efficiency.** Effective data collection and analysis will allow us to direct scarce resources where they are most needed. If an increase in significant incidents is noted in a particular service area, this data can be dissected further to determine whether the increase is widespread or isolated to a particular site. If the issue is isolated, training, staffing, or other resources can be deployed precisely where they are needed, as opposed to system-wide. Data will also support organizations to determine which areas should take priority over others.
- **Tools of Data Collection -** A well-conducted research program postulates sufficient, reliable and valid facts. Such facts are obtained through systematic procedure, which involves various devices. Each tool is particularly appropriate for a certain source of data, yielding information of the kind and in the form that would be most efficiently used.

Some of these devices merely identify the presence or absence of certain aspects of a situation. Some of the tools collect qualitative descriptions that may involve comparison or contradiction between elements present in the situation. Other devices yield quantitative measures.

1.2.1 Benefits of Data Collection:

Good data can help identify and verify issues, theories and perceptions. Good data can help to proactively address issues, measure progress and capitalize on opportunities. Good data can gain trust, develop effective, respectful consultations, and secure the support of key decision-makers and stakeholders. Good data can reduce exposure to possible legal action and human rights complaints.

1.3 Tools of Data Collection:

Many of the research tools have been designed to yield quantitative measures, others yield descriptions that may be refined by counts of frequency of appearance. While some data cannot be expressed in frequency counts, percentage of scores, most data are made more meaningful by quantification. The most frequently used tools of data collection are

- Observation
- Questionnaire
- Psychological Tests
- Social Scaling

1.3.1 Observation:

According to Merriam - Webster, the word 'observation' can be defined as "*an act of recognising and noting a fact or occurrence often involving measurement with instruments*", or "*a record or description so obtained".*

“A statement based on something one has seen, heard or noticed.”

“Observation, as the name implies, is a way of collecting data through observing.”

“Observation data collection methods may involve watching, listening, reading, touching, and recording behavior and characteristics of phenomena”

“A way to gather data by watching people, events, or noting physical characteristics in their natural setting.”

Observation is a **primary** research method. Primary research involves personally collecting the data or information being studied. Observations can be overt (subjects know they are being observed) or covert (do not know they are being watched).

In overt observation research subjects are aware that they are being observed. In covert observation, on the other hand, the observer is concealed and sample group members are not aware that they are being observed.

Covert observation is considered to be more effective because in this case sample group members are likely to behave naturally with positive implications on the authenticity of research findings. Observation is very important when using scientific methods to investigate phenomena.

Observation involves using the senses to gather information about the natural world. Science depends on keeping records of observations for later interpretations. These interpretations may lead to the development of scientific theories or laws. Without accurate observations, scientists cannot make any interpretations and therefore cannot draw conclusions.

A. Quantitative and Qualitative Observations:

- **Quantitative observations** involve measurements or estimates that yield meaningful, numerical results.
- **Qualitative observations** yield descriptive, nonnumeric results. Although all the observations made on a phenomenon are valuable, quantitative observations are often more helpful than qualitative ones. Qualitative observations are somewhat vague because they involve comparative terms. Quantitative observations, on the other hand, have numbers and units associated with them and therefore convey more information. Even an estimated number is more valuable than no number at all.

B. Characteristics of Observation:

a. **Use of Senses The** five senses either to see or hear are involved in the process of observation. For specific data collection, mental and physical elements should be used.
b. **Systematic and Relative- The** observer cannot observe each thing. He studies only those things, which fall, in his direct observation. For example, an inspector of traffic observes only those vehicles driven in the wrong way or fast. In the same way a researcher takes notice of those things which & are the object and relative to his study.
c. **Quantity based on Quality** Observation is an efficient way to draw facts as quantitative based on his nature and quality. Efficient conclusions should be drawn, if qualitative techniques and tools are used in observation methods.
d. **Specific Objectives** A researcher having some purpose and objectives behind a study. To collect correct facts, he studies phenomena, which are related to his study and have specific objectives.
e. **Dominant Interest** Without a researcher interest, no observation is possible. For this purpose the observation method is the outcome of a researcher's personal interest and involvement.
f. **An Eye Affairs** Observation depends on all senses but mostly an eye is used for this method to observe the happening events.
g. **Direct Method of Study -** Observation is a direct method of study. An observer goes into the field and observes all the problematic situations.
h. **Direct Cause-effect Relationship -** An observation is a direct method to the study of cause and effect relationship. Hypothesis may also be developed in the field due to keen study of cause and effect.

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C. Types of Observation:

- **Participant observation** - Participant observation is an observational research method involving the researcher integrating themselves into the group they're studying. They join the community, either as a researcher whose presence is known (overt), or as a member in disguise (covert).
- **Non-participant observation** - Non-participant research is generally cheaper and quicker to do. It doesn't require time and resources for the researcher to integrate into an unfamiliar community. Subjects of non-participant observation aren't able to give informed consent - they are essentially deceived about the occurrence or nature of the study. For instance, a researcher studying young children's behavior in classrooms might want to discern how often they speak without raising their hands. The researcher would mark this behavior on their schedule every time they saw it.

Advantages of Observation Data Collection Method:

- direct access to research phenomena,
- high levels of flexibility in terms of application and generating a permanent record of phenomena to be referred to later.

Disadvantages of Observation Data Collection Method:

- Longer time requirements,
- high levels of observer bias, and
- impact of observer on primary data, in a way that presence of observer may influence the behavior of sample group elements.

D. Validity and Reliability of Observation Method:

A common way of assessing the reliability of observations is to use inter-rater reliability. This involves comparing the ratings of two or more observers and checking for agreement in their measurements. Another way of improving the reliability of an observational study is to ensure that the categories are clearer.

The more observers agree, the greater reliability. Second, even with perfectly reliable observers, the target person being observed may vary in their behaviors from occasion to occasion. The variability of the coded behaviors across time may also influence the results of prediction models.

In observational research, reliability of data refers to the degree of agreement between sets of observational data collected independently from the same scene by two different observers (interobserver agreement) or by the same observer at different times in the data collection process (intraobserver agreement).

1.3.2 Questionnaire Method:

A questionnaire is a list of questions or items used to gather data from respondents about their attitudes, experiences, or opinions. Questionnaires can be used to collect quantitative and/or qualitative information. Questionnaires are commonly used in market research as well as in the social and health sciences. For example, a company may ask for feedback about a recent customer service experience, or psychology researchers may investigate health risk perceptions using questionnaires. Designing a questionnaire means creating valid and reliable questions that address research objectives, placing them in a useful order, and selecting an appropriate method for administration.

A. Questionnaire Methods:

- Self-administered
- Researcher-administered. Self-administered questionnaires are more common because they are easy to implement and inexpensive.

B. Self-Administered Questionnaires:

Self-administered questionnaires are more common because they are easy to implement and inexpensive. Self-administered questionnaires can be delivered online or in paper-and-pen formats, in person or through mail. All questions are standardized so that all respondents receive the same questions with identical wording.

Self-administered questionnaires can be:

- cost-effective
- easy to administer for small and large groups
- anonymous and suitable for sensitive topics
- self-paced

But they may also be:

- unsuitable for people with limited literacy or verbal skills
- susceptible to a non response bias (most people invited may not complete the questionnaire)
- biased towards people who volunteer because impersonal survey requests often go ignored.

C. Researcher-Administered Questionnaires:

Researcher-administered questionnaires allow deeper insights. Researcher-administered questionnaires are interviews that take place by phone, in-person, or online between researchers and respondents.

Researcher-administered questionnaires can:

- help researcher ensure the respondents are representative of your target audience
- allow clarifications of ambiguous or unclear questions and answers
- have high response rates because it's harder to refuse an interview when personal attention is given to respondents

But researcher-administered questionnaires can be limiting in terms of resources.

They are:

- costly and time-consuming to perform
- more difficult to analyze if you have qualitative responses
- likely to contain experimenter bias or demand characteristics
- likely to encourage social desirability bias in responses because of a lack of anonymity

D. Open-Ended Vs. Closed-Ended Questions

Questionnaires can include open-ended or closed-ended questions or a combination of both.

Using closed-ended questions limits responses, while open-ended questions enable a broad range of answers. You'll need to balance these considerations with available time and resources.

E. Closed-Ended Questions

Closed-ended, or restricted-choice, questions offer respondents a fixed set of choices to select from. Closed-ended questions are best for collecting data on categorical or quantitative variables.

Categorical variables can be nominal or ordinal. Quantitative variables can be interval or ratio. Understanding the type of variable and level of measurement means researchers can perform appropriate statistical analyses for generalizable results.

F. Advantages of Questionnaire:

- **Economical:**

It is an economical way of accumulating information. It is economical both for the sender and for the respondent in time, effort and cost. The cost of conducting the study with the help of a questionnaire method is very low. In the questionnaire the researcher has to spend for paper printing and postage only. There is no need to visit each and every respondent personally. So it does not require a high cost for conduct of the research.

- **Wide Coverage:**

It is probably the best method to collect information, compared to the other methods like interview or observation, when the sample population is spread over a large territory. It permits nationwide or even international coverage.

Questionnaire makes it possible to contact many people who could not otherwise be reached. It can cover a large group at the same time. Goode and Hatt say that when the researcher has to cover the group of respondents who are widely scattered, lie can use the questionnaire in order to minimize the cost.

For example, if the researcher wishes to poll the membership of the American Sociological Society, transportation costs for interviewing would be excessive, both in terms of money and time. There may not be enough time to make the necessary interview. However, questionnaires could be distributed to all those members and information could be collected from them. This can be done by a single researcher without the large funds otherwise required to hire an interviewing staff to carry out the interview.

- **Rapidity:**

Replies may be received very quickly in the questionnaire method. In this case there is no need to visit the respondent personally or continue the study over a long period. Thor "fore in comparison with other methods, the mailed questionnaire is the quickest method.

- **Suitable in Special Type of Response:**

The information about certain personal, secret matters can be best obtained through questionnaire methods. For example, information about sexual relationship, marital relationship, secret desires etc. can be easily obtained by 'keeping the names of the respondents anonymous.

- **Repetitive Information:**

Compared to other methods like schedule, interview or observation, the questionnaire method is regarded as more useful and cheap, where the repetitive information has to be collected at regular intervals.

- **An Easier Method:**

Questionnaire is comparatively an easier method to plan, construct and administer. It does not require much technical skill or knowledge.

- **It Puts Less Pressure on the Respondents:**

It puts less pressure on the respondents for immediate response. He can answer it at his own leisure, whereas interview or observation demands specific fixation of time and situation,

- **Uniformity:**

It helps in focusing the respondent's attention on all the significant items. As it is administered, in a written form, its standardized instructions for recording responses ensure some uniformity. Questionnaire does not permit much variation.

- **Useful Preliminary Tool:**

Questionnaire may be used as a preliminary tool for conducting a depth study later on by any other method.

- **Greater Validity:**

Questionnaire has some unique merits as regards validity of information. In methods like interview and observation, the reliability of responses depends on the way the investigator has recorded them. Here they may present biased or prejudiced information of their own.

But in the questionnaire method, the responses given by the subjects are available in their own language and version. Therefore, it cannot be wrongly interpreted by the researcher.

- **Anonymity:**

Questionnaire ensures anonymity to its respondents. The respondents have a greater confidence that they will not be identified by anybody for giving a particular view or opinion. They feel more comfortable and free to express their view in this method.

- **Most Flexible Tool for Data Collection:**

Questionnaire is no doubt the most flexible tool in collecting both quantitative and qualitative information.

G. Disadvantages of Questionnaire:

- **Limited Response:**

One of the major limitations of the questionnaire is that it can be applicable only to those respondents who have a considerable amount of education. It can neither be used for illiterate nor for semi-literate persons. The questionnaire quite often fails to cover very busy and preoccupied persons among the respondents, lazy and indifferent type of persons, the type of respondents who need to conceal a lot about themselves, the easy-going and shirkers among the respondents, the persons who have a unreasonable contempt for research and reform and the persons who unnecessarily doubt the research worker's intentions, sincerity, devotion and commitment. These are the people who constitute a very important segment of the respondents to be covered in the collection of data, but they can be seldom caught. Thus questionnaires are hardly appropriate for a larger section of this type of population.

- **Lack of Personal Contact:**

As in case of questionnaire the researcher does not go to the field, he is not able to establish a proper personal relationship with the respondents. If the respondent fails to understand some of the technical terms or he has any doubt, there is nobody to clarify these technical terms or doubts. Even though the researcher tries in the best possible manner to make the questionnaire a simple, precise and convenient one, the aim and objective of the questionnaire can be much better explained personally than through any other means. Without the proper personal contact it is very difficult to motivate the respondent to fill up the questionnaire.

- **Poor Response:**

In case of a mailed questionnaire method, the proportion of return is usually low. The factors which are likely to affect the returns are: the layout of the questionnaire, its size, the organization conducting the research work, the nature of appeal, the kind of respondents chosen for research, inducement for response etc.

- **Unreliability:**

The information collected through questionnaires cannot be said to be very much reliable or valid. If the subject misinterprets a question or gives an incomplete or indefinite response very little can be done to connect such response. As against this, in an interview there is always the possibility of rephrasing questions for further clarification. The questions can be repeated with adequate elaboration if it is so required. But in the questionnaire method there is no opportunity for repeating questions, explaining them or clarifying the doubts for a particular response. Therefore, in it the validity of the respondent's response can hardly be examined. The investigator here is not in a position to observe the gestures and expressions of the respondents. He cannot cross check the inconsistencies or misrepresentation of the replies. So in the questionnaire method, the reliability of responses is very low.

- **Illegibility:**

Illegible handwriting of the respondent sometimes creates much difficulty for the researcher to understand the responses. Sometimes the respondents erase and overwrite too much. These create many difficulties in reading the answers.

- **Incomplete Entries:**

Often most of the respondents fill up the questionnaire form very poorly. They sometimes leave out many questions altogether or fill in such a way that it becomes very difficult on the part of the investigator to follow those responses. Other than this, there may be the problem of language, use of abbreviations and ambiguous terms etc. All these make a questionnaire an incomplete one.

- **Possibility of Manipulated Entries:**

In case of interview the investigator directly interacts with the respondents personally and intensively in a face to face situation. He can judge a respondent, his attitude, understanding of the research topic and, if necessary, can ask some cross questions to correct various errors. So usually the respondent cannot manipulate his answer. But in questionnaires it is very difficult to detect the errors of the respondents. Here the investigator does not have any facility to check the validity and reliability of the information. In the absence of the researcher, the respondents may supply manipulated information.

- **Useless in Depth-Studies:**

In the questionnaire method, it is not possible on the part of the researcher to conduct an intensive or in-depth study of the feelings, reactions and sentiments of the respondents. All these require a healthy interaction of the researcher with the respondents. But in the questionnaire method, the investigator is not present in the field, so nothing can be done to establish rapport with the respondent. Due to this lack of interaction with the respondent, the researcher cannot go into the details of the respondent’s life. So through questionnaire methods one cannot conduct an in-depth study.

- **Response from Improper Representative Section of People:**

The respondents who return the questionnaires may not constitute a representative section of the entire group. Only mere responsible, research minded or those in favor of the issue may prefer to respond. Some of the important sections of the group may totally remain silent. This vitiates the final conclusions and findings.

- **Lack of Rapport with the Subject:**

There are many people who would not like to share any important information unless and until they are impressed about the rationale of the study and personality of the investigator. The questionnaire does not provide for any opportunity to the investigator to establish rapport with the subject and this cannot attract the respondent for a better response.

- **Not Suitable for Delicate Issues:**

Some of the research areas are so delicate, sensitive, intricate and confidential in nature that it becomes difficult to frame questions on them. It is impossible to put down certain delicate issues in writing.

1.3.3 Psychological Test:

A Psychological test is a standardized measure of a sample of a person's behavior that is used to measure the individual differences that exist among people. A psychological test is an objective and standardized measure of an individual's mental and/or behavioral characteristics.

A Psychological test is a systematic procedure for observing a person's behavior or performing, describing it with the aid of a numerical scale or category system. Most tests are used as a way of measuring differences between people or differences in the same person over time. Psychological tests are written, visual, or verbal evaluations administered to assess the cognitive and emotional functioning of children and adults.

A. Need For Psychological Test:

a. Identifies weaknesses and strength
b. Supports individualized lesson plans
c. Enables placement decisions
d. Monitors progress
e. Identifying disabilities
f. Helping the administrative and academic works
g. g. Vocational ability. For children, academic achievement, ability psychological tests may be used as tools in school placement, in determining the presence of a learning disability or a developmental delay in identifying giftedness, or in tracking intellectual development.

It may also be used with teens and young adults to determine vocational ability (e.g., in career counseling). Tests are administered for a wide variety of reasons, from diagnosing psychopathology (e.g., personality disorder, depressive disorder) to screening job candidates. They may be used in an educational setting to determine personality strengths and weaknesses.

B. Major Uses of Tests: - The basic use of tests is to provide information for decision makers.

- Selection or placement
- Diagnosis
- Accountability evaluations
- Judging progress and following trends
- Self- discovery

C. Main Characteristics of a Good Psychological Test: Five main characteristics are-

- **Objectivity**: The test should be free from subjective—judgment regarding the ability, skill, knowledge, trait or potentiality to be measured and evaluated.
- **Reliability**: This refers to the extent to which the obtained results are consistent or reliable. When the test is administered on the same sample for more than once with a reasonable gap of time, a reliable test will yield the same scores. It means the test is trustworthy. There are many methods of testing the reliability of a test.
- **Validity**: It refers to the extent to which the test measures what it intends to measure. For example, when an intelligent test is developed to assess the level of intelligence, it should assess the intelligence of the person, not other factors. Validity explains to us whether the test fulfills the objective of its development. There are many methods to assess validity of a test.
- **Norms**: Norms refer to the average performance of a representative sample on a given test. It gives a picture of the average standard of a particular sample in a particular aspect. Norms are the standard scores, developed by the person who develops the test. The future users of the test can compare their scores with norms to know the level of their sample.
- **Practicability**: The test must be practicable in- time required for completion, the length, number of items or questions, scoring, etc. The test should not be too lengthy and difficult to answer as well as scoring.

D. Different Types of Test:

Psychological tests can be various types; designed to measure different elements of human brain development.

- **Intelligence Tests**: - These measure the level of intelligence present in the individual. It also assesses the person's ability to relate to its foreign environment.

- **Personality Tests:** - These tests measure the type and traits of the individual's personality. These tests are used for clinical purposes.
- **Attitude Tests**: - The individual's attitude towards the environment, other people or places is judged in this kind of test.
- **The Neuro-psychological tests** are usually conducted when an individual has suffered a traumatic stress or injury. To check the proper cognitive functioning of the brain.
- **Achievement tests** are also a type of psychological tests that measure ability to comprehend a specific topic; for example, mathematics.

The above-mentioned tests can either be used as assessments for screening at corporate or educational institutes, or they can be used for clinical purposes to diagnose the issue and then to prescribe the best possible treatment for the psychological problem.

1.3.4 Social Scaling:

"The process of increasing positive social impact to better correspond to the magnitude of the identified social need."

Social Need - The gap between reality and ideal conditions, as defined by human society.

Likert Scale

Likert scales are one of the most commonly used scales in social science research. They offer a simple rating system that is common to surveys of all kinds. The scale is named for the psychologist who created it, Rensis Likert. One common use of the Likert scale is a survey that asks respondents to offer their opinion on something by stating the level to which they agree or disagree. It often looks like this:

a. Strongly agree
b. Agree
c. Neither agree nor disagree
d. Disagree
e. Strongly disagree

Within the scale, the individual items that compose it are called Likert items. To create the scale, each answer choice is assigned a score (for instance, 0-4), and the answers for several Likert items (that measure the same concept) can be added together for each individual to obtain an overall Likert score.

For example, let's say that we're interested in measuring prejudice against women. One method would be to create a series of statements reflecting prejudiced ideas, each with the Likert response categories listed above. For example, some of the statements might be, "Women shouldn't be allowed to vote," or "Women can't drive as well as men." We would then assign each of the response categories a score of 0 to 4 (for example, assign a score of 0 to "strongly disagree," a 1 to "disagree," a 2 to "neither agree or disagree," etc.). The scores for each of the statements would then be totaled for each respondent to create an overall

score of prejudice. If we had five statements and a respondent answered "strongly agree" to each item, his or her overall prejudice score would be 20, indicating a very high degree of prejudice against women.

Semantic Differential Scale:

The semantic differential scale asks respondents to answer a questionnaire and choose between two opposite positions, using qualifiers to bridge the gap between them. For instance, suppose we wanted to get respondents' opinions about a new comedy television show. First decide what dimensions to measure and then find two opposite terms that represent those dimensions.

For example, "enjoyable" and "unenjoyable," "funny" and "not funny," "relatable" and "not relatable." Then create a rating sheet for respondents to indicate how they feel about the television show in each dimension. The questionnaire would look something like this:

	Very Much	Somewhat	Neither	Somewhat	Very Much	
Enjoyable		X				Unenjoyable
Funny					X	Not Funny
Relatable	X					Not relatable

The four types of scales are:

- Nominal Scale.
- Ordinal Scale.
- Interval Scale.
- Ratio Scale.

Nominal Scale:

A nominal scale is the 1st level of measurement scale in which the numbers serve as "tags" or "labels" to classify or identify the objects. A nominal scale usually deals with the non-numeric variables or the numbers that do not have any value.

Characteristics of Nominal Scale:

- A nominal scale variable is classified into two or more categories. In this measurement mechanism, the answer should fall into either of the classes.
- It is qualitative. The numbers are used here to identify the objects.
- The numbers don't define the object characteristics. The only permissible aspect of numbers in the nominal scale is "counting."

Example:

An example of a nominal scale measurement is given below:

What is your gender?

M- Male

F- Female

Here, the variables are used as tags, and the answer to this question should be either M or F.

Ordinal Scale:

The ordinal scale is the 2nd level of measurement that reports the ordering and ranking of data without establishing the degree of variation between them. Ordinal represents the "order." Ordinal data is known as qualitative data or categorical data. It can be grouped, named and also ranked.

Characteristics of the Ordinal Scale

- The ordinal scale shows the relative ranking of the variables
- It identifies and describes the magnitude of a variable
- Along with the information provided by the nominal scale, ordinal scales give the rankings of those variables
- The interval properties are not known
- The surveyors can quickly analyse the degree of agreement concerning the identified order of variables

Example:

- Ranking of school students – 1st, 2nd, 3rd, etc.
- Ratings in restaurants
- Evaluating the frequency of occurrences
- Very often
- Often
- Not often
- Not at all
- Assessing the degree of agreement
- Totally agree
- Agree
- Neutral
- Disagree
- Totally disagree

Interval Scale:

The interval scale is the 3rd level of measurement scale. It is defined as a quantitative measurement scale in which the difference between the two variables is meaningful. In other words, the variables are measured in an exact manner, not as in a relative way in which the presence of zero is arbitrary.

Characteristics of Interval Scale:

- The interval scale is quantitative as it can quantify the difference between the values
- It allows calculating the mean and median of the variables
- To understand the difference between the variables, you can subtract the values between the variables
- The interval scale is the preferred scale in Statistics as it helps to assign any numerical values to arbitrary assessment such as feelings, calendar types, etc.

Example:

- Likert Scale
- Net Promoter Score (NPS)
- Bipolar Matrix Table

Ratio Scale:

The ratio scale is the 4th level of measurement scale, which is quantitative. It is a type of variable measurement scale. It allows researchers to compare the differences or intervals. The ratio scale has a unique feature. It possesses the character of the origin or zero points.

Characteristics of Ratio Scale:

- Ratio scale has a feature of absolute zero
- It doesn't have negative numbers, because of its zero-point feature
- It affords unique opportunities for statistical analysis. The variables can be orderly added, subtracted, multiplied, divided. Mean, median, and mode can be calculated using the ratio scale.
- Ratio scale has unique and useful properties. One such feature is that it allows unit conversions like kilogram – calories, gram – calories, etc.

Example:

An example of a ratio scale is:

What is your weight in Kgs?

- Less than 55 kgs
- 55 – 75 kgs
- 76 – 85 kgs

- 86 – 95 kgs
- More than 95 kgs

1.3.5 Implementation:

After finalizing the tool of data collection, following steps are identified to be followed for effective research work.

a. Step 1: Identify Goals and Performers.
b. Step 2: Create Investigative Questions.
c. Step 3: Develop a Data Collection Plan.
d. Step 4: Create Data Collection Instruments.
e. Step 5: Collect Data.
f. Step 6: Analyze Data and Identify Gaps.
g. Step 7: Summarize Findings & Prioritize Actions.

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2. A Study on the Techniques for Data Collection in Social Science Research

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Abstract:

The present study sets out to compare and contrast the usefulness of several distinct methods of data collection. The investigator has explored the globe in search of evidence about composition, history, and potential future developments. For research findings to be trusted, the data used must be complete and accurate. This paper offers a primer on the methods employed in social science studies. The process of collecting data that can be used to test hypotheses, answer research questions, and inform analyses is known in the academic world as data collection. One must be able to collect and analyze data efficiently if one pursues a career in the natural sciences, social sciences, arts, or economics. Collecting accurate data is essential for study in any subject area. Credible and convincing answers to the study issues require extensive data collection. Reliable data collection is vital regardless of the research location or the popularly understood meaning of the term "data" (quantitative, qualitative). Issues can be averted with the use of up-to-date data collection tools and clear, thorough instructions on how to use them. A structured strategy for data collection is essential for accurate forecasting. On top of that, a development program's long-term goal can be determined using this strategy in social science research.

Keywords:

Study, Techniques, Data Collection, Social Science, and Research.

2.1 Introduction:

Data collecting refers to routinely acquiring and measuring information to answer research questions, verify or reject hypotheses, and evaluate results. Irrespective of your chosen area of study, you will always have questions. While research methods can differ from one discipline to the next, a dedication to open and honest data collection is consistent. There is more to studying than just data collection. Proper data collection is vital for a thorough understanding of the issues and a reliable analysis of the study's results. Without sufficient information, it would be impossible to do any kind of research. Asking fundamental questions is a prerequisite for doing any investigation. Having faith in and standing by the results of a study requires using rigorous, objective methods of data collection (Sapsford & Jupp, 2006). *Study methods* are strategies and plans used to collect data. They cover a wide range, from basic concepts to specific techniques for gathering, organizing, and interpreting data. With this approach, a range of decisions can be taken; not all of them need to follow

the continuous path. They are here because they should be. It is crucial to give the evaluation process much thought. The study's design, ethical presumptions, and procedures for data collection, processing, and distribution should all be considered while making this choice. Gathering relevant data is the starting point for each research study. No matter how carefully you prepare, you will need more time or money to collect everything you need to analyze your study thoroughly. Collecting all the required data takes a lot of planning, work, time, patience, and determination. Before settling on sample size, it is important to determine what data is required for your work. Then, with the right equipment, data collection from the selected sample can continue. Once a study problem has been identified, and a study strategy or plan has been developed, the data collection procedure begins. The investigator should consider both primary and secondary data when deciding on the data collection method to use in social science research.

2.2 Meaning of Data:

Data is collected in various ways and is the foundation of data-driven research approaches. Data is any piece of information that may be expressed quantitatively. Even though numerical descriptions are the norm for data, more wholeness is always welcome. Today's display and application of data extend beyond raw numbers. In this paper, we will talk about the basic aspects of data. Data are a specific form of information collected by researchers and academics through surveys and interviews. Definitions like "data, plural of datum" highlight that "data" is a plural noun. Data or information is defined in a loose sense throughout the entire term. This begs the question, what is data? Think about the methods by which we organize and categorize data and understanding. We keep coming back to facts and information as we define knowledge.

2.3 Types of Data:

Data collection is the systematic and planned gathering and measurement of information on variables of interest to answer certain research questions, test hypotheses, and evaluate results. Data collecting is a common part of research in all academic fields, including the humanities, social sciences, economics, and natural and applied sciences. Data is a collection of details and numeric data that may be put together and evaluated to answer a research question or provide the foundation for more general inferences. Before creating their data collection procedures, researchers carefully consider the kind of data they aim to get. There are only really two forms of data.

2.3.1 Primary Data:

Primary data, in the context of data collection, is information other sources have not filtered. The public still needs access to primary data, which is likely more reliable, real, and impartial. Since humans may have altered secondary data sources, primary sources are preferable. One must first collect data before making use of statistics in any way. Avoid the mainstream media if you want to discover the real position of women in the United States today. It is necessary to rely on secondary resources without fundamental ones. Secondary data should not be used exclusively because of the high likelihood of human error. They are likely wrong, biased, and out of date. It might be difficult to collect primary data when there

is either a small population or a reluctance to participate in surveys. Primary data, which is data acquired directly from the source, is essential for any credible study. Investigators, in this case, will need to put in much work to collect this data because it is not yet easily accessible through database searches. There is more than just a data collecting approach to collecting primary data. This data has been the backbone of our investigation. The primary data are naturally unique because they are new and being used for the first time.

Advantages of Primary Data:

- The credibility of the data was enhanced through the independent, unique collection.
- Improving Direct Collection enhances data quality.
- Incorporated both quantitative and qualitative research methods.
- To collect secret information, one can utilize primary data.
- Primary data can be used as secondary data after processing.

Disadvantages of Primary Data:

- Information quality that respondents provide impacts reliability.
- Data may include biased.
- It is both time and money-consuming.
- Investigators need to gain more relevant expertise.
- Field research is needed.

2.3.2 Secondary Data:

All of the information used in this study comes from secondary sources rather than first-hand observations. Primary data collecting, often known as ground-up information gathering, may take considerable time. Therefore, additional data may be gathered using this approach. In addition to primary materials, there is also an abundance of excellent secondary resources to choose from. Due to the broad availability of low-cost digital media like the internet, collecting secondary data is easier than ever. Books are a fantastic resource for expanding one's knowledge.

There is no reason to believe them, as every piece of evidence points in the opposite direction. Please tell me the book's title, the publishing company's name, and the year it came out. It is essential to rely on contemporary accounts due to the rapidity with which new discoveries may be discovered as a result of science and research and technological improvement. It would be helpful for you to read a book on the subjects that have recently caught your attention. Before settling on a subject, do some background reading on your options. Make a decision and immerse yourself in the academic literature on that topic. Although books have a negative reputation, many people still use them as their primary source of knowledge. Journals/periodicals: In recent years, more and more weight has been given to studies that appear in respected peer-reviewed publications. Journal articles are more likely to be up-to-date than books since their editors craft pieces to cover specific topics rather than a broad variety of interconnected ones. Although daily newspapers are more reliable than monthly magazines, relying solely on one source for your news is still not a good idea.

On the other hand, newspapers are generally more trustworthy, and in some fields (such as politics), they may be the sole trustworthy source of data. There is no need for further data collection or compilation when secondary sources are used instead of primary ones. Acquired knowledge from seeing how others performed a task. We call "secondary data" information obtained from "primary data," but it is used for a different purpose. Secondary data refers to information that was gathered in a way other than "primary research." Because of its reduced cost and quicker processing time, digital information often replaces primary sources. Secondary data, which is information that has already been collected and has been the topic of data analysis by another entity, is the complete opposite of primary data.

Advantages of Secondary Data:

- These data can be easily managed.
- There continues to be a balance between time and money.
- Experts have already examined the available information.
- Used to interpret or update data already in existence.
- Helpful for authors, thinkers, and philosophers when developing fresh concepts.
- More investigation is needed.

Disadvantages of Secondary Data:

- There is no commonly accepted measure for validity.
- Need for expertise.
- Secondary data is less trustworthy and accurate than primary data.

2.4 The Notion of Data Collection:

Research is a vital and useful instrument for advancing human development. Ongoing data collection would still have resulted in much change (Pandey, P., & Pandey, M. M, 2021). Even though data collection is not new, as we shall see later, conditions have evolved. In formats that were not available a century ago, more data is now accessible. Modern data collection techniques must expand and change to keep up with recent technological advancements. Data collection is the systematic, scientific process of acquiring information on specific topics to analyze the information and subsequently handle problems.

All academic fields, including the humanities, social sciences, physical sciences, and business, require data collection as a necessary component of any study. It must be true and accurate regardless of the method used to collect it, which varies by sector. Any attempt to gather information should be directed at collecting accurate information that can be utilized to conduct in-depth data analysis and create a strong argument in favour of adopting a specific stance.

The fact that data collected is a key component of additional studies and can be done in several different methods should be clear at this point. For instance, we could watch the child, use tools to see how hard they hit something, look at the child's legal history, survey parents and teachers, talk to parents and teachers or give a child a scale to rate aggression to see how aggressive they are.

2.5 Techniques for Data Collection:

This paper aims to introduce students to the several techniques researchers employ while getting data. Investigations are carried out to describe better, explain, and or predict a wide range of events. The original study's ability to draw useful conclusions is very sensitive to the data quality. This paper introduces the many data collection strategies that can be used in social science studies. Taking in information and placing it to use are two sides of the same coin regarding learning. Comprehensive data collection and analysis are essential for solving study issues and providing a solid evaluation of research outcomes. When study outcome is consistent with one another, they are more likely to be accepted as true. A questionnaire is the first step in carrying out any study or investigation. Only from data obtained that reduces the possibility of bias may credible and reasonable conclusions are reached (Sapsford & Jupp, 2006). The methods for collecting primary and secondary data are different since primary data must be collected before secondary data can be compiled. We cover the various data collection methods and their benefits and drawbacks. Once the research problem has been created and properly stated, the research work naturally shifts to data collection.

2.6 Questionnaire Technique:

Data collection questionnaires might take the shape of questions or other prompts presented to participants. The majority of datasets are already structured, which simplifies statistical analysis. There is widespread agreement that Sir Francis Galton was the first to use a questionnaire (1822 - 1911). Suppose you need to learn how to conduct a survey. In that case, a questionnaire may be the best option because it is cheap, easy to distribute (unlike verbal or telephone surveys), and provides standardized answers that simplify data collection. As surveys in their own right, questionnaires are vulnerable to the same influences from question wording and organization as other survey methods. Types: The questions asked in a survey can be divided into two categories: those that assess independent variables and those that combine the results of several questions into a single composite score.

The former is more common in surveys, while the latter is more common in tests. Data can be gathered with the help of the questionnaire. Questions concerning the topic should be the starting point for any information-gathering effort. Individuals in the sample may be addressed in person or sent a questionnaire. The questionnaires are shipped out to respondents, and the responses are sent back in the same format. We will be able to do more research on this topic now that we have this questionnaire's findings. An essential aspect of every survey or study is a questionnaire, defined as "a data gathering device that elicits from a responder the responses or reactions to printed questions presented in a present order" (Schvaneveltd, 1992). Questionnaires are frequently used as the main data collection tool for surveys. Investigators who care about the quality of their data should consider the questions they formulate and the factors they use in surveys. The plan's end goal is to collect reliable data that can be used to learn more about the problem and put various explanations to the test. You should understand the topic much better now that you have read this. So, before deciding on the topics for the survey, the researcher needs to perform an extensive reading in the relevant fields.

Despite the mostly good responses, cover letters can sometimes make or break the credibility of your research. From the introduction, we learn who conducted the study and why. It is suggested that questionnaires be written in the first person and addressed directly to the respondent. More people will feel comfortable sharing information if they understand why, you need it. Please include a note of thanks and reassurance that the respondent's privacy will be protected to thank them for their time and that their answers will be kept confidential.

If respondents are assured of anonymity, they are more likely to answer questionnaires on their initiative. Stop placing respondents on the spot when designing a questionnaire. The survey's opening questions should be broad in scope but still, get at the data points that matter. It could be used as a template for your questionnaire. The scope of these inquiries could be broad or narrow.

The first 10 questions, for instance, are great for answering worries about the school's contents. In a survey, what sorts of questions should be asked? When it comes to this, opinions are divided. Every possible variant has its own set of benefits and drawbacks. If you ask Numen (1997), "the key question is not whatever shape is best".

Instead, it is the circumstances in which particular forms excel that should be highlighted. The best questions to pose in a study depend on a number of factors, including the research topic, the study population, etc. Open-ended questions and closed-ended questions are the two most common types of questionnaires:

Open Ended Questions: Respondents are more inclined to share their thoughts when asked an open-ended question. Participants are invited to share their thoughts from their unique perspectives. Open-ended questions are those posed by one party to another in which there is no predefined correct response. When conducting surveys, it is better to use open-ended questions so that respondents can provide in-depth comments highlighting their unique knowledge, expertise, and experiences. There is no correct conclusion to draw from the consideration of this subject. Responses to open-ended inquiries are more detailed and uninhibited. Open-ended inquiries are stronger and more accurate in contrast to their closed-ended equivalents. For example: Where is my wallet?

Close-ended Questions: Using closed-ended questions is typically more cost-effective when many respondents need to be surveyed. The investigator and their support staff can both benefit from this clarity. The survey is structured as yes/no questions, which could distort the results. When conducting interviews, additional questions might be asked to fill in the blanks left by the survey. Even the investigator needs help to choose the optimal action when confronted with a research question.

Constraints on one's freedom of action make it more difficult to accomplish one's goals. Due to too much data, respondents may be unable to provide accurate answers. When there is just one right way to answer a question, only that answer needs to be offered. When surveying with a restricted number of possible responses, close-ended questions and their variants are indispensable. All future survey and questionnaire data analysis methods build off these core techniques. For example: How can we improve your experience?

Characteristics of a Good Questionnaire:

- Pertains to a key subject.
- Only looks for information that still needs to be made available.
- The lowest amount of time, just enough to gather the data needed.
- Attractive, properly organized, and effectively printed or duplicated.
- The directions are clear and precise.
- Questions are simple and in no way suggest the desired response.
- The order of the questions, with more specific answers after more broad ones, makes physiological sense.
- Easier to calculate and interpret.

2.7 Interview Schedule:

A subject matter expert's thoughts, feelings, and opinions are observed and documented during an interview. More detailed information must be provided in the responses. This provides a deeper understanding of social issues than statistical approaches like surveys and questionnaires. Moreover, interviews are useful for acquiring data when a study addresses more delicate subjects about which the participants might feel uncomfortable speaking openly in a group setting (Gill, Stewart, Treasure, & Chadwick, 2008).

One of the most important methods for gathering data is the interview, which involves discussions between the subject and the researcher. Interviews are commonly employed in survey designs, descriptive and exploratory research, and both. Interviews can be conducted in various ways, from completely unstructured ones, where the subject is only allowed to react to direct questions, to ones that are tightly planned, where the subject is free to discuss anything (Fox, N. 2009).

People's experiences, as well as their underlying attitudes, convictions, and perceptions of reality, are frequently learned through interviews. Based on their structure, interviews can be split into three categories: structured interviews, semi-structured interviews, and interview data (Fontana & Frey, 2005). In social research, primary data can be gathered using various techniques. The two methods that are used the most frequently are interviews and a set schedule. They are related since interview techniques often follow set schedules and need time. An interview is a conversation where someone answers questions about themselves for a newspaper article, television program, or study.

In order to record any thoughts or comments, the investigator must penetrate the interviewer's environment. An *interview schedule* is a list containing structured questions that have been prepared to guide interviewers, researchers, and investigators in collecting information or data about a specific topic or issue. The interviewer will use the schedule, who will fill in the questions with the answers received during the interview. The structure and content of the interview questions will determine the range and flexibility of a subject's response. While some interviews aim to obtain direct, concise responses, others invite in-depth, extended comments. Organized, semi-structured, or unstructured interviews are the three types of interviews. Three types are feasible: structured, semi-structured, and unstructured. The level of structure employed in an interview will differ wildly.

2.7.1 Structured Interviews:

The interviewer can use a prepared interview to ask each participant the same questions in the same manner. It typically employs a quantitative approach to data processing and involves a carefully planned series of questions, much like a questionnaire. Many structured interviews not only have prepared questions and a range of possible responses. Pre-coded answers are necessary to allow for comparisons among all respondents. Each response is often noted or recorded on a questionnaire. Reduce the number of open-ended questions so that computer-processable data may be used for coding and content analysis more frequently and quickly.

A method of interviewing candidates in which an identical set of questions is asked of each one of them. A grading scale based on a candidate's responses is widely used in structured interviews. Studies claim that a structured interview's three most crucial elements are "employment, uniformity of the procedure, and organized usage of the data to evaluate the candidate" (Macan, 2009). Structured interviews of research scientists are with a specified location and predefined format. It seeks to ask identical questions to all respondents in the same order. Since there are often few options available to respondents, the interview is also known as a directed interview. Closed-ended, pre-coded, or fixed-choice questions are used in structured interviews.

2.7.2 Semi-Structured Interviews:

A question-and-answer session is a two-person encounter that occurs on a particular day in which one person serves as the interviewer and the other as the interviewee. Hence, a discussion between two persons about a topic or issue that interests them is an interview (Kvale, 1996). Despite having prepared themes or questions, semi-structured interviews differ from structured interviews because they are built around open-ended rather than closed-ended inquiries. Semi-structured interviews can be useful when more information is needed to produce a list of probable pre-codes or when many attitudes need to be acquired.

Semi-structured interviews take longer to complete than structured interviews due to the necessity for coding frames and the in-depth analysis of each session's content. The interviewer can choose to record the answers verbatim or on tape. Semi-structured interviews are a popular type of study design in the social sciences. The Hyman et al. (1954) semi-structured interview study, which Magaldi (2020) refers to as an "exploratory interview," is a widely used method in social science research. They continue by adding that all interview types—semi-structured, structured, and unstructured—frequently rely on a guide and are often centered on a primary issue that displays several patterns. Semi-structured interviews can be quite helpful for gathering a lot of attitudinal data when performing an investigative study or when there is not enough information to generate a list of potential which was before. However, since more effort must be made before comparing subject responses—which may occasionally be contradictory—interview data from open questions is more challenging to comprehend than interview data from closed questions. Semi-structured interviews that have undergone meticulous planning and execution are the outcome. After careful planning and preparation, the program must be implemented, and the interviews must be evaluated.

2.7.3 Unstructured Interviews:

Unstructured interviews, often known as qualitative interviews, are given that moniker because they have so little framework. In response to the interviewee's opening statement, the interviewer formulates follow-up questions to concentrate the discussion on a few, potentially only one or two themes. Despite the few topics covered, each one is carefully examined. Since the respondents' opinions are neither computed nor kept, it is essential to employ an analysis approach created expressly for in-depth interviews. To present a "rich picture," the case will be carefully studied through in-depth interviews with all relevant parties.

Unstructured interviews are a way to comprehend people's complicated behavior without using any a priori classification that would limit the area of the investigation (Punch, 1998). Since unstructured interviews often occur as a component of ongoing participant observation investigations, Patton (2002) recognized them as a logical step forward from classroom observations. He stated that they completely rely on the conversation topics that naturally keep coming up. Unstructured interviews are frequently utilized in this capacity despite a vast body of evidence suggesting they could be more effective. We looked at objections to the validity of unstructured interviews and the characteristics of unstructured interviews that lead to subpar prediction accuracy.

2.8 Observation Method:

In the social sciences, observation is a vital and accessible research method. The decision must be appropriate for the research topic and the scientific setting because the phrase contains several methods, tactics, and approaches that may be challenging to compare in terms of execution and desired outcomes. Most people base their daily social relationships on carefully observing the behaviours and surroundings of others. We observe encounters, assess them, judge them, and provide commentary. Observation is the detailed portrayal of events, behaviours, and objects in the social context chosen for the investigation (Marshall &Rossman, 1989).

The researcher can use the observational technique to summarise the situation by employing the five senses to explain the conditions (Erlandson, Harris, Skipper, & Allen, 1993). The researcher monitors participant behavior and study results. In order to thoroughly understand the incident under inquiry most objectively and accurately possible, the researcher employs the observational approach (De Walt & De Walt, 2002). Given the scientific approach's status, the observation should be conducted with attention, calm, and based on science, even though curiosity and interest may still be some of its most important components. The researcher can observe how students interact, keep an eye out for emotional and nonverbal cues, examine their conversational patterns, and monitor how much time they spend on various tasks using the observational technique (Schmuck, 1997). One of its characteristics is the impact of research questions on observations. The observations are, therefore, purposeful and intentional. The data are analysed using both quantitative and qualitative data analysis techniques. Observations of behaviour are routinely made and frequently recorded using an observation checklist, as opposed to everyday, casual, selective, and frequently incorrect observations.

2.9 Case Study Method:

Case studies give you a chance to research subjects in-depth and descriptively. Many concepts, including people, businesses, and industry sectors, are represented when there are few locations. They assist the researcher in creating a realistic setting that will permit an in-depth investigation by participating in participant interviews and seeing what transpires there. It is an empirical study that can examine various real-world situations where it is challenging to discern between them, and a thorough investigation is also required. Avoid making last-minute, hurried visits to finish this challenging assignment. For instance, psychologists frequently use the important information learned from these types of treatments to learn about the lives of their patients in order to choose the best course of action for treating their patients' problems (Frechtling, 2002; Taherdoost, 2021). Using the case study data-gathering method, individual entities or instances are described in depth, organized, evaluated, and presented narratively. In essence, the case study report is a narrative. A single person, family, society, workplace, class, school, organization, program, or any other institution could be the subject of the case. The first six months of a new supervisor's employment, the employees' reactions to their company being acquired by another company, or the community's response to a natural disaster are a few examples of social or natural events that could be the focus of a case study. It is used to collect data in various fields, including sociology, anthropology, psychology, education, and medicine, and it has a lot to offer in the way of important advancements. A full understanding of factors, events, and challenges is made possible by case studies through in-depth viewpoints and observation. Swiss developmental psychologist Jean Piaget conducted two studies before formulating his theories, one of which involved his children (Liebert, Poulos, & Strauss, 1974). Case studies can be used to examine the majority of public, corporate, social, and educational efforts. Government case studies, for instance, can be used to demonstrate how closely programe operations align with legislative objectives. Decision-makers will benefit from in-depth case studies explaining challenging initiatives' procedures and outcomes (Patton, 2002). Using case studies to learn more and fully comprehend the researched topics is a cutting-edge and exciting strategy used by specialists in quality management. They are highly adaptable and can be used for various technology-related jobs, from perfecting training curricula to conducting in-depth research. Last but not least, narrative or story-like case study articles have a large readership and are quite effective in influencing readers' perceptions.

2.10 Conclusion:

This paper examines in depth the various methods of data gathering, the typical problems that arise, and the ethical protections that must be in place before proceeding. Data collection techniques were connected directly, including questionnaires, interviews, observations, surveys, and case studies. Recent developments in research tools are discussed here. The definitions of primary and secondary data and qualitative and quantitative data have been presented, and several approaches to data collecting have been detailed. Some techniques that have been examined include in-depth interviews, focus groups, questionnaires and schedules, case studies, field research, oral traditions, and forecasts. The more you know about the various data collection methods, the more likely you are to pick one appropriate for your programme's budget, timeline, and study goals. Integrating data

from many sources allows for a complete picture and better strategic decisions. As an outcome, data collecting is becoming an integral part of modern research across many fields. While it is beneficial for investigators to be aware of data collection processes, even seasoned pros may need help to catch up on these techniques. The potential issues with data collecting and their solutions were discussed at that discussion. Ethical considerations, potential problems, and paper requirements were all looked into and discussed with the appropriate authorities for data collection in social science research.

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3. Research Methodology: Data Collection Methods

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Abstract:

Data will be collected in order to analyse and make decisions about a specific business, sales, etc. This data will aid in drawing conclusions about the performance of a specific business. Thus, data collection is critical for analysing a business unit's performance, solving a problem, and making assumptions about specific things as needed. Before we get into the data collection methods, let's define data collection and how it can help in various fields.

Keywords:

Research Methodology, Data Collection, Primary Data Collection, Secondary Data Collection, Qualitative data Collection, Quantitative data collection.

3.1 Introduction:

As the title suggests, this chapter contains the dissertation's research methodology. In more detail, the author outlines the research strategy, research method, research approach, data collection methods, sample selection, research process, data analysis type, ethical considerations, and project research limitations in this section.

Data is any type of information that has been formatted in a specific way. As a result, data collection is defined as the process of gathering, measuring, and analysing accurate data from a variety of relevant sources in order to find solutions to research problems, answer questions, evaluate outcomes, and forecast trends and probabilities.

To make informed business decisions, ensure quality assurance, and maintain research integrity, accurate data collection is required. During data collection, researchers must identify data types, data sources, and data collection methods. We will soon discover that there are numerous data collection methods. Data collection is heavily used in the research, commercial, and government sectors.

Before an analyst begins collecting data, they must answer three questions first:

- What’s the goal or purpose of this research?
- What kinds of data are they planning on gathering?
- What methods and procedures will be used to collect, store, and process the information?

Additionally, we can break up data into qualitative and quantitative types. Qualitative data covers descriptions such as color, size, quality, and appearance. Quantitative data, unsurprisingly, deals with numbers, such as statistics, poll numbers, percentages, etc. In statistics, data collection refers to the process of gathering information from all relevant sources in order to solve a research problem. It aids in assessing the problem's outcome. The data collection methods enable a person to reach a conclusion on the relevant question. The majority of organisations rely on data collection methods to make predictions about future probabilities and trends. Once the data has been collected, the data organisation process must be completed.

"Data" is the primary source of the data collection methods. Data is divided into two categories: primary data and secondary data.

The primary significance of data collection in any research or business process is that it aids in determining many important aspects of the company, particularly its performance. As a result, the data collection process is critical in all streams. The data collection method is divided into two categories based on the type of data, namely,

- Primary Data Collection methods
- Secondary Data Collection methods

3.2 Data Collection Methods:

Data collection is the process of gathering information from all relevant sources in order to solve the research problem, test the hypothesis (if using a deductive approach), and evaluate the results. Data collection methods are classified into two types: secondary data collection methods and primary data collection methods.

3.2.1 Primary Data Collection Methods:

Primary data is data that has never been seen before. Primary data are your research's original findings. Primary data collection and analysis typically takes more time and effort than secondary data research. There are two types of primary data collection methods: quantitative and qualitative. Methods for collecting quantitative data are based on mathematical calculations in various formats. Questionnaires with closed-ended questions, correlation and regression methods, mean, mode, and median, and others are examples of quantitative data collection and analysis methods.

When compared to qualitative methods, quantitative methods are less expensive and can be applied in less time. Furthermore, because quantitative methods are highly standardised, it is simple to compare results. On the contrary, qualitative research methods do not involve numbers or mathematical calculations. Qualitative research is closely associated with words, sounds, feelings, emotions, colours, and other non-quantifiable elements.

Interviews, questionnaires with open-ended questions, focus groups, observation, game or role-playing, case studies, and other qualitative data collection methods are used to ensure greater depth of understanding.

3.2.2 Secondary Data Collection Methods:

Secondary data is information that has previously been published in books, newspapers, magazines, journals, online portals, and so on. Regardless of the nature of your research topic in business studies, there is an abundance of data available in these sources. As a result, using an appropriate set of criteria to select secondary data for use in the study is critical for increasing the levels of research validity and reliability. These criteria include, but are not limited to, the date of publication, the author's credentials, the reliability of the source, the quality of discussions, the depth of analyses, the extent to which the text contributes to the development of the research area, and so on. The chapter on Literature Review goes into greater detail about secondary data collection. Secondary data collection methods have a number of advantages, including the ability to save time, effort, and money.

They do, however, have a significant disadvantage. Secondary research, in particular, does not contribute to the expansion of the literature by producing fresh (new) data. Data can be either qualitative (meaning contextual) or quantitative (meaning numerical). Many data collection methods are applicable to both types, but some are more suited to one than the other. The second step in the data life cycle is data collection. Data must be collected after it is generated in order for it to be useful to your team. It can then be processed, stored, managed, analysed, and visualised to help your organisation make decisions.

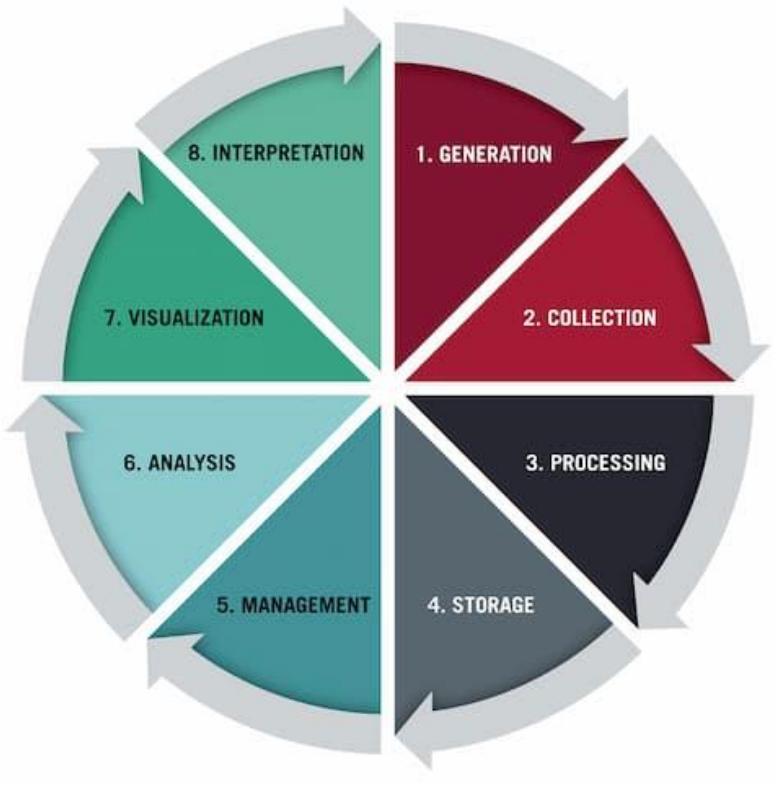

Figure 3.1: Secondary Data Collection Methods

Before collecting data, there are several factors you need to define:

- The question you aim to answer
- The data subject(s) you need to collect data from
- The collection timeframe
- The data collection method(s) best suited to your needs

The data collection method you select should be based on the question you want to answer, the type of data you need, your timeframe, and your company's budget.

3.3 The Importance of Data Collection:

Data collection is an important part of business success because it allows you to ensure the data's accuracy, completeness, and relevance to your organisation and the issue at hand. The data gathered enables organisations to analyse previous strategies and stay informed about what needs to change. Data insights can make you hyperaware of your organization's efforts and provide actionable steps to improve a variety of strategies, from changing marketing strategies to assessing customer complaints. Decisions based on inaccurate data can have far-reaching negative consequences, so it's critical to have confidence in your own data collection procedures and abilities. Business professionals can feel confident in their business decisions if accurate data is collected. Examine the options in the following section to determine which data collection method is best for your business. When there is a problem and no clear solutions exist, as in the case above, qualitative research is frequently used to elicit the following questions: Why are residents upset about rounds? How could we improve the rounds? In this context, gathering "good" information or words (qualitative data) is meant to yield information that will assist you in answering your research questions, capturing the phenomenon of interest, and accounting for context and the rich texture of the human experience. You could also aim to challenge previous assumptions and invite further investigation. *The coherence or alignment of all aspects of the research project is critical. We focus on data collection in this Rip Out, but in qualitative research, the entire project must be considered.*[1,2] *Careful design of the data collection phase necessitates the following: determining who will do what, where, when, and how at various stages of the research process; acknowledging the role of the researcher as a data collection instrument; and carefully considering the context studied and the participants and informants involved in the research.*

3.4 Types of Data Collection Methods:

Data collection methods are important, because how the information collected is used and what explanations it can generate are determined by the methodology and analytical approach applied by the researcher.[1,2] Five key data collection methods are presented here, with their strengths and limitations described in the online supplemental material.

a. Open-ended, free-text questions are commonly used in surveys to collect qualitative data. Surveys are ideal for documenting perceptions, attitudes, beliefs, or knowledge among a specific, predetermined group of people. "Good" open-ended questions should be specific enough to elicit consistent responses from respondents while also inviting a

range of responses. Examples for this scenario include: What are IPRs used for? According to residents, what is the educational value of IPRs? A variety of techniques can be used to analyse qualitative survey data.

b. *Individuals are interviewed one-on-one to gather information using a series of predetermined questions or a set of interest areas. Interviews are frequently taped and transcribed. They can be structured or unstructured; they can be inspired by a loose set of questions that invite interviewees to express themselves more freely, or they can follow a tightly written script that mimics a survey. To collect richer data, interviewers must actively listen and question, probe, and prompt further.* When used to document participants' accounts, perceptions, or stories about attitudes towards and responses to specific situations or phenomena, interviews are ideal. Data from interviews are frequently used to generate *themes, theories, and models*. Many research questions that can be answered with surveys can also be answered with interviews, but interviews produce richer, more detailed data than surveys. However, conducting and analysing interviews takes more time and resources. Importantly, because interviewers are the data collection *instruments*, they should be trained to collect comparable data. The number of interviews needed is determined by the research question and the overall methodology used. These are some examples of questions: How do residents react to IPRs? What can residents' experiences with IPRs teach us about interprofessional care?

c. *Focus groups are used to gather information in a group setting, either through predetermined interview questions that the moderator asks of each participant in turn, or through a script to stimulate group discussions. Ideally, they are used when the sum of a group of people's experiences may offer more insight into social phenomena than a single individual's experiences. Focus groups also enable researchers to record participants' reactions to the comments and perspectives shared by other participants, allowing them to identify similarities and differences in viewpoints. The number of focus groups required will vary depending on the questions asked and the number of stakeholders involved, which may include residents, nurses, social workers, chemists, and patients.* The optimal number of participants per focus group is 8 to 10 people in order to generate rich discussion while allowing all members to speak.3 questions to consider include: How would residents, nurses, and chemists redesign or improve IPRs to maximise engagement, participation, and time use? How do recommendations differ across professional groups?

d. *Observations are used to collect information in the field by utilising the senses of vision, hearing, touch, and smell. Rather than focusing on their own perceptions or recollections, observations allow us to investigate and document what people do—their everyday behavior—and try to understand why they do it. Observations are ideal for documenting, exploring, and understanding activities, actions, relationships, culture, or routine ways of doing things as they occur. The number of observations required, as with the previous methods, will be determined by the research question and overall research approach used.* Some research questions are: How do residents spend their time during IPRs? What is their relationship to other health care providers? During IPRs, what language and body language are used to describe patients and their families?

e. *Textual or content analysis is ideal for investigating changes in official, institutional, or organisational views on a specific topic or area, documenting the context of certain practises, or investigating the experiences and perspectives of a group of individuals who have engaged in written reflection, for example. Textual analysis can be used as the primary method in a research project, or it can be used to contextualise findings*

from another method. The selection and quantity of documents must be guided by the research question, but may include newspaper or research articles, governmental reports, organisational policies and protocols, letters, records, films, photographs, art, meeting notes, or checklists. The research question will guide the development of a coding grid or scheme for analysis, which will be applied iteratively to selected documents. For example, how do our local policies and protocols for IPRs reflect or contrast with broader discourses of interprofessional collaboration? In the literature, what are the perceived successful characteristics of IPRs? What characteristics distinguish residents' reflections on their interprofessional experiences during IPRs?

However, the effectiveness of qualitative research is heavily dependent on the skills and abilities of the researchers, and the results may not be perceived as reliable because they are based on the researcher's personal judgements and interpretations. It is risky for the results of qualitative research to be perceived as reflecting the opinions of a larger population because it is more appropriate for small samples (Bell, 2005).

Table 3.1: Features of Qualitative & Quantitative Research

Qualitative research	Quantitative Research
The aim is a complete, detailed description.	The aim is to classify features, count them, and construct statistical models in an attempt to explain what is observed.
Researcher may only know roughly in advance what he/she is looking for.	Researcher knows clearly in advance what he/she is looking for.
Recommended during earlier phases of research projects.	Recommended during latter phases of research projects.
The design emerges as the study unfolds.	All aspects of the study are carefully designed before data is collected.
Researcher is the data gathering instrument.	Researcher uses tools, such as questionnaires or equipment to collect numerical data.
Data is in the form of words, pictures or objects.	Data is in the form of numbers and statistics.
Subjective – individuals interpretation of events is important ,e.g., uses participant observation, in-depth interviews etc.	Objective: seeks precise measurement & analysis of target concepts, e.g., uses surveys, questionnaires etc.
Qualitative data is more 'rich', time consuming, and less able to be generalized.	Quantitative data is more efficient, able to test hypotheses, but may miss contextual detail.
Researcher tends to become subjectively immersed in the subject matter.	Researcher tends to remain objectively separated from the subject matter.

Source: Miles & Huberman (1994, p. 40). *Qualitative Data Analysis, available at* http://wilderdom.com/research/QualitativeVersusQuantitativeResearch.html

In-depth interviews were conducted for the purposes of this research. In depth interviews are personal, unstructured interviews designed to elicit participants' emotions, feelings, and opinions about a specific research topic. Personal interviews have the advantage of involving personal and direct contact between interviewers and interviewees, as well as eliminating non-response rates; however, interviewers must have developed the necessary skills to successfully conduct an interview (Fisher, 2005; Wilson, 2003).

Furthermore, unstructured interviews allow for greater flexibility in the flow of the interview, allowing for the generation of conclusions about a research subject that were not originally intended to be derived. However, there is a risk that the interview will deviate from the research aims and objectives (Gill & Johnson, 2002). In terms of data collection tools, the research was conducted using a semi-structured questionnaire that served as an interview guide for the researcher. Some specific questions were prepared in order for the researcher to guide the interview towards the achievement of research objectives, but additional questions were encountered during the interviews.

3.5 Research Limitations:

As it is for every study, this dissertation had the following limitations:

- The size of the sample was relatively small - 6 participants. A bigger sample would probably enhance the reliability of the research.
- Qualitative research is not allowing the measurement of the examined problems.
- The analysis of the role of the DMOs in the promotion of Athens as a tourist destination. may be influenced by factors which were not mentioned in this project.
- In some cases participants may refused to speak against their organizations.

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4. Research Design Perspective and Methodological Approaches

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4.1 Introduction:

The research technique is the path that researchers must take in order to do their research. It demonstrates how these researchers construct their problem and objectives and deliver their findings based on the data collected during the study period. This research design and methodology paper also demonstrates how the research outcome will be reached in accordance with the study's objectives. As a result, this paper outlines the research methods used during the study process. It encompasses the study's research technique, from research plan to result distribution. For emphasis, in this paper, the author outlines the research strategy, research design, research methodology, the study area, data sources such as primary data sources and secondary data, population consideration and sample size determination such as questionnaires sample size determination and workplace site exposure measurement sample determination, data collection methods like primary data collection methods including workplace site observation data collection and data collection through desk review, data collection through questionnaires, data obtained from experts opinion, workplace site exposure measurement, data collection tools pretest, secondary data collection methods, methods of data analysis used such as quantitative data analysis and qualitative data analysis, data analysis software, the reliability and validity analysis of the quantitative data, reliability of data, reliability analysis, validity, data quality management, inclusion criteria, ethical consideration and dissemination of result and its utilization methodologies. In order to meet the study's aims, both qualitative and quantitative research methods are recommended. Because data were acquired from all parts of the data source during the study period, the study employed these mixed techniques. As a result, the goal of this methodology is to satisfy the researcher's research objective and target.

The research design is meant to give a suitable structure for a study.

The decision to be made about research approach is a very important decision in the research design process since it affects how relevant information for a study will be gathered; nevertheless, the research design process contains several interrelated decisions. This study used a combination of methodologies. The first stage of the research included a series of well-structured questionnaires (for management, employee representatives, and industry technicians) and semi-structured interviews with important stakeholders (government bodies, ministries, and industries) at participating organisations. The other design employed was an employee interview to determine how they feel about workplace safety and health, as well as field observation at the selected industrial sites. [1]

As a result, this study adopts a descriptive research approach to reach an agreement on the effects of occupational safety and health management systems on employee health, safety, and property damage in certain industrial industries. As a result of this research approach, the researchers were able to collect data from a diverse spectrum of respondents on the impact of safety and health on Ethiopian manufacturing industries. And this aided in analysing the responses gathered on how it affects workplace safety and health in the manufacturing industries. Figure 1 depicts the overall design and flow procedure of the research. [2]

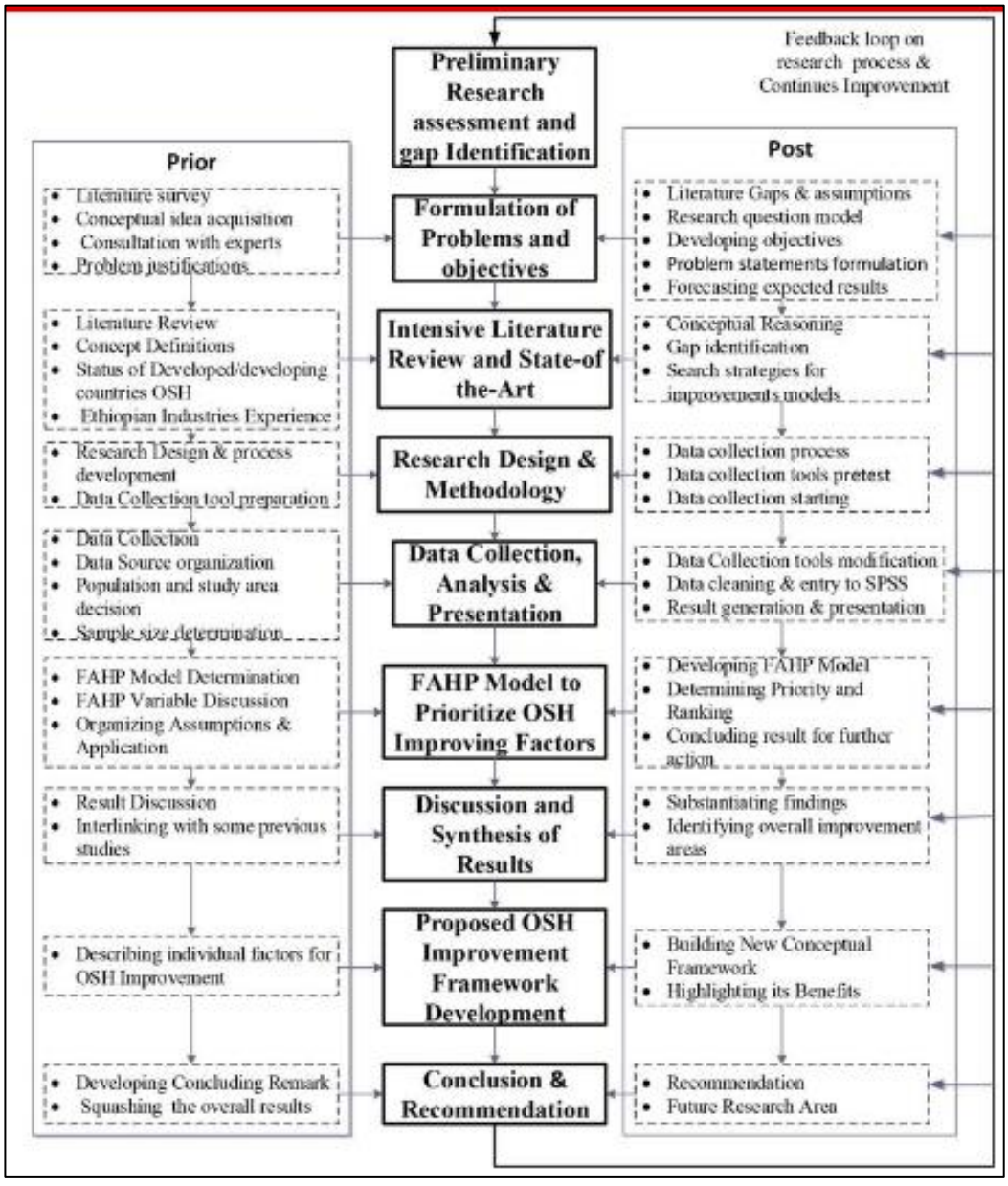

Figure 4.1: Research methods and processes

When conducting research, a particular pattern or plan of action is followed throughout the method, i.e., from problem identification to report preparation and presentation. The term "research design" refers to this specific pattern or plan of activity. It is a road map that directs the researcher's data collection and analysis. In other words, research design serves as a guideline that must be followed throughout the study process. A building, for example, cannot be built unless its structure is known. A builder cannot order raw materials or set deadlines until he understands the construction of the project, which could be an office building, a school, or a home.

4.2 Features of A Good Research Design:

It is considered that a good research design should reduce the biasness while should maximize the reliability of data being collected and analysed. A good research design should provide the opportunity as per the various aspects of research problem. It should minimize the experimental error and should provide maximum information. Hence, it can be concluded the selection of research design relies upon the research problem and the nature of research. Following are the major features of a good research design:

A. **Objectivity:** The ability of research tools to produce conclusions free of observer bias is referred to as objectivity. A good research design should be able to pick only those instruments that produce objective results. It is commonly assumed that keeping objectivity is simple, however it becomes difficult throughout research and data processing.
B. **Reliability:** The dependability of responses is another important aspect of a good study design. The research tools should be able to produce equivalent responses to a question posed by a responder. If the response changes, the instrument is deemed untrustworthy. In other words, the consistency of replies is used to assess the trustworthiness of a research design.
C. **Validity:** The ability of a competent study design to answer the questions in the manner planned is an important attribute. It should concentrate on the research's goal and develop particular arrangements or plans to achieve that goal. For example, if a study is undertaken to assess the effects of commercials on viewers, it should be able to answer this question rather than the sale of a certain product.
D. **Generalizability:** A research strategy is said to be generalisable if the findings are applicable to a larger population from which the sample was drawn. A research design can be made generalizable by properly defining the population, carefully selecting the sample, analysing the statistical data, and methodologically preparing it. As a result, the more generalizable the conclusions, the more efficient the research strategy.
E. **Sufficient Information:** Any research is carried out in order to get insight into the hidden facts, data, and information. The study design should be able to supply the researcher with enough information to allow him to examine the research problem from a broad perspective. The research design should be capable of identifying the research problem and objective.
F. **Other Features:** Along with the aforementioned, there are also more characteristics that contribute to a strong research design. These include adaptation, flexibility, efficiency, and so forth. A good study design should be able to minimise errors while increasing precision. [3]

4.3 Research Design Types:

A researcher must clearly understand the various types to select which model to implement for a study. Like research itself, the design of your analysis can be broadly classified into quantitative and qualitative.

A. Qualitative Research:

It uses mathematical computations to determine links between acquired data and observations. Statistical approaches can be used to prove or invalidate beliefs about natural phenomena. Researchers use qualitative observation research methodologies to determine "why" a specific theory exists and "what" respondents think about it.

B. Quantitative Research:

It is used in situations where statistical conclusions are required to collect actionable insights. Numbers provide a more objective viewpoint for making key business decisions. Quantitative research methodologies are required for any organization's progress. When making future business decisions, insights obtained from complex numerical data and analysis show to be quite beneficial.

4.4 Qualitative Research Vs Quantitative Research:

Table 4.1: The following chart illustrates the key differences between qualitative and quantitative research:

Qualitative Research	Quantitative Research
Focus on explaining and understanding experiences and perspectives.	Focus on quantifying and measuring phenomena.
Use of non-numerical data, such as words, images, and observations.	Use of numerical data, such as statistics and surveys.
Usually uses small sample sizes.	Usually uses larger sample sizes.
Typically emphasizes in-depth exploration and interpretation.	Typically emphasizes precision and objectivity.
Data analysis involves interpretation and narrative analysis.	Data analysis involves statistical analysis and hypothesis testing.
Results are presented descriptively.	Results are presented numerically and statistically.

To summarize, qualitative research is more exploratory and focuses on understanding individuals' subjective experiences, whereas quantitative research focuses on objective data and statistical analysis. [4]

4.5 Research Approach:

study approaches are study plans and procedures that cover everything from general assumptions to detailed methods of data collecting, analysis, and interpretation. This plan necessitates multiple decisions, which do not have to be made in the order in which they make sense to me and are presented below. The ultimate decision entails deciding how to study a subject. This decision should be informed by the researcher's philosophical assumptions, procedures of inquiry (called research designs), and specific research methodologies of data collecting, analysis, and interpretation. The nature of the research topic or issue being addressed, the researchers' personal experiences, and the study's audiences all influence the choice of a research approach. Thus, in this book, research approaches, research designs, and research methods are three essential terms that define a perspective on research that offers information in a sequential manner from large research structures to narrow methodological procedures.

4.5.1 The Three Approaches to Research:

Three research approaches are advanced:

A. qualitative,
B. quantitative, and
C. mixed methods.

Without a doubt, the three techniques are not as distinct as they appear. Qualitative and quantitative techniques should not be regarded as inflexible categories, polar opposites, or dichotomies.

A study is more likely to be qualitative than quantitative, or vice versa. Because it contains components of both qualitative and quantitative methodologies, mixed methods research falls somewhere in the middle of this spectrum.

The contrast between qualitative and quantitative research is sometimes defined by the use of words (qualitative) rather than figures (quantitative), or the use of closed-ended questions (quantitative hypotheses) rather than open-ended questions (qualitative interview questions).

Without a doubt, the three techniques are not as distinct as they appear. Qualitative and quantitative techniques should not be regarded as inflexible categories, polar opposites, or dichotomies.

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The contrast between qualitative and quantitative research is sometimes defined by the use of words (qualitative) rather than figures (quantitative), or the use of closed-ended questions (quantitative hypotheses) rather than open-ended questions (qualitative interview questions).

Interest in qualitative research grew in the later part of the twentieth century, as did the development of mixed methodologies research. With this context in mind, the following definitions of three major concepts used in this book might be useful:

- Qualitative research is a method for investigating and comprehending the meaning that individuals or groups attach to a social or human situation. The research process includes developing questions and procedures, data collection in the participant's environment, data analysis inductively building from particulars to general themes, and the researcher providing interpretations of the data's meaning. The structure of the final written report is adaptable. Those who engage in this type of inquiry advocate for a research approach that values an inductive manner, an emphasis on individual meaning, and the necessity of conveying a situation's complexity.
- Quantitative research is a method of testing objective hypotheses by examining the relationship between variables. These factors can then be measured, often with devices, and the resulting numbered data can be analysed statistically. The final written report follows a predetermined framework that includes an introduction, literature and theory, methods, results, and commentary. Those who conduct this type of research, like qualitative researchers, have beliefs about testing hypotheses deductively, incorporating bias safeguards, controlling for alternative explanations, and being able to generalise and replicate the findings.
- Using a combination of approaches Research is a method of investigation that involves gathering both quantitative and qualitative data, combining the two types of data, and employing diverse designs that may include philosophical assumptions and theoretical frameworks. The primary premise of this type of investigation is that combining qualitative and quantitative methodologies yields a more thorough grasp of a study subject than either strategy alone. [5]

4.6 Theoretical and Epistemological Perspective:

Although management research is primarily concerned with observing persons and their conduct, the epistemological framework is influenced by science. Positivism asserts the independent existence of observable facts in the social environment, and researchers who hold this viewpoint will seek a fairly precise measurement technique. Interpretivism, on the other hand, considers that humans interpret events, therefore researchers who use this method will take a more subjective approach.

4.7 Quantitative Approaches to Research Design:

The objective nature of quantitative research distinguishes it. The premise is that facts exist completely independently of one another, and that the researcher is a completely objective observer of occurrences with no power to affect them. As such, it is likely to begin from a positivist or empiricist viewpoint.

The research design is based on a single iteration of data collection: the categories are isolated prior to the investigation, and the design is planned out and not generally changed during the study (as it may be in qualitative research).

A. Qualitative Approaches to Research Design:

Qualitative research acts from a different epistemological standpoint than quantitative research, which is primarily objective. It is a viewpoint that recognises the fundamental difference between the social and scientific worlds, realising that humans do not necessarily follow natural laws, but rather consist of a wide range of sentiments, observations, and attitudes that are ultimately subjective in origin.

As a result, the theoretical framework is likely to be interpretivist or realist. Indeed, in qualitative studies, the researcher and the research instrument are frequently merged, with the former serving as the interviewer or observer, whereas in quantitative studies, the research instrument may be a survey and the participants may never see the researcher.

"We hold that the social construction of reality is personal, experienced by individuals and between individuals - in fact, the interactions that connect us are the building blocks of reality, and there is a great deal of meaning in the space between individuals."

Unlike quantitative research, which relies on statistics, qualitative research data is based on observation and words, and analysis is based on interpretation and pattern detection rather than statistical analysis.

The following are common qualitative research criteria:

- Intense and sustained field interaction aimed at obtaining a holistic or systemic view.
- Perception is gained from within depending on actors' comprehension.
- There is little usage of standardised instrumentation.
- The majority of analysis is done with words.
- The data can be interpreted in a variety of ways. [6]

4.8 Methodology:

You may only have 'one shot' at collecting data at times; in other words, you plan your sample, your technique of data collection, and then examine the results. This is more likely if your research methodology is more quantitative.

Other sorts of research approaches, on the other hand, require stages in data collection. In grounded theory research, for example, data is collected and processed, and the process is repeated when additional information about the subject is uncovered.

Similarly, there is a cyclical process of data collecting, reflection, and additional data collection and analysis in action research. [7]

4.9 Conclusion:

The general procedure of the flow of the research for the provided study was specified by the research technique and design. The data sources and methods of data collection were used. The whole research strategies and framework are provided in this research process, which includes all parameters from problem conceptualization through problem validation. It has provided some context for how research methodology is developed and framed for researchers. This indicates that it can be used by researchers as one of the samples and models for the study data collecting and procedure from the beginning of the problem description to the research finding. This research cycle, in particular, introduces new researchers to the research environment and methods.

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5. A Study on Qualitative, Quantitative Methods

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5.1 Introduction:

5.1.1 The Definition of Quantitative Research Method:

Quantitative research methods are intended to gather numerical data that may be utilized to quantify variables. Quantitative data is structured and statistical, with objective and clear outcomes. It employs a grounded theory approach that is based on systematic data collection and analysis. Quantitative research is an approach that can help you draw broad conclusions from your research and forecast outcomes.

Surveys are an excellent instrument for quantitative research because they are inexpensive, adaptable, and allow researchers to collect data from a wide sample size.

5.1.2 The Definition of Qualitative Research Method:

Qualitative research is an approach for gathering non-numerical data in order to generate insights. It is unstructured or semi-structured and non-statistical.

Qualitative data is information that aims to describe rather than measure a topic. This sort of research assesses ideas, points of view, and characteristics rather than actual figures given in a graph or chart.

Qualitative research methods, such as interviews or focus groups, typically require first-hand observation. Market research is typically conducted in natural settings, which means that researchers see things as they are without manipulation—no experiments or control groups are used.

Qualitative researchers seek to delve deeply into a topic in order to learn about people's motives, thoughts, and opinions. While qualitative approaches add richness to your research topics, they might make the results more difficult to analyses. [1]

5.2 Quantitative Research and Data:

The goal of quantitative research is to quantify a phenomenon. It is more systematic, objective, and aids in the reduction of researcher biases. It gets at the heart of a person's behavior by answering questions such as how many, how frequently, and to what extent?

Quantitative data is numerical in nature. Consider length, size, amount, price, and duration as quantifiable quantities. The information can be used to confirm or disprove a theory or to predict relationships. Quantitative data is analyzed statistically and presented in tables, graphs, percentages, and other statistical formats.

5.3 Qualitative Research and Data:

Qualitative research is a method of collecting descriptive data that is used to identify details that help explain behavior. It conveys the breadth of people's ideas and experiences. In summary, qualitative research helps us understand why, how, or in what way a specific event or behavior occurs. Anything that describes or explains—from observations of an interaction to quotes from people about their experiences, attitudes, beliefs, and thoughts—is considered qualitative data. It can also take the form of words, photographs, video, audio, transcripts, and so on. [2]

5.4 Qualitative vs. Quantitative Data Collection:

Because qualitative and quantitative research collect different types of information, their data collection methods differ significantly. Quantitative research is based on numerical or measurable data. Qualitative studies, on the other hand, rely on personal stories or documentation that detail how people think or respond within society.

5.5 Qualitative Research:

Non-numerical data collection and interpretation are part of qualitative research approaches. Some qualitative data sources are as follows:

- Interviews
- Focus groups
- Documents
- Personal accounts or papers
- Cultural records
- Observation

The researcher may conduct interviews or focus groups during a qualitative study to obtain data that is not available in current documentation or records. Interviews and focus groups can be unstructured or semi-structured to allow for various or unexpected responses. In an unstructured or semi-structured format, the researcher can ask open-ended questions and then follow the responses. The responses provide a thorough view of each individual's experiences, which are then compared to those of other study participants.

5.6 Quantitative Research:

Quantitative investigations, on the other hand, necessitate various data collection methodologies. Compiling numerical data to investigate causal links among variables is one of these strategies. Data gathering methods for this type of study include:

- Experiments
- Questionnaires
- Surveys
- Database reports

The procedures described above produce data that is suitable for numerical analysis. In this situation, questionnaires use a multiple-choice style to provide countable answers, such as yes or no, which may then be converted into quantifiable data.

5.7 Qualitative vs. Quantitative Outcomes:

The nature of the intended outcome is one of the elements that distinguishes qualitative research from quantitative studies. Qualitative researchers aim to learn from the specifics of persons they are investigating, often known as their informants. Conclusions are generated from a study by accumulating, comparing, and assessing informants' feedback and contribution. The "why" behind a phenomenon, correlation, or behaviour is frequently the subject of qualitative study. In contrast, quantitative data is mathematically analysed to create a statistical picture of a trend or connection. These statistical findings could offer light on cause-and-effect linkages. They may either confirm or refute the original hypothesis of the investigation. Whether positive or negative, the outcome can spark awareness and action. Quantitative research is often focused on answering the questions of “what” or “how” in regards to a phenomenon, correlation or behavior.

5.8 Limitations:

Each type of research has advantages and disadvantages. Researchers must evaluate their hypotheses as well as the types of data gathering and analysis that are likely to yield the most relevant results.

5.8.1 Qualitative Studies: Pros and Cons:

The qualitative method encourages innovation, multiple interpretations, and adaptability. As more information is acquired, the scope of the research endeavour may vary.

However, qualitative research' conclusions and interpretation are more subjective than quantitative studies'. Personal bias can be difficult to manage, thus the researcher's skill and perspective may greatly influence the interpretation of results and the conclusions reached. Furthermore, due of the expenses and difficulties connected with qualitative data gathering methods, qualitative studies frequently test a lower sample size.

5.8.2 Quantitative Studies: Pros and Cons:

Quantitative studies generate objective data that is free of the subjectivity of qualitative investigations. Statistics and figures can plainly communicate results. With the use of data processing tools, quantitative studies may be produced swiftly.

However, while objectivity is a virtue of the quantitative technique, it might be considered as a more limited style of research. Participants are unable to customise their comments or provide context. Furthermore, statistical analysis necessitates a big data sample, which necessitates a high number of individuals. [3]

5.9 Data Collection Methods:

Various methods can be used to acquire quantitative and qualitative data. It is critical to employ a data collection approach that will aid in answering your research question(s).

Many data collection methods might be qualitative or quantitative in nature. In surveys, observational studies, or case studies, for example, your data can be represented as numbers (e.g., by rating scales or counting frequencies) or as words (e.g., by open-ended questions or descriptions of what you observe).

Some procedures, however, are more typically utilized in one category or the other.

5.9.1 Quantitative Data Collection Methods

- Surveys: A list of closed or multiple-choice questions delivered to a sample (online, in person, or via phone).
- Experiments: A situation in which several factors are controlled and modified in order to identify cause-and-effect linkages.
- Observations: Subjects are observed in their natural setting, where variables cannot be controlled.

5.9.2 Qualitative Data Collection Methods:

- Interviews: Asking open-ended questions to respondents verbally.
- Focus groups: A discussion among a group of people on a topic in order to gain opinions for future research.
- Ethnography: Long-term participation in a community or organisation to closely examine culture and behaviour.
- Literature review: An examination of previously published works by other authors.

5.10 Analyze Qualitative and Quantitative Data:

Qualitative or quantitative data cannot prove or demonstrate anything without being analyzed in respect to the study objectives. Each sort of data requires a different approach of analysis.

5.10.1 Analyzing Quantitative Data:

Numbers are the foundation of quantitative data. To uncover commonalities or trends in the data, simple algebra or more complicated statistical analysis is performed. Graphs and tables are frequently used to present the findings.

Calculations can be performed using applications like as Excel, SPSS, or R.

- Average scores (means)
- The number of times a particular answer was given
- The correlation or causation between two or more variables
- The reliability and validity of the results

5.10.2 Analyzing Qualitative Data:

The analysis of qualitative data is more challenging than that of quantitative data. Instead of numbers, it uses text, graphics, or videos.

The following are some common ways to analyzing qualitative data:

- Qualitative content analysis: Tracking the occurrence, position and meaning of words or phrases
- Thematic analysis: Closely examining the data to identify the main themes and patterns
- Discourse analysis: Studying how communication works in social contexts [4]

5.11 Definition of Qualitative and Quantitative Research:

Qualitative Research:

Based on observation and interpretation of individuals, qualitative research is used to get a knowledge of human conduct, intentions, attitudes, experience, and so on. It is an unstructured and exploratory exercise. A technique for dealing with extremely complicated events. This type of study is typically conducted to gain a thorough understanding of the subject. It is done out by conducting interviews with open-ended questions, describing observations in words, and so on.

Quantitative Research:

The quantitative research approach is based on natural science methods for generating concrete facts and numerical data. It uses various statistical, computational, and statistical methodologies to establish the cause-and-effect link between two variables. This study method is also known as "Empirical Research" since the results are precisely measured. This form of study is typically used to establish broad facts about a certain topic. Surveys, experiments, and other methods are commonly used in this type of research.

5.12 Differences Between Qualitative and Quantitative Research:

Quantitative research is a more methodical approach to problem solving that involves the generation and use of data. This research method is utilized to convert data and variables into real data. Online surveys, print surveys, and other types of surveys are utilized in Quantitative Research to finish the research. [5]

Table 5.1: Differences Between Qualitative and Quantitative Research

Qualitative Research	Quantitative Research
A method for developing a better understanding of human and social sciences, in understanding human behaviour and personalities better	It is the method used to generate numerical data by using a lot of techniques such as logical, statistical and mathematical techniques
It employs a subjective approach	It employs an objective approach
It is generally expressed using words	It is expressed using graphs and numbers
It has open-ended questions	It has multiple choice questions
Qualitative research needs only a few respondents	Quantitative research requires many respondents
The data collection methods involved are interviews, focus groups, literature review, ethnography	The data collection methods involved are experiments, surveys, and observations expressed in numbers
Qualitative research is holistic in nature	Quantitative Research is particularistic in nature
The reasoning used to synthesise data in this research is inductive	The reasoning used to synthesise data in this research is deductive
This method involves a process-oriented inquiry	This method does not involve a process-oriented inquiry
It develops the initial understanding of data	It recommends a final course of action
The data taken in the Qualitative research method is pretty verbal	The data taken in this method is pretty measurable
The objective of this research method is to engage and discover various ideas	The main objective of Quantitative research is to examine the cause and effect between the variables
It is one of the exploratory research methods	It is a conclusive research method

Table 5.2: Differences Between Qualitative and Quantitative Research, synthesize, analyze, and compare [6]:

	Qualitative	Quantitative
Keywords	Complexity, contextual, inductive logic, discovery, exploration	Experiment, random assignment, independent/dependent variable, causal/correlational, validity, deductive logic
Purpose	Understand a phenomenon	Discover causal relationships or describe a phenomenon
Sample	Purposive sample, small	Random sample, large
Data	Focus groups, interviews, field observation	Tests, surveys, questionnaires
Methods/Design	Phenomenological, grounded theory, ethnographic, case study, historical/narrative research, participatory research, clinical research	Experimental, quasi-experimental, descriptive, methodological, exploratory, comparative, correlational, developmental (cross-sectional, longitudinal/prospective/cohort, retrospective/ex post facto/case control)

5.13 Key Differences Between Qualitative and Quantitative Research:

The differences between qualitative and quantitative research are provided can be drawn clearly on the following grounds:

- Qualitative research is a form of investigation that seeks to discover how people think and feel in the human and social sciences. Quantitative research is a scientific and empirical research method that uses statistical, logical, and mathematical techniques to obtain numerical data.
- Qualitative research is more holistic in character, whereas quantitative research is more specific.
- Qualitative research takes a subjective approach because the researcher is intimately involved, whereas quantitative research takes an objective approach because the researcher is uninvolved and attempts to precise the observations and analysis on the topic to answer the inquiry. In contrast to conclusive quantitative research.
- In qualitative research, the logic used to synthesise data is inductive, whereas in quantitative research, the reasoning is deductive.
- Purposive sampling is used in qualitative research to pick a small sample size in order to gain a full knowledge of the target topic. Quantitative research, on the other hand, is based on random sampling, in which a large representative sample is chosen in order to extrapolate the results to the entire population.
- In qualitative research, verbal data is gathered. In contrast, quantitative research collects measurable data.
- In qualitative research, inquiry is process-oriented, whereas quantitative research is not.
- Words, pictures, and objects are employed in qualitative research analysis, whereas numerical data is used in quantitative research analysis.

- Qualitative research is carried out with the goal of investigating and discovering ideas that are employed in ongoing activities. In contrast to quantitative research, the goal of qualitative research is to investigate the cause and effect relationship between variables.
- Finally, qualitative research employs methodologies such as in-depth interviews, focus groups, and so on. In contrast, systematic interviews and observations are used in quantitative research.
- Qualitative research generates preliminary insights, whereas quantitative research proposes a definitive course of action. [7]

5.14 Benefits of Qualitative Research:

- Unlike quantitative research, which is based on numerical data, qualitative research is based on information gathered through interviews, observations, and written texts.
- It is frequently employed in subjects such as sociology and anthropology, where the goal is to comprehend complex social phenomena. • Because it is used to explore a wide range of social elements, qualitative research is thought to be more flexible and adaptive. Furthermore, qualitative research frequently leads to deeper insights into the research study. This aids academics and intellectuals in developing research methodologies.

5.15 Benefits of Quantitative Research:

- Statistical analysis is used to interpret quantitative data. The statistical research is founded on mathematical concepts and gives a quick, concentrated, scientific, and relevant method.
- Quantitative research develops the ability to duplicate research tests and results. This method makes the data more dependable and less subject to debate.
- Expected outcomes indicate which statistical tests are relevant after gathering quantitative data, and results provide a measurable conclusion for the research hypothesis.
- Complex statistical analysis research is seen as valuable and outstanding. Quantitative research is linked to technological breakthroughs such as computer modelling and data-driven judgements.

5.16 Step-wise Guide to Conduct Qualitative and Quantitative Research:

- Recognize the distinctions between research kinds – qualitative, quantitative, or mixed-methods research.
- Construct a research question or hypothesis. This research approach will determine the type of research that can be conducted.
- Select a data gathering method. The type of research could be decided by the data collection process.
- Analyse and analyse the data collected. The results are presented based on the data that has been analysed.

- If the observed results do not match the expected results, try employing an unbiased research methodology or combining qualitative and quantitative research approaches to achieve the desired results. [8]

5.17 The Drawbacks of Qualitative Research:

You're dealing with small sample sizes: Qualitative analysis tends to be more in-depth, which is great, but it's more time-consuming as a result. And because it's resource-intensive, the number of people you can actually speak to is limited. Chances are, you won't survey as many people as you'd like to.

It's harder to generalize the results: Because you're working with a tiny pool of perspectives in any qualitative study, you can't state with certainty that the opinions you got represent the views of a larger community.

You need a skilled qualitative researcher: There are numerous methods to inadvertently impact the results of a qualitative survey, including your tone of voice, relationship with the people you're speaking with, and even the order in which you ask the questions. Unfortunately, the quality of the responses you receive is heavily influenced by how skillfully the researchers conduct their interviews or focus groups.

There's no anonymity: Let's face it: not everyone feels at ease discussing everything with everyone all of the time. Some topics are avoided by people, particularly in one-on-one sessions or discussion groups with strangers.

If this is the case, individuals are more likely to conceal their entire replies if they are embarrassed or judged, which will skew the results of your study. Some people may only be willing to participate in an anonymous quantitative study.

5.18 The Drawbacks of Quantitative Research:

You get a less detailed picture: The outcomes of this study approach are based on numerical responses, which gives you slightly less insight into your group's thoughts, motives, and drivers. You're missing a critical component: context. To avoid this, provide 'open-ended' responses, which allow participants to put down more descriptive responses rather than simply ticking a box. However, this is dependent on respondents having the time and fully understanding the question.

It's somewhat artificial: Quantitative research must be conducted in an unnatural environment in order to be controlled. While this is significant, it also implies that the results you obtain may differ from 'real world' findings.

You're faced with limitations: A quantitative method requires pre-determined answers, and how a person thinks, feels, or behaves may not be on the list. Their true answer is hidden under your lack of options, which may force them to choose one that does not accurately reflect how they feel. [9]

5.19 Conclusion:

An ideal study is one that takes into account both techniques simultaneously. Although there are some specific sectors that require only one style of research, this is primarily determined by the information requested by the researcher. Qualitative research is interpretative, whereas quantitative research is concrete. Acceptance and refinement of the underlying paradigms of qualitative and quantitative research, recognition by funding agencies of the need for both perspectives and a willingness to allocate adequate resources, editorial board awareness of the importance of publishing multimethod research, training of researchers in both paradigms, encouragement of teamwork, and promotion of mutual acceptance and respect by adherents of each approach are examples of these.

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6. Types of Sampling in Research Methodology

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6.1 Definition of Data:

Sampling is a method for choosing a portion of a population for study or analysis. Costs can be decreased, time can be saved, and outcomes' correctness can be improved. However, based on their objectives, resources, and difficulties, various fields or industries may employ various sampling techniques. We shall look at a few instances of sampling techniques used in various disciplines or industries in this post. [1] Sampling involves choosing a representative sample of the population being studied. The total population of people from which a sample could be taken is known as the target population. A sample is a subset of the participants in the study. Those who participate are referred to as "participants." The degree to which we can adapt our research findings to the target population we are interested in is referred to as generalizability. Only if the sample of participants is representative of the population is this possible. When particular groups are over or underrepresented in the sample, it is considered to be biassed. For instance, if only men are chosen or if the volunteer advertisement is placed in the Guardian, only readers of the Guardian are chosen. This restricts how far the study's conclusions may be applied to the entire population.

6.2 The Purpose of Sampling:

In psychology study, we're interested in finding out more about sizable populations of individuals that share a characteristic. The group we are interested in investigating is referred to as our "target population." The target audience for certain studies may be as vast as all people. Other study, however, may have a more narrowly defined target audience, such as teenagers, young children, or drug users. [2]

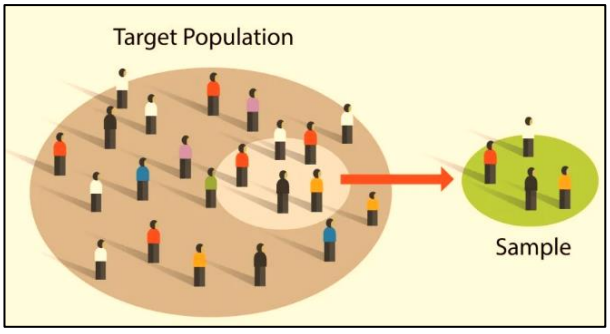

Figure 6.1: Population of Sampling

It is essentially impossible to study every member of a given community. Since this is the case, psychologists choose a sample or sub-group of the population that is probably representative of the target population we are interested in. Sampling is the process of choosing a sample from a person or from a big population for a certain type of research goal. Sampling has a variety of advantages and drawbacks. Why is sampling necessary, we could ask ourselves occasionally? The reason we utilise sampling in research studies is that it would be extremely expensive and time-consuming to poll the entire population. Figuring 6.1.

There are several sampling techniques. The one selected will be determined by a lot of variables (including time, money, etc.). [3]

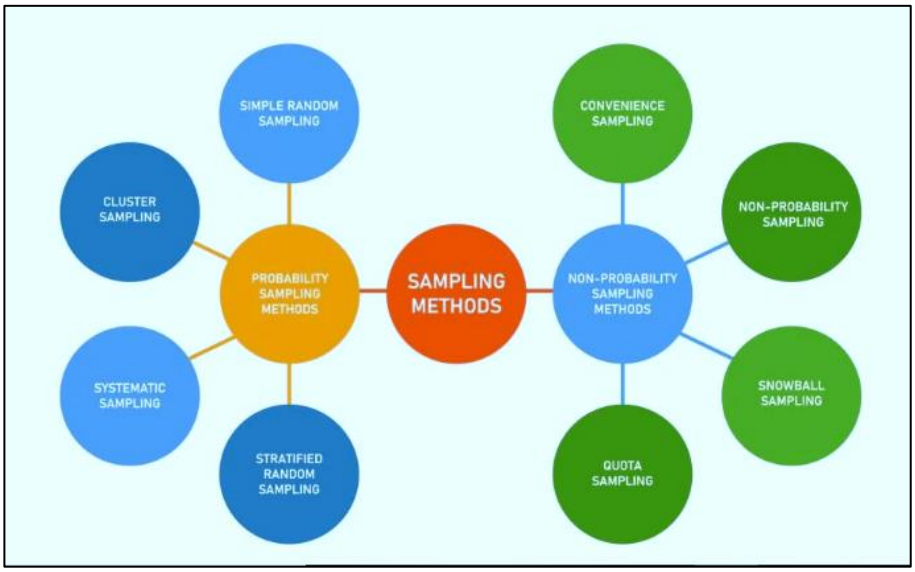

Figure 6.2: Types of Sampling

A. Advantages and Disadvantages of Sampling Advantages:

Sampling is the ideal method when there is a large population since it:

- Saves time and money and produces faster findings because the sample size is smaller than the entire population;
- Produces more accurate results because it is carried out by trained and experienced investigators; and
- Sampling makes it possible to calculate sampling errors. Consequently, it helps in gathering information about various demographic features. Studying samples only needs a little amount of room and equipment, so sampling is the ideal option when resources are scarce. [4]

Chances of bias are the sampling's biggest drawback. But with so many benefits, sampling is the most effective strategy to move forward with your research. [5]

6.3 Types of Sampling:

Before we talk about the various sampling techniques, let's define the term "sample." A sample is a collection of individuals, things, or things collected from a large population for measurement in research. So sampling is done in order to obtain accurate data. [6] To examine whether all the chips in a factory are good or not, for instance, would be quite challenging. Instead, we would choose a random chip and assess its flavour, shape, and size. Therefore, sampling is a crucial research method when there is a huge population. Due of this, we have separated it into two categories: [7]

A. Probability
B. Nonprobability [Figure 6.3].

These two types of sampling are further divided into the following subtypes: [8]

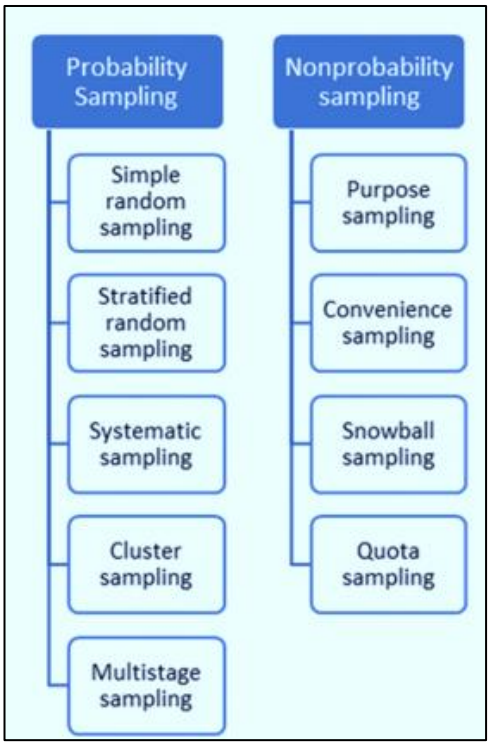

Figure 6.3: Two Types of Sampling [9]

6.3.1 Probability Sampling:

Each member of the population has a known probability of being chosen for the sample in this kind of sampling. When a population is very homogeneous, there is a good possibility that each person will be chosen for a sample. [10] For instance, if we wanted to choose some rice from a bag of rice, there is a good likelihood that each grain would be chosen. As a result, the sample taken will be an accurate representation of the entire rice bag. [11]

Every member of the population has a possibility of getting chosen when sampling using probability. Mostly quantitative research uses it. Probability sampling techniques are the best option if you wish to generate findings that are inclusive of the entire population.

There are four main types of probability sample.

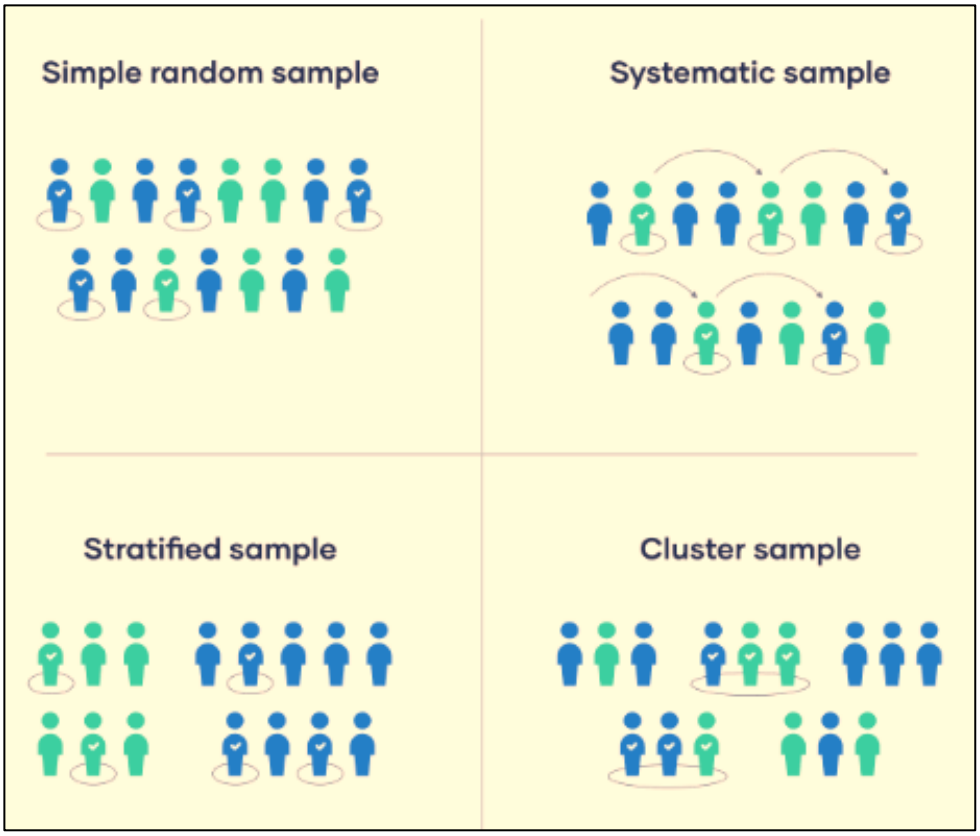

Figure 6.4: Types of Probability Sampling

A. Simple Random Sampling:

Every person in the population has an equal probability of getting chosen in a simple random sampling. The entire population should be included in your sampling frame.

You might utilise instruments like random number generators or other methods that just rely on chance to carry out this kind of sampling.

B. Systematic Sampling:

Simple random sample and systematic sampling are comparable, but systematic sampling is typically a little simpler to carry out. Every person in the population is assigned a number, but instead of assigning numbers at random, people are picked at predetermined intervals.

C. Stratified Sampling:

Stratified sampling entails breaking the population up into smaller groups that might have significant differences. By ensuring that each subgroup is fairly represented in the sample, it enables you to reach more accurate findings.

By dividing the population into strata according to the pertinent attribute (such as gender identity, age range, economic bracket, or job position), you can apply this sampling technique.

D. Cluster Sampling:

The population is also divided into smaller groups for cluster sampling, although each smaller group should share traits with the larger sample. You choose complete subgroups at random rather than picking a representative sample of each subgroup. You could, if it is practically feasible, include each and every member of each sampled cluster. You can also sample people from each cluster using one of the aforementioned methods if the clusters are large. Multistage sampling is the name for this. [12]

6.3.2 Non-Probability Sampling:

Non-probability sampling is a form in which the sample participants are chosen from the population at a non-random process. In contrast to random selection, non-probability sampling allows the sample to be chosen based on convenience, accessibility, or other variables. Because non-probability sampling cannot be guaranteed to be representative of the population, it is often seen as being less trustworthy and unbiased than probability sampling. [13]

Some common sampling methods for non-probability sampling include:

A. Convenience Sampling:

This approach entails choosing a sample based on practicality or accessibility. Instead of choosing a random sample from the population, a researcher can, for instance, select a sample of volunteers from a neighbouring community or a convenient area. When you want to receive as many responses as possible immediately, you typically do it. Typically, convenience samples favour participants who concur with your study question. Among other things, polling friends and family. [14]

B. Judgement Sampling:

A non-probability sampling technique called judgement sampling selects the sample based on the researcher's knowledge or judgement. In judgement sampling, the researcher chooses a sample they feel to be representative of the population based on their knowledge and experience. When it is difficult or impossible to randomly sample the population, or when the researcher has specialized knowledge that enables them to choose a representative

sample, this method is frequently utilized. [15] However, because judgement sampling is not certain to be representative of the population, it is typically seen as less trustworthy and less unbiased than probability sampling. For instance, depending on their concerns from the last audit, an auditor chooses a sample. [16]

An approach known as "judgmental sampling," in which specific situations, people, or events are purposefully chosen in order to convey crucial information that cannot be learned from other options, is known as "purposeful sampling." When a researcher feels that certain cases or volunteers should be included in the sample, they will include them.

The advantages and disadvantages of each sampling technique are shown in Table 6.1. [17]

Table 6.1: Strengths and Weaknesses of Sampling Techniques [18]

Technique	Strength	Weaknesses
Convenience sapling	Least expensive, least time consuming most convenient	Selection bias, sample not representative, not recommended by descriptive or casual research
Judgement sapling	Low cost, convenient, not time-consuming, idle for exploratory research design	Does not allow generalization subjective
Quota Sapling	Sample can control for certain characteristics	Selection bias or assurance
Snowball sapling	Can estimate rare characteristics	Time consuming
Simple random sampling	Easily understood results predictable	Difficult to contrast sampling frame expensive lower precision no assurance of representativeness
Systematic sampling	Can increase representativeness, easier to implement than simple random sampling, sampling frame not always necessary	Can decrease representativeness
Stratified sapling	Includes all important subpopulation presidents	Difficult to select relevant stratification variables, not feasible to stratify on many variables, expensive
Cluster sapling	Easy to implement cost effective	Imprecise, difficult to compute an interpret results

C. Quota Sampling:

With this approach, quotas are established for various population groupings, and a sample is chosen to meet those quotas. Usually, after identifying the target group, the researcher chooses a portion of the group at random. For instance, a university may like to survey students' opinions of its courses. They choose 200 individuals at random each year out of the approximately 1000 pupils that enroll each year.

D. Snowball Sampling:

With this approach, a small group of participants is asked to recommend more individuals who meet the study's eligibility requirements. Up until the necessary sample size is obtained, this process is repeated. When the target population is tough to reach, this technique is frequently used. [19]

6.4 Difference Between Probability Sampling and Non-Probability Sampling Methods:

Probability sampling and non-probability sampling differ primarily in the method used to choose the sample from the population. Non-probability sampling is based on non-random criteria, whereas probability sampling relies on random selection. Non-probability sampling is regarded as less trustworthy and unfair while probability sampling is seen as more trustworthy and impartial.

The various sampling methods and their subtypes have been examined. But to summaries the entire discussion, the key distinctions between probability sampling techniques and non-probability sampling techniques are as follows: [20]

Table 6.2: Difference Between Probability Sampling and Non-Probability Sampling Methods

	Probability Sampling Methods	**Non-Probability Sampling Methods**
Definitions	Probability sampling is a sampling technique in which samples from larger population are chosen using a method based on theory of probability.	Non probability sampling is a sampling technique in which researcher select samples based on the researcher's subjective judgement rather than random selection.
Alternatively known as	Random sampling method.	Non random sampling method.
	The population is selected randomly.	The population is selected arbitrarily.
Nature	The research is conclusive	The research is exploratory
Sample	Since there is a matter for deciding the sample and the	Seems the sampling method is arbitrary, the population.

	Probability Sampling Methods	**Non-Probability Sampling Methods**
	population demographic are exclusively represented.	demographics representation is almost always skewed.
Time Taken	Takes longer to conduct since the research design define the selection parameters before the market research study begins.	This type of sampling method is quick since neither the sample nor the selection criteria of the sample are undefined.
Results	This type of sampling is entirely unbiased; hence, the results are also conclusive.	This type of sampling is entirely biased and hence, the results are biased too rendering research speculative.
Hypothesis	In probability sampling there is an underlying hypothesis before study begins, and this method aims to prove the hypothesis.	In non-probability sampling the hypothesis is derived after conducting research study.

6.5 Sampling Works:

Accurately doing research on huge populations can be challenging for researchers. It may not always be practicable to examine every member of the group. They frequently select a small part to represent the entire group because of this. We refer to this as a sample. Researchers can estimate the features of the broader population using samples and the characteristics of the small group. [21]

The sample picked should fairly represent the total population. When selecting a sample from a broader population, it's crucial to take the sample selection process into account. A representative sample must be taken at random from the entire population in order to be accurate. For instance, a lottery mechanism may be used to sample 10% of the student body to ascertain the average age of students in an institution.

- Sampling enables researchers to make observations and calculations using a small sample of a larger population.

Random, block, judgement, and systematic sampling are a few examples of sample types.

- Sampling errors, which may be caused by bias or random sampling, should be recognised by researchers.

In order to understand the requirements and preferences of their target market, businesses employ sampling as a marketing strategy. During audits, certified public accountants employ sampling to assess the precision and completeness of account balances.

6.5 Sampling Methods:

It is unlikely that the researcher will be able to gather information from every example in order to address the study questions. Thus, choosing a sample is necessary. The population is the whole set of cases from which the researcher's sample is drawn. Researchers use sampling techniques to cut down on the number of instances since they lack the time and resources to analyse the complete population. The stages that a s-ample procedure is expected to go through are shown in the figure.

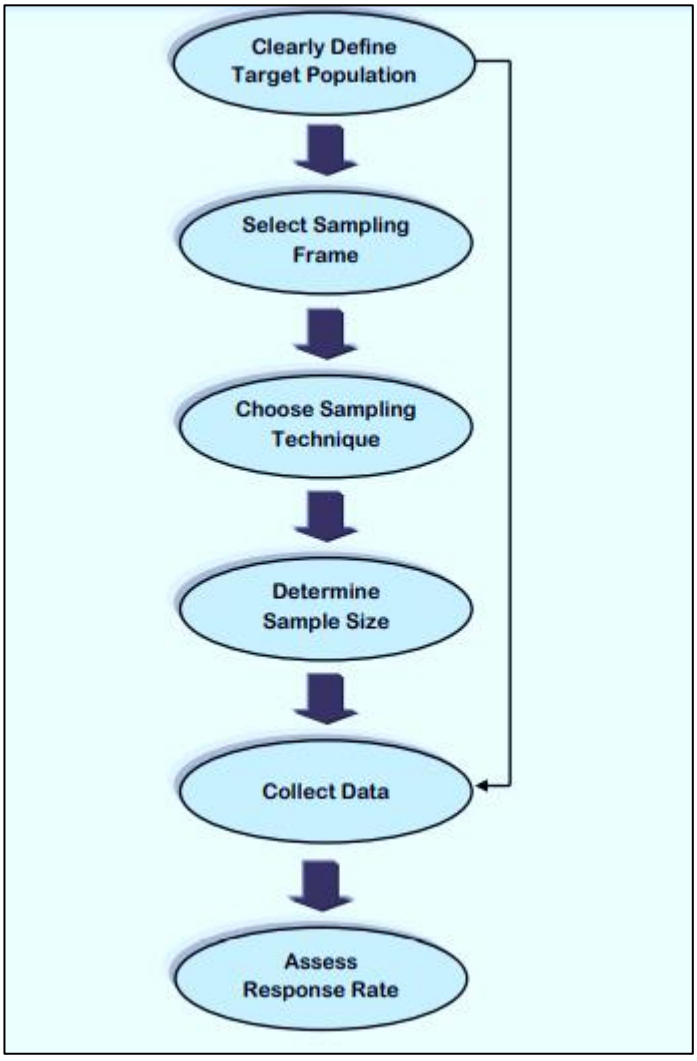

Figure 6.5: Sampling Process Steps [22]

6.6 Choosing Between Probability and Non-Probability Samples

Several criteria determine whether to use a probability-based or non-probability-based strategy to sampling:

- Goals and the size of the study
- Method of gathering data
- accuracy of the findings

A sample frame's accessibility and the resources needed to keep it up-to-date availability of additional data regarding population members. [23]

Sampling is approached differently by qualitative and quantitative researchers. Sampling is the process of choosing the group from whom you will draw data for your study. You can test your theory about the features of a particular population via sampling. The main objective of sample collection is to obtain a representative sample of a population, allowing the researcher to examine that group and draw valid generalizations about the broader group.

Probability sampling is used by quantitative researchers because it saves time and money. A well-designed and meticulously carried out sample will also produce results that are accurate.

Qualitative researchers pay more attention to how well the sample captures the essential elements of social life. To gain clarity and a deeper understanding of the sample, qualitative researchers collect data. Finding situations that will improve what scholars understand about social life's processes is their main focus. Qualitative researchers frequently gather non-probability sampling for this reason. [24]

6.7 Conclusion:

Let's discuss a tool that can help you manage these insights now that we have learnt how various sampling technique's function and are frequently utilized by researchers in market research so that they don't need to investigate the complete population to acquire meaningful insights. The various kinds of sampling methods and procedures were discussed in this work. Additionally, the six processes that must be followed to do sampling were described. The two types of sampling techniques are probability sampling and non-probability sampling, as was already explained. Each of these strategies uses a variety of sampling methodologies. Quota sampling, Snowball sampling, Judgement sampling, and Convenience sampling are examples of non-probability sampling, while simple random, stratified random, cluster sampling, systematic sampling, and multi-stage sampling are examples of probability sampling.

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7. Primary and Secondary Data Collections and Methods

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7.1 Definition of Data:

Primary data collecting techniques and Secondary data collection methods are the two basic categories into which data gathering methods are typically categorised. Figure 1 illustrates a few primary and secondary data collection techniques. [1] Primary data is unpublished material that was obtained directly from a source and has not been altered by anyone. In other words, researchers employ a variety of techniques to obtain and compile primary data for a certain objective. As a result, primary data have higher levels of validity, trustworthiness, objectivity, and authenticity than secondary data kinds. In some research methodologies, like statistical surveys, these characteristics are crucial because the information used must be relevant to an issue and cannot be obtained from published references. [2]

Consequently, even though the research can be carried out utilising secondary data, a meaningful conclusion cannot be drawn without the use of primary data as well. because third parties often alter and modify secondary data. Using primary sources allows you to obtain high-quality data that can enhance outcomes and gives you the chance to add more material as needed throughout the research process. The definition of words used in primary data collection, such as the objectives of data collection, the types of data to be collected, when to collect them, and how to do so, can be challenging. The majority of the research money is obtained through this method, which is equally expensive and requires sponsorship from numerous organisations. By precisely gathering data, removing extraneous information, and avoiding the use of fabricated or fabricated data, you may ensure the calibre of the data that has been acquired. [3]

When data is collected from published sources, it is considered secondary data because it has previously been collected for another reason and can be used for other research reasons. The literature review component of every publication draws on secondary data sources. Therefore, secondary data is a crucial component of research that can assist in obtaining information from previous studies as a basis for doing research or as the necessary background knowledge. The design of a study and the provision of a baseline for contrasting primary outcomes can also be helpful. It should be mentioned, nonetheless, that for genuine results, researchers need to reevaluate the accuracy and dependability of these backdrops. [4]

Figure 7.1: Data Collection Methods [5]

Secondary data can be found in a variety of places, including documents, books, scholarly publications, and online content. These sources are nonetheless crucial for scientific investigations even though they don't have the same level of validity as primary data sources because it can be difficult or impossible to collect primary data. Additionally, in some circumstances, the respondents do not permit the release of information, therefore the study must be undertaken using secondary data. Secondary data is typically less expensive and simpler to get than primary data, and as it is only being reported in the study, no responsibility for its quality is assumed. Due to the possibility that it is not dependable or accurate, it also has certain drawbacks.

Additionally, it cannot be applied to diverse circumstances. For instance, environmental factors might impact the data, and timing is crucial because it is occasionally necessary to use current data. [6]

7.2 The Advantages of Using These Two Types of Data:

7.2.1 Primary Data:

Utilizing primary data has the benefit of allowing researchers to gather data specifically for their study's objectives. Fundamentally, the questions the researchers pose are designed to elicit the information they need for their investigation. By conducting their own surveys, interviews, and direct observations, researchers gather the data.

For instance, a researcher may conduct direct observations by seeing people at work in the field of workplace health research. The researcher could keep track of and code instances of practices or behaviors that are of interest to her, such as instances of incorrect lifting posture or the frequency of unpleasant or disrespectful interactions staff members have with clients and consumers over time.

For another illustration, suppose a study team is interested in learning about how employees adjust to returning to work following an injury sustained at work. Telephone interviews with employees on their length of absence from work and their experiences with the return-to-work process may be a part of the research. The workers' responses—which are regarded as primary data—will give the researchers detailed information about the return-to-work process; for instance, they may find out how frequently employers offer work accommodations and why some employees decline them.

7.2.2 Secondary Data:

Secondary data might be of various forms. They may contain data from other government databases, such as the national population census and other data gathered by Statistics Canada. Administrative data is one category of secondary data that is being used more and more. Data that is routinely gathered as part of a company, institution, or agency's daily activity is referred to by this phrase. There are numerous instances, including documents from workers' compensation claims, hospital admission and discharge records, and automobile registrations.

Secondary data is typically easier to find and less expensive to acquire than main data. Additionally, because administrative data are routinely and thoroughly collected, they frequently have large samples. Additionally, administrative data—along with many other kinds of secondary data—are gathered over an extended period of time. This enables scientists to spot changes over time.

Recalling the return-to-work study from earlier, the researchers had the option of looking at secondary data in addition to the knowledge they had gained from their main data (i.e., survey findings). To find out how long workers were getting wage replacement benefits, they might examine lost-time claims data from workers' compensation. The researchers may

be able to identify the variables that indicate a shorter work absence among wounded workers using a combination of these two data sources. The return to work for other injured workers could then be enhanced with the aid of this information. [7]

7.3 Primary Data Collection Methods:

Primary data collecting techniques are also known as raw data collection techniques. Through tests, interviews, recordings, surveys, and observations, it is information that is legally obtained from the original source. The following are the five conventional techniques for gathering primary data:

- Direct, one-on-one conversations
- Interviews with people informally
- Data gathering with a questionnaire
- Data gathering with Enumerators
- Obtaining information from local sources

Primary data collection methods are further classified into two types namely:

A. Quantitative Data Collection Methods
B. Qualitative Data Collection Methods

7.3.1 Quantitative Data Collection Methods:

With the quantitative data collection method, each data set is associated with a particular numerical value that expresses the data value as numbers or counts. The data gathered via the quantitative data collecting approach can be quantified and used for statistical and mathematical calculations. To provide answers to questions like "How many", "How often?", and "How much?", quantitative data gathering techniques are utilised. Using various mathematical techniques, this data can be simply reviewed and confirmed. For instance, asking "How much did those vegetables cost" can yield quantifiable information.

7.3.2 Qualitative Data Collection Methods:

Qualitative data is descriptive rather than numerical, in contrast to quantitative data collection techniques that deal with numbers and statistics. Qualitative data can be gathered by observation, open-ended survey questions, or interviews but cannot be as easily measured as quantitative data. We typically receive responses to queries like "why" and "how" in qualitative research.

Since qualitative data may be categorised, it is often referred to as categorical data. Think of a pupil reading a section of an English book in class, for instance. Feedback on the student's reading of that paragraph is given by the student's English teacher, who is also listening to the student. If the teacher provides feedback without assigning a grade based on fluency, tone, word choice, and pronunciation clarity, this is seen as an example of qualitative data.

A. Here are the methods to collect Qualitative Data:

a. Surveys:

The most popular method of data collection is surveys. It seeks to create a well-informed theory or judgement. When used to gather information by asking open-ended questions that force the respondent to express their point of view or opinion regarding a certain topic or circumstance, this strategy is advantageous. There are two categories into which surveys can be subdivided: paper surveys and online surveys.

Paper Survey - Questionnaires are the primary form of paper surveys. Open-ended and brief questions are included in the paper survey, and respondents are asked to provide a detailed response. It is employed to compile data from a sizable sample size on a certain subject.

Online Surveys - The web surveys are created with software or put online on the website, and they are used to conduct the online surveys. The most popular tool for gathering data from online surveys is the Google survey form. Additionally, as opposed to a paper survey, an internet survey is more frequently employed because it allows researchers to conduct surveys with anybody, anywhere, at any time.

7.4 Secondary Data Collection Methods:

The term "secondary data collection" refers to information that has previously undergone statistical analysis and has been obtained by others for a purpose other than the researcher's ongoing endeavour. There are no particular collection methods because the secondary data can be easily obtained from various sources. Both quantitative and qualitative data can be collected from secondary sources. Newspapers, diaries, interviews, transcripts, and other sources of information can be used to gather qualitative data, whereas surveys, financial accounts, and statistics can be used to gather quantitative data. In secondary data, the researcher might gather information from both internal and external sources within the firm. The following internal resources are used to gather secondary data: Sales Reports and Organisation Financial Records

- Information on the customer, such as name, age, and contact information.
- A distributor, dealer, retailer, etc. report and comments.

System for Management Information.

The External Sources of Collecting Secondary Data are:

- Business Journals
- Socal Books
- Business Magazines
- Libraries
- Internet, where comprehensive formation about different areas is readily available.

- Information from other government departments such as tax records, social security, etc. [8]

7.5 Primary Data Collection Methods in Research:

Data gathered through first-hand experience and taken straight from the original source is referred to as primary data. It refers to information that has never before been used. The best type of data for study is typically thought to be that which is obtained using primary data collection techniques. Quantitative data collection methods (which deal with aspects that can be tallied) and qualitative data collection methods (which deal with factors that are not always of a numerical nature) can be used to further categories the techniques for gathering primary data.

7.5.1 Here Are Some of The Most Common Primary Data Collection Methods:

A. Interviews:

The direct approach of gathering data is through interviews. It is only a process in which the interviewee answers questions that are posed by the interviewer. It offers a great level of flexibility because questions can be modified and changed as necessary depending on the circumstance.

B. Observations:

Researchers use this technique to observe their surroundings and document their results. It can be used to assess how various people behave in scenarios that are controlled (everyone is aware that they are being watched) and uncontrolled (no one is aware that they are being watched). Because it is simple and independent of other participants, this strategy is quite effective. To evaluate whether or not to start a pet food business, for instance, a person might observe random people walking their dogs on a busy street.

C. Surveys and Questionnaires:

Surveys and questionnaires offer a comprehensive viewpoint from sizable populations. They can be carried out in-person, by mail, or even posted online to collect responses from people all over the world. Yes or no, true or false, multiple choice, and even open-ended questions are acceptable as responses. However, surveys and questionnaires have the disadvantage of delayed responses and the potential for confusing responses.

D. Focus Groups:

Similar to an interview, a focus group is done with a group of people who all share a same interest. Similar to in-person interviews, the data gathered provides a greater insight of why a certain set of people believes the way they do. However, this approach has certain limitations, including lack of privacy and interview dominance by one or two people. Focus groups might take a lot of time and be difficult, but they can help disclose some of the best information for difficult circumstances.

E. Oral Histories:

Similar to interviews and focus groups, oral histories also entail questioning participants. However, it is more specifically defined, and the information gathered is connected to a single phenomenon. It entails compiling the viewpoints and firsthand accounts of those who participated in a specific event. For instance, it can be useful in researching the impact of a new product on a certain community.

7.6 Secondary Data Collection Methods in Research:

Data that has already been gathered by another party is referred to as secondary data. Compared to primary data, it is significantly more accessible and less expensive to obtain. Although primary data collecting yields more authentic and unique data, secondary data collection frequently offers organizations a lot of value.

7.6.1 Here are Some of the most Common Secondary Data Collection Methods:

A. Internet:

One of the most often used secondary data collection techniques in recent years is the usage of the Internet. On the Internet, there is a significant selection of both free and paid research resources. Despite the fact that this method is quick and simple, you should only use reliable websites for gathering data.

B. Government Archives:

You can use a lot of the data that is available in the government archives. The fact that the information in official archives can be verified and is authentic is the biggest benefit. The problem, though, is that data isn't always easily accessible for a variety of reasons. Criminal records, for instance, may fall under the category of classified information and are difficult for anybody to access.

C. Libraries:

Most scholars donate multiple copies of their scholarly works to libraries. Based on several study circumstances, you can gather pertinent and reliable information. Business directories, annual reports, and other comparable papers that aid firms in their investigation are also kept in libraries. [9]

7.7 Principal Difference between Primary and Secondary Data:

A. Difference in Objective: The specified objective is always the focus of the investigator's initial data collection. Therefore, no modifications are required for the study's objectives. However, the investigator's secondary data was already gathered by someone else for a different reason. As a result, the researcher must modify the data as needed to meet the primary goal of the current study.

B. Difference in Originality: The data is original because it was first obtained directly from the source of origin. However, the secondary data is not original because it is already out there.

C. Difference in Cost of Collection: In terms of time, effort, and money, acquiring primary data is more expensive than collecting secondary data. It's because the data is being gathered from the original source for the first time. However, because secondary data is acquired from published or unpublished sources, the cost is lower. [10]

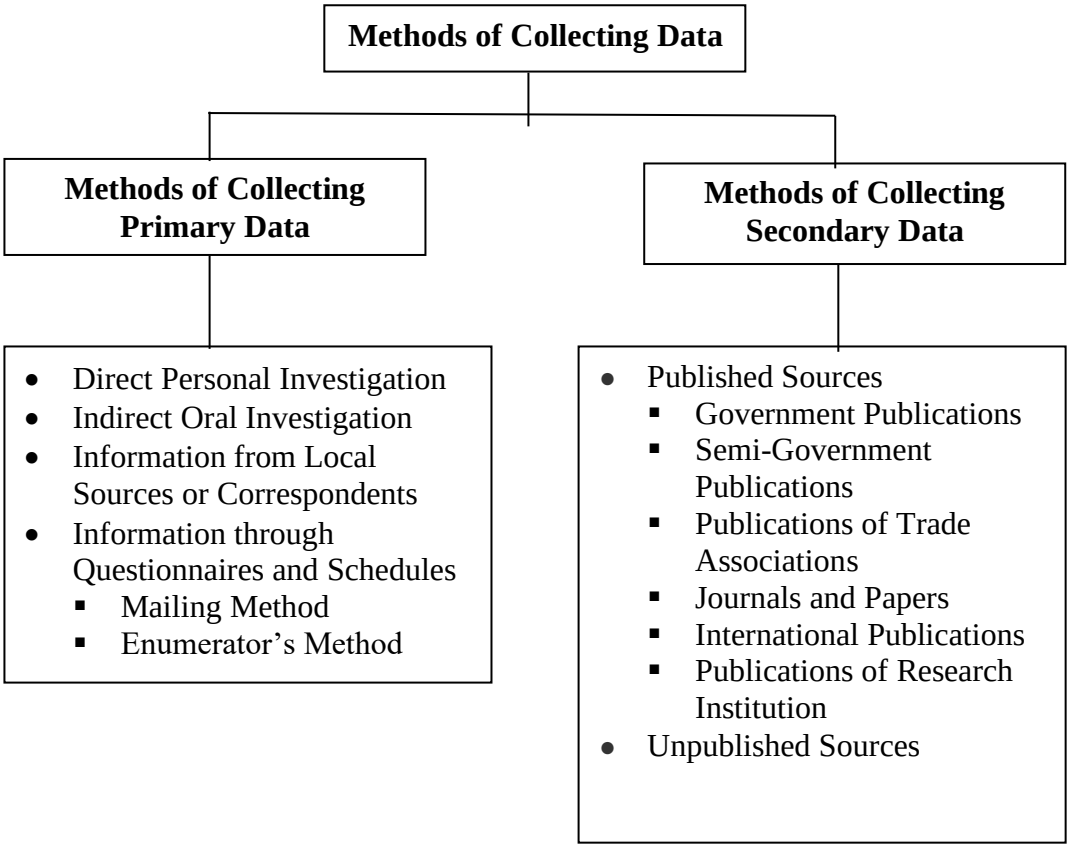

Figure 7.2: Methods of Collecting Data

D. Challenges in Collecting What is Primary Data and Secondary Data in Research Methodology:

Accurate participant response collection is one of the challenges in primary and secondary data collection. Another problem could occur if there is too much bias in some datasets (such as political opinion polls), which makes it challenging for researchers to properly interpret findings. Additionally, depending on the kind of personal information needed for research (like medical studies), there can also be some privacy concerns.

7.8 Analyzing Primary and Secondary Research Results:

The first step in analyzing primary and secondary research results is to identify the key points from each study. This includes understanding what was studied, who participated in the study, how it was conducted, and any other relevant information about the study's methodology. Once this information has been gathered, it can be used to draw conclusions about the findings. Additionally, researchers should compare their own findings with those of other studies on similar topics to gain a more comprehensive understanding of their topic area. [11] This article discusses the numerous distinctions between primary and secondary data. The primary data is factual and original, whereas secondary data is only an analysis and interpretation of the primary data, and this is the most significant distinction. Secondary data is gathered for reasons other than the ones for which primary data is gathered, which is to find a solution to the issue at hand.

A. Comparison Chart:

Table 7.1: Comparison Chart for Primary and Secondary Data

Basis For Comparison	Primary Data	Secondary Data
Meaning	Primary data refer to the first-hand data gathered by the researcher himself	Secondary data means data collected by someone else earlier
Data	Real time data	Past data
Process	Very involved	Quick and easy
Source	Survey, observations, experiments, questionnaire, personal interview, etc.	Government publications, websites, books, journal articles, internal records etc.
Cost effectiveness	Expensive	Economical
Collection time	Long	Short
Specific	Always specific to the researcher's needs.	May or may not be specific to the researcher's need
Available in	Crude form	Refined form
Accuracy and Reliability	More	Relatively less

7.9 Differences Between Primary and Secondary Data:

The following points address the key distinctions between primary and secondary data:

The word "primary data" refers to information that was first created by the researcher. Secondary data is information that has already been compiled by the investigating agencies and entities.

Real-time data are called primary data, whilst historical data are called secondary data.

While secondary data is gathered for objectives unrelated to the situation at hand, primary data is gathered to address the current issue.

Primary data gathering is a labor-intensive procedure. On the other hand, gathering secondary data is a quick and simple operation.

Surveys, observations, experiments, questionnaires, in-person interviews, and other primary data gathering methods are some examples. On the other hand, secondary data gathering sources include internal documents, books, journals, websites, and government publications.

Primary data collecting demands a significant investment of time, money, and labour. On the other hand, secondary data is easily and cheaply accessible.

The researcher always uses primary data that is unique to his purposes, and he oversees the calibre of the study. The researcher has no control over the quality of the secondary data, and it is not tailored to his needs.

While secondary data is a polished version of primary data, primary data is only available in its raw form. Additionally, when statistical techniques are used on main data, secondary data is produced.

In comparison to secondary sources, data obtained from primary sources is more trustworthy and accurate. [12]

After a researcher has distinctly identified and stated his or her study challenges, data collecting would start. There are two methods for gathering data: using primary sources and using secondary sources. After going to the field, the main data is gathered. As a result, it serves as first-hand information to solve a particular research issue. The secondary data was gathered by another party and put though an exhaustive statistical process. The type of data the researcher will use for the study must be decided before beginning data collection. In contrast to secondary data, which is simply a compilation of the primary data, secondary data collection methods involve actually acquiring the primary data. [13]

7.10 Steps for Data Collection:

Determine problems and opportunities with data collection: Each data collection tool has advantages and disadvantages. As a result, it's critical to spot problems and chances for gathering data in accordance with the method before choosing the best one. To evaluate our instruments and sample size, it could be beneficial to do a pilot research.

Setting objectives and goals the researcher must develop his or her approach in accordance with how data will be used to answer the study questions. As a result, each instrument the researcher uses must have specific goals that might be applied to answering these queries after analysis.

Planning approach and methods: The researcher would decide on the project's duration, the subjects of the survey, the manner in which the data would be gathered, and the sources and instruments that will be used.

Collect data: It's crucial to recognise logistical difficulties and make appropriate preparations while organising the data collection.

7.10.1 Selection of Appropriate Method for Data Collection:

Nature, scope and object of enquiry: This serves as the foundation for selecting the data gathering method. It must be appropriate for the type of investigation the researcher intends to conduct. This would also assist the researcher in deciding whether primary or secondary sources should be used to gather data.

Availability of funds: The availability of funding is a crucial component of research because it enables the researcher to select an approach that is efficient, effective, and will enable data collection given the resources at hand.

Time: A good researcher emphasises time allocation in addition to their study plan in order to complete each stage of the research process. Time is also a crucial consideration because different approaches take different amounts of time.

Precision: The level of precision required for authoring a thorough research, impact assessment, or evaluation study would also necessitate a proper assessment of data collection methods. [14]

7.11 Conclusion:

While secondary data is gathered from already-existing sources like books, journals, newspapers, and websites, primary data is gathered through surveys, interviews, experiments, or observations. To ensure accuracy and dependability, substantial planning and execution must go into collecting both types of data.

In order to help innovation teams make informed decisions or develop effective strategies, it might be helpful to analyses the findings of primary and secondary research to pinpoint industry trends. Depending on the source from which the data was gathered, the data could be classified into two categories: primary, or the raw data, and secondary data. The researchers gather primary data directly, and secondary data are pre-made data sets that are used for additional analysis.

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