

Module III: Collection of Data and Data Processing

13. Sources of Collection of Data: Secondary Sources, Primary Sources – Observation Method, Interview Method, Questionnaire, and Schedule

Data Collection

Data collection is the process of gathering information relevant to a research problem. The quality of research findings largely depends on the quality of data collected. Data may be collected from primary sources or secondary sources.

Primary Data

Original data collected by the researcher for the first time specifically for the purpose of the study. Collected directly from respondents or observations.

Characteristics: Original, specific purpose, more accurate, time-consuming.

Advantages: Highly relevant, greater control, up-to-date.

Disadvantages: Expensive, requires more effort.

Example: A company conducting a survey among customers.

Secondary Data

Data already collected and published by others for some purpose. Researchers use existing data instead of collecting fresh info.

Sources: Internal (sales reports, records) & External (Govt. publications, journals, websites).

Advantages: Less expensive, quick availability, useful for preliminary analysis.

Disadvantages: May not fit objectives exactly, data may be outdated.

Example: Using Census data published by the Govt of India.

Primary vs Secondary Data

Primary Data	Secondary Data
Collected first-hand	Already collected by others
More specific	May be less specific
Expensive	Economical
Time-consuming	Quickly available
Usually more accurate for the study	Accuracy depends on source

Observation Method

Observation is a method where the researcher collects data by directly watching people, events, or situations.

Types of Observation

- **Participant:** Researcher becomes part of group.
- **Non-Participant:** Observes without participating.
- **Structured:** Follows a predefined plan.
- **Unstructured:** Flexible observation.

Pros & Cons

- **Advantages:** Direct info, useful when respondents cannot communicate.
- **Limitations:** Observer bias, time-consuming.

Example: Observing customer behavior inside a supermarket.

Interview Method

An interview is a method of collecting data through direct interaction between the researcher and respondent.

Types of Interviews

- **Structured:** Questions are predetermined.
- **Unstructured:** Questions are flexible.
- **Personal:** Face-to-face interaction.
- **Telephone:** Conducted via telephone.

Pros & Cons

- **Advantages:** Detailed info, clarification possible.
- **Disadvantages:** Costly, interviewer bias may occur.

Example: Interviewing managers regarding employee performance.

Questionnaire

A written list of questions completed by respondents themselves.

Characteristics: Standardized questions, suitable for large samples, low cost.

Pros/Cons: Economical, large coverage / Low response rate, misinterpretation possible.

Example: Google Forms survey.

Schedule

Similar to a questionnaire, but the researcher or enumerator records responses instead of respondents filling it.

Pros/Cons: Higher response rate, suitable for illiterate / More expensive, needs trained investigators.

Example: Population census surveys.

14. Design and Development of Questionnaire

Questionnaire design refers to the process of preparing a structured set of questions for collecting data. A well-designed questionnaire increases accuracy and reliability.

Steps in Questionnaire Development

Define Objectives → Identify Targets → Decide Content → Select Type → Arrange → Design Layout → Pre-Test

Types of Questions & Good Characteristics

Types of Questions

Open-Ended: Respondents answer in own words.

Ex: What improvements do you suggest?

Closed-Ended: Select from given options.

Ex: Are you satisfied? Yes/No

Characteristics of a Good Questionnaire

- Simple language & Clear questions
- Logical sequence
- Avoid ambiguity & leading questions
- Appropriate length

15. Measurement Scales: Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale

A measurement scale is a system used to assign numbers or symbols to characteristics of individuals or objects.

Nominal Scale

Classifies data into categories without order. No ranking, numbers are labels only.

*Ex: Gender, Religion.
(Male=1, Female=2)*

Ordinal Scale

Classifies data and provides ranking. Differences between ranks unknown.

*Ex: Satisfaction rating
(Satisfied, Neutral).*

Interval Scale

Ranking possible, equal differences measurable. No absolute zero.

Ex: Temperature in Celsius.

Ratio Scale

Possesses all characteristics of interval scale plus an absolute zero.

Ex: Income, Age, Weight.

Comparison of Measurement Scales

Scale	Classification	Ranking	Equal Intervals	True Zero
Nominal	Yes	No	No	No
Ordinal	Yes	Yes	No	No
Interval	Yes	Yes	Yes	No
Ratio	Yes	Yes	Yes	Yes

16. Scaling Techniques: Comparative and Non-Comparative

Scaling is the process of assigning numbers/symbols to represent characteristics. It helps measure opinions and perceptions.

Comparative Scaling

Respondents compare one object with another.

- **Paired Comparison:** Two objects compared at a time.
- **Rank Order:** Respondents rank alternatives.
- **Constant Sum:** Distribute points among alternatives.

Non-Comparative Scaling

Respondents evaluate an object independently.

- **Likert Scale:** Measures degree of agreement.
- **Semantic Differential:** Attitudes between opposite adjectives.
- **Stapel Scale:** Numerical scale ranging pos to neg.

Comparative vs Non-Comparative Scaling

Comparative	Non-Comparative
Comparison required	No comparison required
Relative measurement	Absolute measurement
More complex	Easier to administer

17. Techniques and Tools for Data Collection, Pre-testing, and Pilot Study

Common tools include: Questionnaires, Schedules, Interviews, Observation, Focus Groups, Online Surveys.

Pre-testing

Testing the questionnaire before actual data collection.

Objectives: Identify errors, Improve wording, Ensure clarity.

Ex: Testing questionnaire on 20 respondents.

Pilot Study

A small-scale trial run of the entire research project.

Objectives: Test research design, Identify practical difficulties, Improve procedures.

Ex: Conducting trial survey on 30 respondents before main 500.

Difference Between Pre-testing and Pilot Study

Pre-testing	Pilot Study
Tests questionnaire	Tests entire research process
Small scale	Larger scale
Focus on questions	Focus on complete study

18. Processing of Data, Classification, Editing, Coding, Tabulation

Data processing involves converting raw data into meaningful information.

Editing

Checking collected data for completeness and accuracy.

Classification

Grouping similar data into categories.

Coding

Assigning symbols or numbers to responses.
(Male=1)

Tabulation

Presenting data in rows and columns for easy analysis.

Data Processing Flow

Data Collection → Editing → Classification → Coding → Tabulation → Analysis

19. Testing of Hypothesis - Errors in Testing - Type-I and Type-II

Hypothesis testing is a statistical procedure used to determine whether a hypothesis should be accepted or rejected.

Type-I Error (α)

Rejecting a true null hypothesis. (False positive)

Ex: Concluding advertising affects sales when it actually does not.

Type-II Error (β)

Accepting a false null hypothesis. (False negative)

Ex: Concluding advertising does not affect sales when it actually does.

20. & 21. Tests and Interpretation

One-Tailed vs Two-Tailed

One-Tailed: Examines direction (e.g. increases productivity). More specific.

Two-Tailed: Examines whether relationship exists in either direction. More general.

Level of Significance: Probability of committing a Type-I Error (e.g. 0.05 or 5%).

Parametric vs Non-Parametric

Parametric: Assume normal distribution, interval/ratio data. (Z-test, t-test, ANOVA)

Non-Parametric: No distribution assumption, nominal/ordinal data, suitable for small samples. (Chi-Square, Mann-Whitney)

Interpretation of Test Results

If p-value < significance level → **Reject H_0**

If p-value > significance level → **Accept H_0**

22. Use of Computer in Data Processing

Computers play an essential role by simplifying storage, processing, analysis, and presentation.

Uses in Research

- Data Entry, Processing & Storage
- Data Analysis & Graphical Presentation
- Report Preparation

Advantages

- Speed and Accuracy
- Large Storage Capacity
- Supports advanced statistical techniques

Common Software: MS Excel (Entry/Analysis), SPSS (Statistical analysis), R/Python (Advanced analytics), Google Forms (Data collection).

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