

Chapter Five

Processing, Analysis and Data Interpretation

Chapter Objectives: at the end of this chapter, the student will be able to:

- Explain the nature and meaning of data analysis and interpretation
- Value the different types of data processing, analysis and interpretation
 - Nature and Meaning of Data Analysis
 - Quantitative Data Analysis
 - Qualitative Data Analysis

★ Overview

Dear students, in the previous sections we have discussed about the issues of collecting data. The collection of data is not an end in itself. It has to be analyzed. Hence, in this section you will learn about data analysis especially in light of qualitative data; approaches and general strategies.

5.1 The Analysis of Quantitative Data

? *What is quantitative data?*

Quantitative data are data which are in the form of numbers (or measurements). Thus, quantitative research is empirical research where the data are in the form of numbers.

The analysis of quantitative data covers a wide range of things, from simple organization of the data to complex statistical analysis. Quantitative information go through a process that is primarily aimed at transforming the information into numerical values, called **codes**, so that the information can easily be analyzed either manually or by computers.

For coding quantitative data, you need to go through such steps as developing a code book, pre-testing code book, coding the data and verifying the coded data. Henceforth, you should develop a frame of analysis, which should specify

- ◆ Which variables you are planning to analyze
- ◆ How they should be analyzed
- ◆ What cross-tabulations you need to work out
- ◆ Which variables you need to combine to construct your major concepts or to develop indices (in formulating a research problem concepts are changed into variables-at this stage change them back to concepts)
- ◆ Which variables are to be subjected to which statistical procedures

In the frame of analysis the type of analysis to be undertaken (e.g. frequency distribution, cross tabulation) and the statistical procedures applied should be specified. Frequency distributions group respondents into the subcategories into which a variable can be divided. On the other hand, cross-tabulations analyze two variables, usually independent and dependent to determine if there is a relationship between them. The subcategories of both the variables are cross-tabulated to ascertain if a relationship exists between them.

5.2 The Analysis of Qualitative Data

? What is qualitative data?

Qualitative data are, unlike the quantitative data, data not in the form of numbers (most of the time, but not always, this means they are in the form of words). Dear students, these simplified definitions are useful for getting started in research, but they do not give the full picture of the quantitative-qualitative distinction.

Qualitative data is considered an ‘attractive nuisance’. Their attractiveness is undeniable. Words, which are by far the most common form of qualitative data are a specialty of the humans and their organizations. On the other hand the unison refers to the legal doctrine that if you leave our attractive object such as an unlocked car when children can play with it, you may be liable for any injuries they sustain. Naïve researcher may be injured by unforeseen problems with qualitative data. This can occur out the collection stage where overload is a constant danger. But the main difficult is in their analysis. There is no clear and accepted set of conventions for qualitative analysis. Quantitative data may be useful for in supplementing and illustrating the quantitative data obtained from an experiment or serves.

5.2 Approaches to analysis

? What are the approaches to qualitative analysis?

Irrespective of whether your study generates qualitative or quantitative data the major task is to find answers to your research questions. This has a major influence on the kinds of analysis needed. To come up with trustworthy answers the analysis has to treat the evidence fairly and without bias and the conclusions must be compelling, not least in ruling out alternative interpretations.

The central requirement in qualitative analysis is clear thinking on the part of the analyst. Qualitative analysis remains much closer to codified commonsense than the complexities of statistical analysis of quantitative data.

However humans as 'natural analyst' have deficiencies and biases corresponding to the problems that they have as observers. Thus deficiencies of the human as analyst include

- **Data overload**- limitation on the amount of data that can be dealt with (too much to receive, process and remember).
- **First impressions**- Early input makes a large impression so that subsequent revision is resisted.
- **Information availability**-information which is difficult to get hold of gets less attention than which is easier to obtain.
- **Positive instances**-There is a tendency to ignore information conflicting with hypotheses already held and to emphasize information that confirms them.
- **Internal consistency**-There is a tendency to discount the novel and unusual.
- **Uneven reliability**-The fact that some sources are more reliable than others tends to be ignored.
- **Missing information**-Something for which information is incomplete tends to be devalued.
- **Revision of hypotheses**- There is a tendency either to over or to under react to new information.
- **Fictional base**- The tendency to compare with a base or average when no base data is available.
- **Confidence in judgment**- Excessive confidence is placed in one's judgment when once it is made.
- **Co-occurrence**- co-occurrence tends to be interpreted as strong evidence for correlation.
- **Inconsistency**- Repeated evaluations of the same data tend to differ.

5.2.1 The Quasi-Judicial Approach.

? *What is quasi-judicial approach?*

The quasi-judicial approach covers a set of basic rules and procedural steps for how a case study should be carried out from start to finish. It is termed 'quasi-judicial' because it is modeled on jurisprudence (the 'science' of law). It is an exercise in problem-solving rather than in interpreting the law. At its core is the notion of a systematic procedure which uses rational argument to interpret empirical evidence.

? *What are the procedural steps in the quasi-judicial approach?*

Procedural steps in the quasi-judicial approach

1. State the initial problems and issues as clearly as possible

2. Collect back ground information to provide a context in terms of which the problems and issues are to be understood.
3. Put forward prima facie explanations and solution to the problems and issues.
4. Use these explanations to guide the search for additional evidence. If they don't fit the available evidence, work out alternative explanations.
5. Continue the search for sufficient evidence to eliminate as many of the suggested explanations as possible in the hope that one will account for all the available evidence and be contradicted by none of it. Evidence may be direct or indirect but must be admissible, irrelevant and obtained from competent and credible sources.
6. Closely examine the sources of evidence as well as the evidence itself. All items should be checked for consistency and accuracy. This is analogous to legal cross examination in the case of personal testimony.
7. Enquire critically into internal coherence, logic and external validity of the network of argument claiming to settle the issues and solve the problems.
8. Select the most likely interpretation compatible with the evidence.
9. Formulating an acceptable explanation usually carries an implication for action, which has to be worked out.
10. Prepare an account in the form of a report. It should contribute to 'case law' by virtue of the general principles employed in explaining to specific case.

These lists of ten procedural steps emphasize that analysis is not left to the end of the process but is a continuing concern dealt with by iteration. Thus through this process one should keep in mind four important questions.

1. What is at issue?
2. What other relevant evidence might there be?
3. How else might one make sense of the data?
4. How were the data obtained?

The quasi-judicial approach does not produce tight prescriptions for analysis of the kind generated by statistical tests when dealing with quantitative data. As with the 'real' judicial approach it is to a large extent concerned with evidence and argument.

While the quasi-judicial approach provides a useful orientation and a new framework for dealing with qualitative case study data, it is admittedly less helpful in suggesting what one does with the data collected.

5.3 General Strategies for Analysis

? What are the general strategies for analysis?

5.3.1 Basing the Analysis on Theoretical Propositions

In many cases a study is based on a particular set of theoretical propositions. The theoretical stance, in some sense ‘given’ to you (perhaps through reviewing previous work, or more literally by you being asked to do work in these terms) will have helped from the research questions to be asked, and through them the design of the study. This strategy can be a powerful aid in guiding the analysis, indicating where and on what, attention should be focused.

5.3.2. Basing the Analysis on a Descriptive Framework

In exploratory and descriptive case studies you may, quite possibly, not start within a particular theoretical framework. An alternative is to develop a case description. You are looking for a set of themes, or areas, linked to the research questions once again, which appear to give an adequate coverage of the case. One version, common in applied, real world studies, is to work towards an issue analysis, where the issues can be used as a means of organizing and selecting material.

5.3.4 Explanation-building

It is, self-evidently, primarily concerned with explanatory case studies, where the goal is to provide an explanation of what is happening in the case. Thus, the final explanation is the result of the following series of iterations:

- Making an initial theoretical statement or an initial proposition
- Comparing the findings of an initial case against such a statement or proposition.
- Revising the statement or proposition
- Comparing other details of the case against the statement or proposition
- Again revising the statement or proposition
- Comparing the revision to the facts of a second, third or more cases, and
- Repeating the process as many times as it is needed

5.3.5. Chronologies

? What is chronological analysis all about?

A Chronological analysis is a way of organizing data from a case study over time. As a strategy case study can be longitudinal, that is, it allows the enquirer to trace events over time, although this would be

precluded in small scale studies for anything apart from situations where the time spans are relatively short. It is possible to extend the time dimension beyond your direct involvement by seeking retrospective information through interviews and documentary evidence.

An attraction of chronological origination is the help that it gives in determining causal relationships. Causes must precede effects in time.

A particular form of chronology is the life history approach. It is usually taken as a full length account of a single person's life in that person's own words. There are alternatives to a chronological presentation, for instance, using dimensions or aspects of the person's life, the principal 'turnings' in their life and their life conditions between them and their characteristic means of adaptation. They are typically expressed in narrative form, and are often of compelling interest.

5.3.6. Time series analysis

? What does time series analysis refer to?

Time series design can be used with case study data. Analysis of time series designs is primarily an analysis of the patterning of data over time- asking questions about, for example, whether there is a discontinuity in the pattern which coincides with a change in treatment. The same is true about single subject designs, which although developed separately, overlap substantially with time series approaches.

5.3.7. Triangulations

? What is triangulation?

Triangulation is an indispensable tool in real word enquiry. It is particularly valuable in the analysis of qualitative data where the trustworthiness of the data is always a worry. It provides a means of testing one source of information against other sources.

Both correspondences and discrepancies are of value. If two sources give the same messages then, to some extent, they cross-validate each other. If there is a discrepancy its investigation may help in explaining the phenomenon of interest.

A case study of the effects of introducing national testing in to primary schools might incorporate as well as the test results, interview data from the children involved in relation to their own views and feelings and further interview data from their teachers. Triangulation of information about progress might, for example, indicate that for some children the test data and teachers' views suggest good progress, whereas the children consider their own progress to have been unsatisfactory. This discrepancy might be

hypothesized as related to increased stress and could help in suggesting comparisons with pupils who have realistic views about their progress in suggesting additional topics to explore in discussion or suggest including the parents views in the study.

Here, and in many cases the by products of triangulation are as useful as its primary purpose in validating information. It improves the quality of data and in consequence the accuracy of findings. An alertness for possible triangulation opportunities is a valuable quality in the enquirer.

5.3.8. Key events

? *What is key event analysis all about?*

Key or focal events are used in ethnographic style case studies where they are widely used to form a focus for analysis. They are a feature and classical anthropologic studies. Their use is not only in helping to understand the group or situation, but also in helping to share that understanding with others. Dear students, now let us see the strategies for analyzing interview and observation.

➤ Strategies for analyzing interviews

? *What are the strategies for analyzing interviews?*

The first decision to be made in analyzing interviews is whether to begin with case analysis or cross-case analysis. Beginning with case analysis means writing a case study for each person interviewed or each unit studied (e.g. each critical event, each group and so on). Beginning with cross-case analysis means grouping together answers from different people to common questions or analyzing different perspectives on central issues.

If a standardized open ended interview is used it is fairly easy to do cross-case or cross interview analysis for each question in the interview. With an interview guide approach, answers from different people can be grouped by topics from the guide, but the relevant data won't be found in the same place in each interview. The interview guide actually constitutes a descriptive analytical framework for analysis.

It is appropriate to begin with individual case studies where variations in individuals are the primary focus of the study. This strategy requires writing a case analysis using all the data for each person before doing cross-case analysis. For example if one has studied the juvenile delinquents the analysis could begin by doing a case description of each juvenile before doing cross-case analysis. On the other hand, if the focus is on a criminal justice program serving juveniles, the analysis might begin with a description of variation in answers to common question, for example, what were patterns of major program experiences, what did they like, what did they dislike, how did they think they had changed and so forth.

These two strategies are by no means mutually exclusive. A study will often include both kinds of analysis but one has to begin somewhere. Trying to do both individual case studies cross-case analysis by issue at the same time will likely lead to confusion

➤ **Strategies for analyzing observations**

? What are the strategies for analyzing observation?

Initial analysis of observational data is greatly facilitated by clarity about how it will be most helpful to present the findings. Options include the following.

Chronology: Describe what was observed chronologically over time to tell the story from beginning to end.

Key events: Present the data by critical incidents or major events, not necessarily in order of importance.

Various settings: Describe various places sites, settings, or locations (doing case studies of each) before doing cross setting pattern analysis.

People: If individual or groups are the primers unit of analysis the case studies.

Processes: The data may be organized to describe important processes (e.g. control, recruitment decision making socialization, communication)

Issues- The observation may be pulled together to illuminate key issues often the equivalent of the primary evaluation questions, such as how did participant change?

Again these are not mutually exclusive or exhaustive ways of organizing observational data.

5.4 Organizing Qualitative Data

? How do we organize qualitative data?

There is typically not a precise point at which data collection ends and analysis begins. In the course of gathering data, ideas about possible analysis with occur.. Those ideas constitute the beginning of analysis.

The data generated by qualitative methods are voluminous. Sitting down to make sense out of pages at interviews and whole files at field notes can be overwhelming. However, the first thing to do is to make sure it's all there. Are the field notes complete? Get a sense of the data; check out the quality of information you have collected.

The analysis of qualitative data is an iterative process. It is also a process demanding intellectual discipline, analytical rigor and a great deal of hard work. Because different people manage their creativity, intellectual endeavors, and hard work in different ways there is no right way to go about organizing, analyzing and interpreting qualitative data. Thus, the following sections describe some alternative ways of organizing and reporting qualitative data.

5.4.1 Content analysis

? What is content analysis all about?

Content analysis is the process of identifying coding and categorizing the primary patterns in the data. This means analyzing the content of interviews and observations.

Dear students, first we need to code our notes. You should start by reading through all the field notes or interview and making comments in the margins or even attaching pieces of paper with staples or paper clip that contain notions about what you can do with different parts of the data. This is the beginning of organizing the parts of the data. This is the beginning of organizing the data into topics and files. The following are examples of topics used to organize field notes ('P' is for Participants)

Abbreviation: P's React Prog.

Meaning: (Participants' reactions to the program)

Abbreviation: P's Reacts P's

Meaning: (Participants reactions to other Participants)

This process of labeling the various kinds of data and establishing a data index is a first step in content analysis. Thus, a classification system is critical; without classification there is chaos. Simplifying the complexity of reality into some manageable classification scheme is the first step of analysis.

➤ The content of case studies

Once the raw case data have been accumulated, the researcher may write a case record. The case record pulls together and organizes the voluminous case data into a comprehensive primary resource package.

The case record includes all the major information that will be used in doing the final case analysis and case study. Information is edited, redundancies are sorted out, parts are fitted together, and the case record is organized for ready access either chronologically and/or topically.

The case record is used to construct a case study. The case study includes the information that will be communicated in the final report; it represents the descriptive data presentation in the report. The report may consist of several case studies that are then compared and contrasted, but the basic descriptive data of the study are the cases.

The case study should take the reader into the case situation, a person's life, a group's life, or a program's life. Each case study in a report stands alone, allowing the reader to understand the case as a unique, holistic entity. At a later point in analysis it is possible to compare and contrast cases, but initially each case must be represented and understood as an idiosyncratic manifestation of the phenomenon of interest. The descriptions of the case should be holistic and comprehensive given the focus of evaluation and will include myriad dimensions, factors variables and categories woven together into an idiographic framework.