

# Chapter 9

## Analyzing Quantitative Data in Mixed Methods Research for Improved Scientific Study

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### ABSTRACT

*The purpose of the chapter is to review the role of quantitative methods in corporate research and the methods for analysing quantitative data. The study used a secondary data on quantitative research methods and a survey of published articles on schools, businesses and non-profit organizations. The key findings show that exploratory data can be analyzed using graphs and charts and hypothesis testing can be employed to test statements made. Impacts of one variable on another and the relationships between variables can be explained using correlation and regression analysis. The implications are that the value of a quantitative analysis arises when it is possible to identify features that occur frequently across the many participatory discussions aimed at studying a particular research theme.*

### INTRODUCTION

Data analysis is more than number crunching. The prospect of analysing numerical data sends shivers down the spines of many novice researchers who not only baulk at the thought of statistics but also hold fundamental objections to what they see as ‘the mathematisation of nature’ (Horkheimer, 1972). Most concepts in mixed research method, some will assert, is a combination of both quantitative and qualitative analysis. Quantitative data analysis has no greater or lesser importance than qualitative analysis. Its use is entirely dependent on fitness for purpose. Arbitrary dismissal of numerical analysis is mere ideology or prejudice.

Quantitative methods are research techniques that are used to gather quantitative data — information dealing with numbers and anything that is measurable e.g. Statistics, tables and graphs, are often used to present the results of these methods. The main aim of this chapter is to establish the methods employed when analysing quantitative data in mixed method research. This chapter is organised as follows: sec-

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tion one explains the different data and their characteristics followed by exploratory data analysis in section two. Section three discusses hypothesis testing The last section explains the use of regression and correlation for data analysis.

## **BACKGROUND**

Quantitative data analysis is a powerful research form, emanating in part from the positivist tradition. It is often associated with large scale research, but can also serve smaller scale investigations, with case studies, action research, correlational research and experiments.

In this chapter, the author introduces several common statistics used in social research and explains how they can be used to make sense of the “raw” data gathered in research. Such quantitative data analysis, using numbers to discover and describe patterns in data, is the most elementary use of social statistics. Numerical analysis can be performed using software, for example the Statistical Package for Social Sciences (SPSS), Minitab, or Excel. Software packages apply statistical formulae and carry out computations.

With this in mind, extended outlines of statistical formulae are avoided though we do provide details where considered useful. The primary aim is to explain the concepts that underpin statistical analyses and to do this in as user-friendly a way as possible. Lest the approach should raise purist eyebrows, we provide extended treatments in greater detail, signalled where appropriate by web site references. This chapter begins by identifying some key concepts in numerical analysis (scales of data, parametric and non-parametric data, descriptive and inferential statistics, dependent and independent variables). I then address the concept of statistical significance and finally conclude with a brief outline of some simple statistics.

The use of multiple data collection methods dates back to the earliest social science research. It was, however, Campbell and Fiske’s (1959) study of the validation of psychological traits that brought multiple data collection methods into the spotlight. In their classic study, the multitrait-multimethod matrix was designed to rule out method effects; that is, to allow one to attribute individual variation in scale scores to the personality trait itself rather than to the method used to measure it.

Over time, mixed methods research has gradually gained momentum as a viable alternative research method. Over the past 15 years, at least 10 mixed methods textbooks have been published (Bamberger, 2000; Brewer & Hunter, 1989; Bryman, 1988; Cook & Reichardt, 1979; Creswell, 2002, 2003; Greene & Caracelli, 1989; Newman & Benz, 1998; Reichardt & Rallis, 1994; Tashakkori & Teddlie, 1998). Recently, the *Handbook of Mixed Methods in Social and Behavioral Research* was published (Tashakkori & Teddlie, 2003). In addition, journals such as *Field Methods* and *Quantity and Quality* are devoted to publishing mixed methods research. International online journals (see *Forum: Qualitative Social Research* at <http://qualitative-research.net>) and Web sites (e.g., <http://www.fiu.edu/~bridges/people.htm>) provide easy access, resources, and hands-on experiences for interested researchers. Despite this growth and development, a number of controversial issues and debates have limited the widespread acceptance of mixed methods research.

Mixed methods researchers have expanded the reasons for conducting a mixed methods investigation (Mertens, 2003; Newman, Ridenour, Newman, & De-Marco, 2003; Punch, 1998). The author agrees with Mertens (2003) and Punch (1998), who suggested that mixed methods investigations may be used

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