9 Quantitative Data Gathering Methods and Techniques

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Researchers are concerned with analysing and solving problems. These problems come in many forms, can have common features and often include numerical information. It is therefore important that researchers should be competent in the use of a range of quantitative methods. Data is required in order to perform quantitative analyses. This chapter focuses on methods of collecting quantitative data, sampling and measurement issues, surveys, collecting secondary data and experimental research.

The nature of quantitative research

According to our Methods Map (see *Chapter 4*), quantitative methods are part of an **objective** ontology and a **positivist** epistemology. Social science research is mainly influenced by the hypothetico-deductive paradigm (a research approach that starts with a theory about how things work and derives testable hypotheses from it). According to Malhotra (2009), quantitative research aims at quantifying the collected data and employs some kinds of statistical analysis based on a representative sample. The following phrases are linked with quantitative methodology and are often used interchangeably: deductive approach, etic view, objective epistemology, structured approach, systematic approach, numerically based data collection, statistical analyses and replicable research design.

In other words, quantitative studies have four main characteristics:

1. systematic/reconstructed logic and linear path (step-by-step straight line);
2. data which is hard in nature (e.g. numbers);
3. a reliance on positivist principles and an emphasis on measuring variables and testing hypotheses and
4. they usually verify or falsify a pre-existing relationship or hypothesis.

Advantages of using quantitative data relative to qualitative data include the broad comparability of answers, speed of data collection and the 'power of numbers'. Qualitative questions can be asked in a quantitative survey, but responses (and resultant data) are much more structured (and, some may say, restrictive).

The data that you need to collect will very much be driven by the research question you are trying to answer (see Box 9.1). This needs to be very specific and will drive both your data collection *method* and *sampling*. We discuss these terms below.

Box 9.1: Examples of research questions suited for quantitative analysis

In its simplest form, a quantitative research question will try to quantify the variables you wish to examine.

e.g. 'What is the average change in a company's value after merger and acquisition transactions?'

Another researcher might wish to identify the differences between two or more groups on one or more variables.

e.g. 'What is the difference in value between financial and non-financial companies after merger and acquisition transactions?'

Finally, a researcher might wish to explore the relationship between one or more variables on one or more groups. This type of research is mostly associated with experiments and the identification of causal relationships as will be discussed later in the chapter.

e.g. 'What is the relationship between leverage and the value of a company after merger and acquisition transactions?'

Defining dependent and independent variables

Data analysis and design involves measuring variables, which can be dependent or independent. We define dependent and independent variables as follows: a **dependent** variable is one which the researcher thinks will be affected by another variable (or by an experiment), while an **independent** variable is one which the researcher thinks will affect the dependent variable. These will be identified directly from the research question. For example, if you are studying the effects of stock liquidity on firms' performance, firms' performance is the dependent variable and liquidity is the independent variable. Other independent variables, called **control** variables, may include firm size, capital structure and other factors that may affect performance. These control variables are included in order to provide a clear understanding of the role of the independent variable on the dependent variables. In the example above, stock liquidity is not the only variable that affects the performance of the firm: size, capital structure and some other factors might also have an impact on performance. The power of the relationship between the dependent and the independent variables under investigation can be understood more reliably through the inclusion of control variables in the model.

For all quantitative studies, a crucial component of design is the selection and measurement of the dependent variable. It is crucial because the usefulness of the research depends upon the relevance of the dependent variable and its representation on the outcome of interest. Researchers must be cautious, as dependent variable selection reflects the problem definition process and can thus influence the decision-making. Our example suggests the aspect of performance to be considered and the method of measuring it should be carefully selected. For example, if the researcher is interested in the 'financial' aspect of performance, he/she has to choose a suitable measure of financial performance, e.g. accounting measures, such as return on assets (ROA) and return on equity (ROE), or market measures, such as Tobin's Q and market return. To use a different example, if a researcher studying the relationship between board of directors' diversity and capital structure were to choose 'the ratio of male/female directors in the board' as the dependent variable, he/she would have to justify why that ratio is considered to be a more appropriate indicator of diversity than, for example, the ratio of independent directors in the board.

Primary and secondary sources of data

In quantitative research, data can be gathered from either a primary or a secondary source. Primary data refers to data that has been collected directly through first-hand experience. The most common means of gathering primary data for