CHAPTER 5: RESEARCH STUDY APPROACH AND METHOD

5.1 Introduction

This fifth chapter of the thesis is primarily concerned with detailed description and justification of the scholarly approach and method employed in the research study. The chapter begins by critically appraising prior smaller enterprise research from a methodological viewpoint. It then goes on to establish some theoretical foundations for the investigation by identifying certain conceptual paradigms relied upon in the research. Subsequently, the chapter establishes the methodological framework for the study by acknowledging its descriptive, associative and predictive ambitions, by explaining its cross-sectional and exploratory features, by justifying its dependence on secondary data, and by recognising the strengths and weaknesses deriving from its reliance on a postal survey using a structured, self-report questionnaire.

There follows as detailed a description of the data collection procedures employed in the research as is permitted by the remaining records and report of the Australian Manufacturing Council on its *Best Financial Practice* study. The account covers research instrument design and testing, sample selection, response to the survey, and data coding. Finally, the chapter fully explains and justifies the univariate, bivariate and multivariate statistical techniques relied upon in this investigation for description and analysis of its findings.

5.2 Critical Appraisal of Prior Smaller Enterprise Research

The purpose of this section of the chapter is to provide an initial appraisal of prior smaller enterprise research undertaken internationally up to this time from a methodological viewpoint. This is then supplemented and extended as the chapter progresses. The desired outcome is an informed appreciation of the strengths and weaknesses of previous scholarly investigations in the field, so that the methodological choices and features of the present research can be realistically evaluated. Reviews and surveys of SME research reflected in this and subsequent sections of the chapter include those of Loucks (1981) Paulin *et al.* (1982), Perryman (1982), Peterson & Horvath (1982), Carsrud *et al.* (1986), Churchill & Lewis (1986), Wortman (1986), Hornaday & Churchill (1987), Ireland & Van Auken (1987), Sexton (1987), Wortman (1987), Low & Macmillan (1988), Sexton (1988), Bygrave (1989a, 1989b), Smith *et al.* (1989), Stevenson & Harmeling (1990), Bygrave & Hofer (1991), Aldrich (1992), Churchill (1992), Hofer & Bygrave (1992), Macmillan & Katz (1992) and Van de Ven (1992) from North America; Chell & Haworth (1988) and Curran (1989) from the United Kingdom; Szyperski & Klandt (1981) and Roessl (1991) from Europe; and Holmes & Kelly (1989), Gibson (1992c), Holmes (1992) and Williams *et al.* (1992) from Australia.

At the risk of creating an entirely negative view of smaller enterprise scholarship, but as a means of leading into the discussion and focusing it, the most significant methodological problems identified in published reviews and surveys of prior SME

research can be summarised as follows (there is unavoidable overlap between criticisms, and authors cited are simply examples of those making particular criticisms):

- Too much focus on exploratory research (Wortman, 1986; Churchill & Lewis, 1986; Wortman, 1987; Holmes & Kelly, 1989; Sexton, 1988; Holmes, 1992) and too little (Bygrave, 1989a 1989b; Bygrave & Hofer, 1991).
- Lacking conceptual rigou and theoretical underpinning (Carsrud *et al.*, 1986; Wortman, 1987; Sexton, 1988; Curran, 1989; Holmes & Kelly, 1989; Bygrave & Hofer, 1991; Churchill, 1992; Holmes, 1992; Macmillan & Katz, 1992; Williams *et al.*, 1992).
- Narrow focus with reliance on single paradigms or disciplinary frameworks, and insufficient learning from other fields in terms of both content and process (Hornaday & Churchill, 1987; Sexton, 1987, 1988; Bygrave, 1989a, 1989b; Aldrich, 1992; Gibson, 1992c; Macmillan & Katz, 1992; Van de Ven, 1992; Williams *et al.*, 1992).
- Excessive academic orientation of the research, and insufficient attention to its policy relevance (Curran, 1989; Williams *et al.*, 1992) and/or relevance to practitioners such as SME support professionals and owner-managers (Churchill & Lewis, 1986; Ireland & Van Auker, 1987; Churchill, 1992).
- Too many cross-sectiona surveys, and far too few longitudinal and field research studies (Paulin *et al.*, 1982; Stevenson & Harmeling, 1990; Roessl, 1991; Aldrich, 1992; Churchill, 1992; Hofer & Bygrave, 1992; Van de Ven, 1992; Williams *et al.*, 1992).
- Use of small and/or non- epresentative and/or non-random and/or poorly selected samples (Wortman, 1986; Ireland & Van Auken, 1987; Wortman, 1987; Curran, 1989; Holmes & Kelly, 1989; Sexton, 1988; Aldrich, 1992; Churchill, 1992; Williams *et al.*, 1992).
- Reliance on data from surveys with poor response rates, and failure to adequately test for response and non-response bias – thus creating serious misgivings about the external validity or generalisability of findings (Holmes & Kelly, 1989; Smith *et al.*, 1989; Aldrich, 1992; Churchill, 1992).
- Poor reporting of definitions used, sampling frames and samples employed, and other methodological details – so that it becomes difficult to validly compare research findings and/or replicate them (Wortman, 1986; Sexton, 1988; Bygrave & Hofer, 1991; Aldrich, 1992).
- Reporting is largely descriptive and statistically simplistic, only limited use of more sophisticated techniques of statistical analysis, and widespread disregard for the circumstances in which particular forms of analysis may be validly employed (Carsrud *et al.*, 1986; Wortman, 1986; Ireland & Van Auken, 1987; Wortman, 1987; Holmes & Kelly, 1989; Aldrich, 1992; Williams *et al.*, 1992).

- For a variety of reasons, some inherent to the field, subject and/or researcher bias is frequently evident in reported research (Curran, 1989; Smith et al., 1989; Churchill, 1992).

At a more general level, there are inevitably many criticisms relating to gaps in coverage of prior smaller enterprise research across many disciplinary areas (Wortman, 1986, 1987; Curran, 1989; Churchill, 1992). Most worrying though, is a growing feeling amongst leading scholars that cumulation of knowledge in the field is being seriously limited by (*inter alia*) a lack of awareness amongst researchers of the work of others, especially those in different countries (Wortman, 1986, 1987; Sexton, 1988; Aldrich, 1992; Williams *et al.*, 1992).

Ireland & Van Auken (1987, p. 12) summarise as follows the findings of their review and classification of small enterprise/entrepreneurship research published in the period from 1976 to 1985 in two leading journals of the time, *American Journal of Small Business* and *Journal of Small Business Management*:

> In global terms, the classification process reveals that the preponderance of small business management and entrepreneurship research published in the two journals over the last ten years focused on going concerns, was generic in scope, concentrated on an examination of operations-related issues rather than strategic ones, was descriptive in nature, and appears to have been targeted primarily for academic audiences.

Ireland & Van Auken (1987) go on to make a case for more research into new ventures; for research to focus upon more specific samples in terms of enterprise size, industry, geography, time frame, etc.; for more research with a strategic decision-making emphasis; for additional prescriptive as well as descriptive research; and for more research to be carried out with the needs of owner-managers/entrepreneurs, and those who professionally support them, in mind.

In an essay entitled 'The field of entrepreneurship: is it growing or is it just getting bigger?', Sexton (1988, p. 5) comments as follows on the state of small enterprise/ entrepreneurship research world-wide towards the end of last decade:

> With regard to research in the field of entrepreneurship, economists would describe the situation as being in disequilibrium; marketeers would say it is fragmented; strategic managers would be concerned about direction; organizational behavioralists would be concerned about communications; and investors might wonder about the timing of a return on their investment.
>
> Although interest is high in entrepreneurship . . . it appears that research in the area could be described as one of academia's best-kept secrets.

Sexton (1988) goes on to acknowledge considerable growth in the quantity of research being conducted in the area; but he bemoans its generally poor quality and the limited cumulation of knowledge that has occurred because of unawareness of each others' work amongst scholars, and due to a common failure to relate individual research efforts to a broader context or to a convergent theory. Definitional imprecision and inadequate description of samples employed – inevitably making it difficult to discern what or whom is really being studied – is particularly deplored by Sexton (1988). Other weaknesses

identified include use of invalid and/or outmoded theories and techniques from other fields, small samples, lack of controls, too many exploratory studies, and poorly specified models with limited explanatory power.

Echoing Bygrave (1989a, 1989b) in particular, Bygrave & Hofer (1991, p. 13) are less disparaging about progress in small enterprise/entrepreneurship research over the period identified in the last paragraph:

> At the start of the 1980s, entrepreneurship was, at best, a potentially promising field of scholarly inquiry. However, by the end of that decade, due primarily to impressive advances in its body of empirical knowledge, entrepreneurship could claim to be a legitimate field of academic inquiry in all respects except one: it lacks a substantial theoretical foundation.

Thus, Bygrave & Hofer (1991, p. 13) go on to proclaim that 'A major challenge facing entrepreneurship in the 1990s is to develop models and theories built on solid foundations from the social sciences'. They concur with Sexton (1988) and Bygrave (1989a, 1989b) on the need for definitional precision, and for clear specification of samples employed, if research in the field is to truly advance knowledge. Churchills' (1992, p. 580) summation on the era is as follows:

> In short, in 1980 the atmosphere was one of relatively unguided exploration; in 1985 the attitude was one of excitement, proselytizing, and a few breakthroughs; and in 1990 it was optimism and a maturing awareness of the size and complexity of the subject at hand.

In the United Kingdom, Curran (1989, p. 4) clearly shares the more generous view of then recent developments in smaller enterprise research expressed by the North Americans in the previous paragraph, although the latter are unlikely to agree with everything in the following quotation:

> As an initial, broad brush assessment, it can be said that the increase in the range, quality and depth of small business research since 1971 has been remarkable. The curves measuring output and quality have become steeper and steeper, especially since 1980. No other country, not even the United States, can match this contribution to small enterprise knowledge and there is every indication that we may expect further enhancement on both dimensions.

Nevertheless, Curran (1989, p. 25) acknowledges all the problems of emergent research in the field already identified, and also most clearly articulates a further weakness of which the majority of other reviewers seem to want to avoid mention:

> In many areas of the human sciences researchers develop a strong empathy with those they study and in small business research this is even more likely given the cultural and political approval currently given to economic individualism.

From the other side of the Atlantic, Aldrich (1992, p. 191) is similarly frank:

> People who study entrepreneurship exhibit a certain sort of madness in their passion for the subject. This zest for the substance of entrepreneurship is what makes the field so attractive to many of us who are refugees from other, more boring fields. It also, however, occasionally draws stares of disbelief from adherents of older, more established fields, who are suspicious of anyone who is excited about an academic subject. Outsiders scrutinize our research closely, looking for flaws that will confirm their worst suspicions that our madness is certifiable.

Thus brought out is the emotional and/or doctrinaire bias of researchers which so obviously pervades much scholarly writing in the field.

As a means of clarifying how theoretically ambitious small enterprise/ entrepreneurship research can or should be, Bygrave (1989a, 1989b) and Bygrave & Hofer (1991) draw attention to Penrose's (1989) classification of theories as follows:

- Superb theories – that make extremely accurate predictions like those emerging from Euclidean geometry Newtonian mechanics or Einstein's special relativity theory.
- Useful theories – that make rather more untidy and less accurate predictions than superb theories.
- Tentative theories – that make predictions which, at best, are vague and of limited accuracy, and that generally lack significant empirical support.

On the basis of Penrose's (1989) belief that there are no superb theories outside the mathematical and physical sciences, Bygrave & Hofer (1991, p. 16) argue that 'the very best we can hope for in the field of entrepreneurship is useful models and theories'.

Bygrave (1989a, 1989b) and Bygrave & Hofer (1991) particularly emphasise that, to the extent that small enterprise/entrepreneurship models and theories must necessarily incorporate human volition, they are inevitably going to be non-deterministic or non-algorithmic. In the present context, a foretaste of this characteristic is provided late in Chapter 4 of the thesis when considering why prior research has found relationships in either direction between financial reporting practices on the one hand and business growth and performance on the other very difficult to discern. Bygrave (1989a, 1989b) and Bygrave & Hofer (1991) see such indeterminacy as bringing out the weakness in mathematical modelling approaches to research in the SME field, the popularity of which they attribute to 'physics envy'. Bygrave & Hofer (1991, pp. 19-20) refuse to subscribe to 'the Laplacian fantasy that all entrepreneurial processes can be described with mathematical models', and they go on:

> . . . if entrepreneurship researchers feel that they must pursue mathematical models, we urge them to look beyond regression analysis for several reasons. First, regression analysis is reductionist while entrepreneurship is holistic. Also, regression analysis usually generates smoothly changing analytical functions, while entrepreneurship deals with sudden changes and discontinuities. In addition, regression analysis assumes stable models built with relatively few variables, rather than unstable models with many variables. In short, it is time to abandon the linear, incremental thinking that regression models inculcate.

In this light, Bygrave & Hofer (1991) would perhaps disapprove of the approach and method employed in the present research, culminating as it does in predictive modelling using logistic regression techniques. Furthermore, some findings to be presented could be construed as something of a vindication of Bygrave & Hofer's (1991) position.

At the close of his paper, Bygrave (1989a) provides the following methodological guidelines for sounder research in the emergent scholarly field of small enterprise/ entrepreneurship:

- Less physics envy.
- More empirical models and fewer theoretical models.
- Less concern with sophisticated statistics.
- More field research.
- More longitudinal studies.
- Dedicated researchers.
- Original field-derived data banks.
- Less obsession with scientific revolutions.

Supplementing the methodological guidelines for sounder small enterprise/ entrepreneurship research provided by Bygrave (1989a), Hofer & Bygrave (1992, p. 98) observe as follows on the methods of statistical analysis most likely to be suitable for the type of quantitative data typically obtained:

> . . . regression, multiple regression, and various other parametric statistical techniques are vastly overused in the entrepreneurship area. Moreover, they are also used in inappropriate ways in many entrepreneurship research studies. For instance, most of these techniques are built on assumptions of linear relationships and continuous variables neither of which is generally met by entrepreneurship phenomena. Put differently, non-parametric statistics rather than parametric statistics are called for in most entrepreneurship research – unless one has taken the time and made the effort to look at the underlying statistical distributions to see whether they are sufficiently well behaved to justify the use of parametric techniques. Few studies that we have seen, though, have done this!

As will be seen, non-parametric 'distribution free statistical techniques are appropriately used in the present research.

Parallelling calls from Ireland & Van Auken (1987), Aldrich (1992) and Churchill (1992) for less 'coarse grained' samples, Hofer & Bygrave (1992, p. 96) also argue that 'the sensitivity of outcomes to changes in initial conditions means that conditional data, rather than non-conditional data, should be gathered about most entrepreneurship phenomena'. With 25 enterprise characteristic variables and 44 financial management characteristic variables jointly capturing the business context of the study, the present research is clearly sympathetic to this argument.

In closing, Holmes & Kelly (1989, p. 21) comment as follows on the methodological weaknesses of prior Australian research in the specific field of the present investigation:

> During the past two decades, 'empirical' research concerning the relationship between small business owner-managers and practising accountants has provided limited insight into the role of accountants and accounting information in assisting small business operations. This research has been exploratory and largely descriptive, tending to focus on small samples of poorly defined small businesses in non-representative Australian regional locations. Rigorous statistical analysis of the results obtained is virtually non-existent.

Holmes & Kelly (1989, p. 29) make the following observations on analytical techniques employed in previous investigations in the field:

> The typical analysis was naïve involving the listing of frequencies for each question in tabular form and comparing the percentile differences between sub-groups, usually based on either employment size or industrial sector. Limited

> analysis was undertaken of the possible relationships within various cross tabulations presented in several studies. A number of parametric and non-parametric statistical tests are available which could have been applied to further analyse the data. For example, probit and logistic regression analysis . . . and development of ordinal models . . . are powerful statistical tests that would have further enhanced data analysis and the interpretation of the results obtained.

As will be seen, apart from being justifiably exploratory, the research described in this thesis successfully avoids all of the criticisms in these two quotations from Holmes & Kelly (1989).

5.3 Paradigm Choice for the Study

Amongst the major methodological problems with prior smaller enterprise research noted earlier in this chapter is use of a single research paradigm. This is most often the neoclassical microeconomic view of the world of business. Given the nature of the principal research question addressed in the study, it is most difficult to avoid considerable reliance on the neoclassical microeconomic paradigm. Thus, stage models of smaller enterprise development and growth having their origins in the neoclassical microeconomic literature are employed in Chapters 2 and 3 of the thesis. Given the roots of modern finance theory, it was initially necessary in Chapter 3 to view the financial reporting dimension of this study with a neoclassical microeconomic perspective. Subsequently, however, an alternative perspective on financial reporting in smaller enterprises provided by the so-called Austrian school of economic thought is considered. In fact, both these perspectives are contemplated in this study as they point to markedly different possibilities for findings on financial reporting practices amongst the SMEs investigated. Significantly, the differences are most likely to be reflected in what is discovered on use of financial reports for internal financial management purposes by owner-managers and, to a lesser extent, managerial employees. In a broad sense, the present research tests the veracity of these competing perspectives.

It is appropriate to consider here whether the Austrian economics paradigm has anything to offer the smaller enterprise growth dimension of the present research. Fortunately, this can be answered in the affirmative on the grounds which follow. In his book entitled *The Theory of Economic Development*, leading Austrian economics thinker and writer Schumpeter (1934) is explicitly concerned with economic growth and dynamics in a capitalist economy. While this seminal work has a macroeconomic overlay, as Ekelund & Hébert (1990, p. 577) indicate, 'The distinguishing feature of Austrian macroeconomics is its overriding concern for the microeconomic foundations of macroeconomic principles'. At the microeconomic core of Schumpeter's writings is the entrepreneur as innovator and economic change agent. Ekelund & Hébert (1990, p. 577) point out that:

> Schumpeter described innovation in several ways. He first spelled out the kinds of new combinations that underlie economic development. They encompass the following: (1) creation of a new good or new quality of good, (2) creation of a new method of production, (3) the opening of a new market, (4) the capture of a new

source of supply, and (5) a new organization of industry (e.g., creation or destruction of a monopoly

Plausibly, the initiation by its owner-manager (or entrepreneur) of growth strategies in a smaller enterprise can be perceived as an innovation for that business concern, and may constitute a truly innovative development in domestic and/or international markets.

In Chapter 1 of this thesis attention is drawn to the well-documented competitive advantage small and medium enterprises frequently enjoy in technological and managerial innovation. The most recent Australian federal government statistics on innovation and research and development activity amongst manufacturing small enterprises are provided by the Bureau of Industry Economics (1995c) for 1993-94. An Australian Manufacturing Council (1995) report entitled *The Innovation Cycle* also addresses innovation in the manufacturing sector. Other recent works on innovation and Australian business include Carnegie & Butlin (1993), McKinsey & Company (1993c) and Ohmae (1993). The key point about such evidence is that there appears to be a tangible nexus between growth and innovation amongst smaller business concerns. To the extent that this is so, the Austrian economics paradigm arguably has considerable relevance to the smaller enterprise growth dimension of the present research. At the very least, it can be claimed that this theoretical paradigm is sympathetic to the context of the study, and to the nature of the businesses making up the study sample.

In prior chapters of the thesis, use of a strategic management paradigm has been considered and resisted as the principal conceptual framework for key dimensions of this study. For various reasons summarised below, strategic management perspectives on smaller enterprise development and growth are valued but not fully taken up in Chapter 2 of the thesis. For similar reasons, valuable scholarly views on the role and importance of financial reporting in strategic management of smaller business concerns are acknowledged but not wholly embraced in Chapter 3. The limitations of strategic management theory and research for the purposes of this inquiry are seen to include:

- Despite much investigation, there are still serious questions about whether owner-managers of smaller enterprises are consciously or deliberatively strategic in their management style. For strategic management perspectives on growth to be sufficiently plausible, it would seem essential to be able to demonstrate more substantial longer-term vision and strategic intent amongst SME owner-managers.
- Unfortunately, strategic management perspectives on smaller enterprise growth are rich to a fault in explanations they attempt to provide. Simplicity and parsimony are qualities which seem to be overlooked in the zeal to provide as comprehensive and nuance-replete an explanation as possible of growth phenomena.
- Adequate empirical support for strategic management perspectives on smaller enterprise growth is yet to be forthcoming. Strategic management explanations tend to employ such complex and difficult to measure concepts, and are so

contingent in their specifications, as to make these theories almost untestable in any practical sense.

- Relatively little explicit attention to general purpose financial reporting practices, as defined for the purposes of this research, can be found in the strategic management literature since these have not been outcome, predictor or contingent variables which have interested scholars in the area to any marked extent. At most, financial reporting of the type at the focus of this study is apt to be mentioned as one of many tools available for achieving adequate managerial control. Where reference is made to financial reporting, it is most often what has been styled as special purpose financial reporting.

Overall then, a strategic management paradigm is not employed centrally in this study because it is, for various reasons, an extremely difficult perspective to work with from a practical research viewpoint. Furthermore, despite a voluminous and exponentially growing literature strategic management as a field of scholarship is very far from having settled theoretical foundations. For example, leading writer in the field Mintzberg (1990, 1994) identifies no less than three prescriptive and seven descriptive schools of thought on strategy formation that have emerged in the strategic management literature. In closing the introduction to his book entitled *The Rise and Fall of Strategic Planning*, Mintzberg (1994, p. 4) indicates that:

> A certain cynicism of tone pervades much of this book. Perhaps the reader will forgive it when bearing in mind that he or she has to see only this final result of my work. I, in turn, had to read huge quantities of some awfully banal literature. In the midst of doing that, I heard an item on Canadian radio news about the opening of a new mine from which the owners expected to extract about three-quarters of an ounce of gold for every ton of ore. My immediate reaction was – if only I had been able to do as well with this literature!

Finally, it should also be acknowledged that, because of their particular orientation and beliefs, it is doubtful that strategic management scholars would approve of a focused inquiry of the present kind.

In summary, this study relies substantially on the neoclassical microeconomic and Austrian economics paradigms which have been identified; doing so mainly to the extent they seem likely to shed light on the financial reporting practices at the focus of the research. Nevertheless, it is believed that elements of the strategic management paradigm can usefully inform this study, especially as regards broad organisational and managerial context or background. This methodological approach is considered well advised because it permits paradigmatic plurality in the inquiry, with potential explanatory benefits to not only the financial reporting dimension, but also to the smaller enterprise growth aspect of the study.

5.4 Methodological Framework for the Study

5.4.1 Broad Methodological Approach

The following is a classification of research by method based on that of Gay & Diehl (1992) which reflects the broad strategy, orientation, emphasis and approach of the research, and also the type of research question intended to be answered:

- Historical research – which involves studying, understanding and explaining past events.
- Descriptive research – which involves collecting and examining data in order to answer questions concerning the status or condition of the research subjects at some point in time.
- Associative (or correlational) research – which attempts to determine whether, and to what degree, a relationship exists between the status or condition of the research subjects at some point in time and other factors which cannot be manipulated by the researcher.
- Causal-comparative (or *ex post facto*) research – which attempts to establish the cause of the status or condition of the research subjects at some point in time on the basis of knowledge of factors which cannot be manipulated by the researcher.
- Experimental research – which attempts to establish the cause of the status or condition of the research subjects at some point in time on the basis of knowledge of factors which can be manipulated by the researcher

Alternative methods could be used for a particular research situation, depending upon how the research question is framed or structured; and methods may be jointly employed in a given situation. A key issue is whether the intention is to establish causation. Only experimental research can truly identify causation. Causation in causal-comparative research is, at best, tenuous. Using the historical, descriptive and associative methods, causation may be suspected but not demonstrated. To the extent that dependable associations are evident, research findings may be used for predictive purposes whether or not causation is established.

Other considerations in selecting a research method include what resources (including time) are at the disposal of the researcher, the nature and accessibility of research subjects, and the type of data which are or will become available. By and large, the resource demands of research become more stringent moving down the list of methods identified above. Given the nature of the research question and the various constraints which apply, the present research mainly employs the descriptive and associative methods. The study also extends to being predictive.

The obvious attractions of seeking knowledge and understanding of small and medium-sized enterprises using longitudinal research methods – involving structured data collection from elements of a population over extended periods of time, usually years – have already been alluded to in this chapter. There can be little doubt that, given

that they are almost always time-dependent, issues surrounding growth and/or development in SMEs are most appropriately studied in a longitudinal manner (Bygrave, 1989a; Stevenson & Harmeling, 1990; Hofer & Bygrave, 1992; Van de Ven, 1992). However, in the present research, time and cost constraints mitigated against use of longitudinal techniques. The elapsed time limits usually imposed on doctoral research once formally started make longitudinal research in this context the exception rather than the rule. A leading entrepreneurship scholar, Bygrave (1989a, p. 21) observes that 'longitudinal field research is excruciatingly time consuming, so it does not fit the time constraints imposed on most researchers, especially doctoral students'. Furthermore, the substantial financial resources necessary for a well-founded longitudinal study with an adequate sample size are rarely at the disposal of doctoral students. To put this in some perspective, the budget for the Australian federal government's Business Longitudinal Study involving an annual postal questionnaire survey over five years of approximately 6,000 employing businesses is around $4 million (Australian Bureau of Statistics, 1996e). Looking more broadly in terms of an academic career, Churchill (1992, p. 594) point out that longitudinal studies are 'powerful, demanding, and difficult to conduct given the tenure and promotion criteria of today's universities'.

Thus this investigation is of necessity, cross-sectional in nature -- involving structured data collection from elements of a population at a single point in time. Amongst other authorities, Zikmund (1994) and Cooper & Emory (1995) point out that this is by far the most common form of survey research in many fields of scholarship. Inevitably, the findings of such research give a static and shallow view of the issue or problem at hand; and insights gained tend to be blurred by many extraneous differences between research subjects that cannot be detected and/or completely controlled for. Nevertheless, especially when a broad perspective is required or is acceptable, there is frequently little choice but to use a cross-sectional design in exploratory research and for doctoral research. In relation to research on smaller enterprises, Hofer & Bygrave (1992, p. 95) observe that:

> Breadth is always desirable to make the findings generated as generalizable (i.e., widely applicable) as possible. It is unrealistic . . . to demand that anyone devote multiple years to every study they wish to do in a particular field.

5.4.2 Exploratory Orientation of the Research

One of the methodological issues identified in the critical review of prior smaller enterprise research presented earlier in the chapter is whether such inquiry should, at the present stage of development of the field, be more exploratory (naturalistic or inductive or data analytic or data-driven or theory constructing) or more confirmatory (or explanatory or scientific or deductive or theory-driven or theory testing) in orientation. The choice profoundly influences the ordering of steps in the method employed in a scholarly investigation, and also determines the outcomes ultimately sought (Glaser &

Strauss, 1967; Buckley *et al.*, 1976; Tukey, 1977; Abdel-Khalik & Ajinkya, 1979; Lewins, 1992; Sekaran, 1992; Lewins, 1993; Zikmund, 1994).

This study can be characterised as being exploratory research that relies upon 'simply and subjectively observing phenomena in their natural setting and deriving theories that fit the analysis of the data' (Abdel-Khalik & Ajinkya, 1979, p. 29). Sekaran (1992, p. 95) indicates that 'In essence, exploratory studies are done to better comprehend the nature of the problem', and he explains:

> An exploratory study is undertaken when we do not know much about the situation at hand, or when we have no information on how similar problems or research issues have been solved in the past. In such cases, extensive preliminary work needs to be done to gain familiarity with the phenomenon in the situation, and to understand what is happening before we can develop a model and set up a rigorous design for complete investigation.

The nature or role of exploratory research in the context of pursuing a doctorate is indicated, perhaps somewhat cynically, by Phillips & Pugh (1987, p. 45) in observing that 'It obviously involves pushing out the frontiers of knowledge in the hope that something useful will be discovered'.

Following Lewins (1992, 1993) in particular, the typical sequential steps in conducting exploratory research can be summarised as follows (with corresponding parts of this thesis indicated in parentheses):

- Problem identification – usually a recognised and significant gap in knowledge in a comparatively new scholarly field with underdeveloped theoretical foundations (see Chapter 1 supported by Chapters 2, 3 and 4).
- Method choice – including identification of an appropriate unit of analysis and the relevant population, selection of a sample, choice of variables, and selection of data collection and examination techniques (see mainly Chapter 5).
- Data collection – may include quantitative and/or qualitative inquiry, often using smaller and non-random samples; and secondary data is frequently important (see mainly Chapter 5).
- Data examination – including description and analysis of the data to gain desired empirical and conceptual insights into the research problem and its context (see Chapters 6 and 7).
- Conclusion formulation – including development of an agenda comprising questions and/or hypotheses relating to the research problem for subsequent confirmatory testing and theory development (see Chapter 8).

The most significant methodological feature of exploratory research thus represented is that specific research hypotheses are sought outcomes of the inquiry, rather than the basis for its initiation.

Buckley *et al.* (1976) distinguish between inductive inquiry and deductive inquiry in terms of the types of research questions they typically address:

- Inductive research is claimed to be keyed to which-questions, where-questions, who-questions, why-questions, whether-questions, how-questions and what-questions.
- Deductive research is claimed to be keyed to will-questions, is-questions, set-response-questions, task-response questions and if-questions.

Reference to the principal research question in the present inquiry (see Chapter 1 of the thesis) reveals that it actually combines a which-question and a what-question – thus suggesting this research is inductive in nature.

Recognising, as do many other authorities, that both inductive and deductive modes are present to some degree in all research, Buckley *et al.* (1976) argue that there is a need for more inductive, theory generating research in accounting. Buckley *et al.* (1976, p. 50) cite advantages in favour of such 'grounded theory' originally put forward by Glaser & Strauss (1967):

- One canon for judging the usefulness of a theory is how it was generated – and it is likely to be a better theory to the degree that it has been inductively developed from social research.
- Generating theory from data means that most hypotheses and concepts not only come from the data, but are systematically worked out in relation to the data during the course of the research.
- Theory based on data can usually not be completely refuted by more data or replaced by another theory. Since it is too intimately linked to data, it is destined to last despite its inevitable modifications and reformulations.
- Grounded theory can help to forestall the opportunistic use of theories that have dubious fit and working capacity.

Abdel-Khalik & Ajinkya (1979, p. 21) prefer the formal structure of the scientific method for research in accounting; but they recognise that 'Infeasibility and intractability may sometimes make it very difficult to use that structure'. They believe all approaches to research are desirable; but they recognise that the various approaches obviously have differing degrees of strength and reliability. A view on the relationship between exploratory and confirmatory research is provided by Abdel-Khalik & Ajinkya (1979, p. 103) as follows:

> When the characteristics of the two methods [are] contrasted, they [are] reduced to the matter of controlling the extraneous variables not under study, and the matter of trade-offs between the strength of the causal inferences that can be drawn (internal validity) versus the generalizations (external validity) that can be made. It is our view that both approaches are needed in the sense that looking at the research problem by employing two different approaches could in effect add to, and enhance, the quality of findings. This process of using multiple methods is called triangulation, which is a way of confirming research quality.

Another view is embodied in a dictum from the most widely acknowledged authority on exploratory research, Tukey (1977): that exploratory methods can only be a beginning, a base from which subsequent confirmatory research can be undertaken. Thus, Zikmund

(1994, p. 33) points out that 'conclusive evidence to determine a particular course of action is *not* the purpose of exploratory research. Usually, exploratory research is conducted with the expectation that subsequent research will be required to provide conclusive evidence'.

In a critique of prior smaller enterprise/entrepreneurship research, Chell & Haworth (1988, p. 17) observe that:

> . . . research in this area has been heavily criticised . . . A major weakness is the lack of large scale studies carried out systematically across industries and locations, using sophisticated statistical techniques and analyses . . . Qualitative approaches, applied to non-random samples and using non-statistical, in-depth interview techniques have abounded. This is largely because entrepreneurial research is at an early stage with little theory to guide it. Exploratory research was, and still is, warranted in order to give insights and develop theories for subsequent testing. However, this is no reason for an inadequately conceived research design . . .

On the rapidly growing body of research into entrepreneurship, Macmillan & Katz (1992, p. 6) have more recently concluded that 'at the micro level we have no cogent theory of entrepreneurship. Therefore we cannot test hypotheses'. This suggests that, even yet, much scholarly inquiry in the broad area tends to be exploratory in its orientation. Statements like the following from Merz *et al.* (1994, p. 50) are common in published SME research studies:

> The thrust of this study is exploratory and descriptive and should be considered preliminary to the subsequent inductive development of a more general growth management theory. Therefore, the study does not offer specific hypotheses to be tested. Instead it provides preliminary empirical evidence to evaluate the proposition that . . .

It could be argued that SME researchers should try to use a theoretical framework developed for other circumstances as a foundation for applying the scientific method to their studies. One potential problem with this line of reasoning is that such theory might not exist, which is frequently the situation facing smaller enterprise scholars. Another is alluded to by Brytting (1991, p. 184) in his study of organising in smaller growth enterprises:

> . . . several earlier attempts to verify or test our traditional theories and concepts in the small firm context have been unsuccessful. Without meaningful concepts and theories, small firm behaviour stands out as irrational, complex and difficult to understand.
>
> Many of the shortcomings of traditional theory stem from their rationalistic bias, and from their tendency to separate organizational phenomena in small firms from the thoughts, feelings and lives of the individual human beings involved.

This position is strongly supported by Bygrave (1989a, p. 20) who asserts:

> . . . I am certain that we cannot separate entrepreneurs from their actions. After all, in a startup company, the entrepreneur and the company are one and the same. In entrepreneurship research, it is nearly impossible to reduce problems to neat constituents that can be examined in isolation. We should avoid, whenever possible, reductionism in our entrepreneurship research. Instead we should look at the whole.

Bygrave (1989a, p. 20) goes on:

> Entrepreneurship, as an emerging paradigm, is in the pre-theory stage. It is rather like biology before Darwin's natural selection theory or nuclear physics before Rutherford's model. At that stage, the emphasis should be on painstaking observations rather then theory building. I must stress that I am not opposed to theories. On the contrary, I fully recognise that theories are central to science. It is just that when I contemplate our present empirical knowledge, it appears inadequate for building robust theories of entrepreneurship.

Given the current state of research specifically in the field of smaller enterprise finance/financial management, the study described in this thesis is necessarily exploratory. It is of a type contemplated by Petty (1991, p. 90) when he inquires:

> What is 'good' research? Conventional wisdom teaches us that research should be theory based, where we first develop the theory, build our hypotheses from the underlying theory, which we then test empirically, i.e., deductive analysis. In an emerging and immature, discipline, where we find ourselves with small-business and entrepreneurial finance, could we not also benefit from the skills of the pure empiricist? In other words, should we not value also inductive logic applied to purely exploratory, empirical research – what William Bygrave calls 'enlightened speculation'?

Recent support for this position is provided by Peel & Wilson (1996, p. 66) as follows:

> . . . in addition to theoretical contributions, it is clearly important that further empirical studies are conducted (including in-depth case studies) on small business financial management and working capital practices, and their relationship with firm performance, not least to assist policy-makers and educators to identify the requirements of, and specific problems faced by, small firms.

These latter words are obviously sympathetic to the present research for their emphasis on linkages between financial management practices and enterprise performance.

However, the most important justification for adopting an exploratory approach to this study is reflected in McMahon & Davies' (1991a, p. 31) comments on their earlier study of financial reporting practices amongst smaller growth enterprises:

> A problem is encountered in trying to [assess] the financial reporting practices of each enterprise [in a manner] which reflects not only whether particular financial statements are obtained but also their relative importance to financial management practice and the frequency with which they should be obtained. Intuitively, it might be expected that various financial statements and reporting frequencies may not be seen as equally attractive to the owner-managers of smaller enterprises. The difficulty arises primarily because the disciplines of Accounting and Finance have yet to provide an accepted normative theory indicating which financial statements are most valuable in financial management, and a desirable frequency for their use.

At the time of conducting the present research, a normative theory on financial reporting that could be appropriately applied to smaller businesses seems no closer in prospect.

5.4.3 Obtaining Data for the Research

The overall intention in the present investigation has been to avoid as far as possible the sample-related criticisms of past smaller enterprise research which have been identified in this chapter. Thus, the goal has been to obtain a sample which is as representative as possible of the target population, broadly defined, hence maximising the external validity or generalisability of the study. The specification given in Chapter 1 of the thesis for the unit of analysis, which therefore defines the population of interest, is individual small or

medium-sized manufacturing enterprises legally organised as proprietary companies in Australia that might be growing by catering to domestic and/or international markets.

Clearly, the external validity or generalisability of this research is immediately limited by specifying an Australian population, rather than one that is international. However, it is considered justifiable in the circumstances to accept this limitation for a number of pragmatic and methodological reasons:

- Practically, it is beyond the time and financial resources, not to mention the personal research network linkages, of the researcher to access an international population. Furthermore, no suitable international databases of the chosen research subjects with reasonable or affordable accessibility for sampling is known to the researcher.
- As far as method is concerned, accessing an international population would introduce to the study a host of extraneous or confounding influences which could not be easily controlled for, and which might obscure the relationships of particular interest in the research. Such influences include vastly differing social, political and economic *milieux* between countries.
- Thinking also of the ultimate value of the research to policy makers, unless it is possible to make the study large enough to control for, or enable comparisons between, policy environments (which seems out of the question), it is far better to restrict the study to a single policy environment; that is to say, a single country which is Australia.

A number of possibilities existed for establishing a research sample for this study. In recent years, the Australian federal government, often in partnership with private sector organisations such as business chambers and industry associations, has undertaken a number of initiatives for stimulation and support of growth amongst small and medium enterprises in this country. While any of the programmes, and their associated organisations, could have been approached to assist with identifying and establishing contact with smaller enterprises for inclusion in the study sample, the most desirable sample appeared to be those smaller manufacturing concerns included in the federal government's Business Longitudinal Study of employing businesses (Australian Bureau of Statistics, 1996e). However, the recent report of the Australian federal government's Small Business Deregulation Task Force entitled *Time for Business* (Bell, 1996, pp. 60-61) observes that 'Statistical collections are a source of considerable irritation for small business' and goes on:

> Small businesses are critical of the number of surveys in which they are expected to participate, the frequency and duplication of requests for the same information, and the inconvenient or inappropriate timing of these requests.

Amongst recommendations in the report are: that the Australian Bureau of Statistics rationalise and/or reduce its statistical collections from Australian small enterprises, and that the Bureau provide leadership to public and private sector organisations to do

likewise. Early attempts made by the present researcher to secure the assistance of the Australian Bureau of Statistics and the Department of Industry, Science and Tourism in sample selection and distribution of a postal questionnaire specifically developed for this investigation failed completely because the Australian federal government responded immediately and forcefully to this recommendation of the Small Business Deregulation Task Force.

Consequently, before undertaking other inevitably less convenient, less effective and more costly means of gathering primary data for this research, a concerted effort was made to ascertain what data already exist that might permit the principal research question to be appropriately and adequately addressed. It was at this stage that the Australian Manufacturing Council's *Best Financial Practice* study came to notice, and the prospect of using secondary data arose. Zikmund (1994, p. 40) defines secondary data as 'Data that have been previously collected for some project other than the one at hand'. Some advantages and weaknesses of using secondary data, and the role of secondary data in exploratory research such as the present study, are identified by Zikmund (1994, p. 41) as follows (italics added for emphasis):

> Secondary data can almost always be gathered faster and at lower cost than primary data. However, secondary data may be outdated or may not exactly meet the needs of the researcher because they were collected for another purpose. Nevertheless, *secondary sources often prove to be of great value in exploratory research.* Investigating such sources has saved many a researcher from 'reinventing the wheel' in primary data collection.

Another weakness of secondary data mentioned by Zikmund (1994) is that the user has no control over their accuracy. On this point, Zikmund (1994, p. 117) indicates that 'Investigators are naturally more prone to accept data from sources such as the . . . government because of the integrity of the source'. This investigation does, of course, rely on secondary data gathered for an organisation established and sponsored by the Australian federal government. Zikmund (1994) specifies two typical objectives for research based on secondary data as follows:

- Fact finding – accumulation of descriptive information from secondary data sources.
- Model building – attempting to specify relationships between variables based on secondary data, sometimes using descriptive or predictive equations.

Both of the these objectives are clearly pertinent in the present research.

Further authority and justification exists in the business research methods literature for employing secondary data in investigations like this. For example, Cooper & Emory (1995, p. 241) point out that:

> . . . secondary data may be used as the sole basis for a research study. The historical method is the classic example, but it is hardly the only one. Retrospective research often requires the use of past published data. In many research situations, one cannot conduct primary research because of physical, legal, or cost limitations.

And according to Howard & Sharp (1983, p. 141):

> . . . secondary data have considerable attractions for the research student particularly in the social sciences . . . They are usually more quickly available than primary data and much less organisation is required to obtain them. Furthermore they exist in considerable quantity and may contain information that is fairly easy for a government agency with legal backing to collect that would be very difficult for the lone researcher.

In Chapter 1 of the thesis, when initially justifying use of a secondary data source in this research, it is indicated that, by both national and international smaller enterprise research standards, the Australian Manufacturing Council's *Best Financial Practice* study has provided excellent data in terms of sample size and representivity, and the completeness of responses. Underwritten as it was by the Australian federal government, a survey of this scale, quality and cost would be difficult indeed for an individual researcher to match. In fact, without the authority of the federal government behind it, it is unlikely that smaller manufacturers in Australia would have responded to such a survey in the numbers they did.

It seems appropriate to close this sub-section of the chapter with the most evocative and pragmatic case found for use of secondary data in SME research, provided by Stevenson & Harmeling (1990, p. 120) in the following words:

> There is an obvious temptation in our field to rely on the resource of assembled data bases. They have many advantages: someone has already completed the laborious task of assembly, documentation, and purging. They have accepted objectivity and offer clear repeatability. Whether in economics, finance, or entrepreneurship, the control of a data base offers its possessor a unique opportunity to get on with the work of applying tools, techniques, and theories instead of suffering the drudgery of unsung labors in collecting data with uncertain value in its output.

To be absolutely fair to its authors, this quotation is really a preamble to a call for collection of more primary data in small enterprise/entrepreneurship research!

5.4.4 Employing a Postal Survey in the Research

It has already been indicated that research for the *Best Financial Practice* study involved data collection through a postal survey using a structured questionnaire containing essentially closed questions. Postal questionnaire surveys are most often used in business research where, as in the present situation, the investigator is trying to obtain a broad, fairly general picture of current practice is some field. Providing an adequate response rate is achieved, the comparatively large sample size and wide coverage possible with a postal survey (in relation to the limiting survey resource – usually funds) permit generalisations to made which together represent a reasonable, if somewhat superficial, picture of 'the state of the art'. Wortman (1986, 1987) indicates that mailed questionnaires have dominated as data collection tools in smaller enterprise research in North America. Roessl (1991) reports that approximately three-quarters of European SME research projects surveyed by him used questionnaires for data collection. Aldrich (1992, p. 209) states that mailed surveys are the mode in papers presented at two

leading international small enterprise/entrepreneurship conferences reviewed by him, and he goes on:

> . . . *our* research method of choice is the static, cross-sectional standardized questionnaire which, at best, asks entrepreneurs to recall – in *our* own words – their triumphs.

The claimed advantages for the mailed questionnaire procedure in research data collection include (Moser & Kalton, 1979; Kanuk & Berenson, 1980; Mautz & Skousen, 1980; Gay & Diehl, 1992; Sekaran, 1992; Zikmund, 1994; Cooper & Emory, 1995):

- With mailed questionnaires, larger and/or more geographically dispersed samples are possible for lower cost than with telephone or personal interviewing, less researcher time is required, and mailed questionnaires avoid problems with interviewer access, variability or bias.
- Information from mailed questionnaires may be more expansive and/or reliable than that from either telephone or personal interviews because it is gathered contemporaneously, respondents are able to check information by verifying their records or consulting with others and since mailed questionnaires permit convenient, leisurely and thoughtful reply.
- Relative or promised anonymity of mailed questionnaires may encourage respondents to more freely divulge private or embarrassing or socially undesirable information.

The alleged disadvantages of the mailed questionnaire procedure in research data collection include (Moser & Kaltor, 1979; Kanuk & Berenson, 1980; Mautz & Skousen, 1980; Gay & Diehl, 1992; Sekaran, 1992; Zikmund, 1994; Cooper & Emory, 1995):

- For many reasons, including limited available time on the part of respondents, mailed questionnaires may elicit low response rates with the attendant problems of response and non-response bias – thus leading to poor generalisability of findings.
- Mailed questionnaires can only be used when questions are sufficiently simple and straightforward to be understood by respondents with a presumed level of education, and with the help of just printed instructions.
- Even if great care is taken in devising mailed questionnaires, there is always the possibility that respondent may misunderstand questions – so it can never be certain that respondents are answering questions researchers intended to ask.
- Answers to a mailed questionnaire generally have to be accepted as final with there being no opportunity to clarify questions or answers, ensure answers are given, discourage false or misleading answers, probe further, make additional observations on context, and so on.
- Mailed questionnaires cannot be used when spontaneous answers from just one person with particular position, and without the collusion of others, are essential.

- Answers to various questions in a mailed questionnaire cannot be treated as independent and sequentially appropriate because respondent can see all questions before answering any one of them.

The report of the Australian federal government's Small Business Deregulation Task Force entitled *Time for Business* (Bell, 1996, p. 61) includes the following comment from one small business: 'Statistical collections are a nuisance . . . I often report rubbish just to get them off my back!'. In view of this, and of the other observations that have been made on the inadequacies of a postal questionnaire survey for gathering the type of data sought in the present research, it is considered prudent to follow Lawson (1964, p. 226) and state the following disclaimer at this point:

> . . . it is emphasized that the data are presented not as proof but merely as evidence, the quality of which, bearing in mind the questions asked, is left to the judgement of the reader.

5.5 Data Collection for the Study

5.5.1 General Considerations

Before describing data collection for this research, the point needs to be emphasised that the only detail available to the present researcher on methods employed in the Australian Manufacturing Council's *Best Financial Practices* survey is that provided mainly in Appendix 2 to the study report *Practising Balance: Integrating Best Financial Practice Into Your Business* (Australian Manufacturing Council, 1996). With the wind up of the AMC in June, 1996, staff involved in the project were moved to positions throughout the federal government bureaucracy and became very difficult indeed to track down. Several attempts to gain access to the staff to obtain more information on the research methods used were unfortunately unsuccessful. Furthermore, access to AMC files on the project is no longer possible.

5.5.2 Research Instrument Design and Testing

The manufacturing SME survey in the *Best Financial Practice* study used a structured questionnaire for completion by respondents that contained 53 essentially closed questions focused on enterprise characteristics and performance, and financial management characteristics and practices (including financial reporting practices). A re-typed version of the survey instrument is presented in Appendix B to this thesis.

In the *Best Financial Practice* study report (Australian Manufacturing Council, 1996, p. 77), development of the survey instrument is described as follows:

1. The first design stage for the Firm Survey questionnaire required:
   (a) the development of some principles of what constituted Best Financial Practice; and
   (b) identification of the key components of financial practices within manufacturing firms of all sizes.

The principles of BFP and the key components were then tested for recognition and confirmation with 15 manufacturing firms, 4 industry and accounting bodies, and 5 financial institutions.

2. Following these consultations, the survey questionnaire was developed, framed around these principles and components. The survey questionnaire was designed to determine the extent to which firms of different sizes had implemented principles of BFP, to identify certain financing characteristics and to gather basic operational and financial data concerning the firm.

   The draft survey was then tested with 25 manufacturing firms, and adjustments made.

Apart from use of the post, no information on the dissemination and collection of the survey instrument is provided in the *Best Financial Practice* study report. In particular, no clear indication is given of to whom the questionnaire was addressed and who was to requested to complete it. Nevertheless, it is reasonable to infer that owner-managers of the manufacturing SMEs surveyed were the principal recipients and respondents, perhaps with assistance from internal and external financial advisers.

5.5.3 Sample Selection Procedure

For research on smaller enterprises such as this, Hofer & Bygrave (1992, p. 95) believe that 'purposive sampling, stratified sampling, or variable probability sampling should be among the more frequently used sampling techniques in the field, whereas simple random sampling should be among the least used techniques'. In the *Best Financial Practice* study report (Australian Manufacturing Council, 1996, p. 78), the choice of a survey sample is described as follows:

> The selection of the sample was aimed at capturing the potential diversity amongst the sample group. The sample was stratified by manufacturing industry sector (12 industry categories) and by employee size (4 size categories). The reason for using Australian Standard Industry Classification (ASIC) rather than Australia New Zealand Industry Classification (ANZIC) was because the population data for ANZIC was not available from the ABS at the time the sample was drawn. The industry and size structure of the population was determined by obtaining data from the Australian Bureau of Statistics Business Register.
>
> The sample was drawn to match the population as closely as possible, with one exception. Over 85 per cent of the firms in the population on the ABS Business Register were firms with fewer than 20 employees. In order to capture the full range of practices of firms, it was felt that the sample should be more balanced. This size group was reduced to 40 per cent of the sample (partly by removing firms with fewer than six employees), with the remaining size groups adjusted upwards commensurately.
>
> With random selection of the required number within each of the strata for the sample, 4545 manufacturing firms were selected from a commercial database (Dun and Bradstreet). In addition, the 962 respondents to the Leading the Way study were added to the total.

No specific information on determining sample size is provided in the *Best Financial Practice* study report.

The Australian Bureau of Statistics' Business Register is a database of all employing businesses in Australia that provides a population frame for most ABS economic or business surveys or censuses. The ABS can provide from the Business

Register counts of businesses classified by their industry, size, geographical location and type of legal organisation. However, the ABS is not permitted to release from the Business Register details of individual businesses such as names and addresses. Hence the use of the commercial Dun & Bradstreet Marketing database of over 500,000 active Australian businesses for final selection of target businesses to receive the mailed survey instrument. The Dun & Bradstreet database permits searches by line of business, size and location leading (*inter alia*) to business names and contact details. Both the ABS Business Register and Dun & Bradstreet databases are well regarded and widely used research tools in this country. Dun & Bradstreet is, of course, an international commercial credit and business information organisation, the services of which are very frequently used in public and private sector research (Curran, 1989; Stevenson & Harmeling, 1990; Aldrich, 1992)

As indicated in Chapter 1 of the thesis, the Australian Manufacturing Council international competitiveness study immediately preceding, and giving rise to, the *Best Financial Practice* survey is reported in the publication *Leading the Way: A Study of Best Manufacturing Practices in Australia and New Zealand* (Australian Manufacturing Council 1994). It clearly made sense to include businesses cooperating in the former study in any sample for a subsequent survey dealing with financial best practice in Australia.

5.5.4 Response to the Survey

In the *Best Financial Practice* study report (Australian Manufacturing Council, 1996, p. 78), the response to the mailed questionnaire survey is described as follows:

> Responses were received from 1763 firms, representing a response rate of 32 per cent, which was considered excellent for a survey of this type.
>
> Responses were sufficient in each of the 48 cells (industry by size) to be taken as reflecting the full population. There was not sufficient variation in the responses in the under 20 employee category (which had been reduced in size from the population to the sample) to warrant any additional adjustment.

Amongst the 1,753 businesses that answered the first question in the survey instrument by indicating employment numbers, there were 1,628 with the equivalent of 300 or fewer full-time employees – thus qualifying as small or medium-sized enterprises for the purposes of this study. This corresponds to 92.9 per cent of respondents to the employment question which, when allowance is made for the enterprise size distribution being deliberately skewed away from smaller manufacturers during sampling, appears to approximate the proportion of such concerns in the population (see official statistics presented in Chapter 1 of the thesis).

On the issue of the adequacy of the response rate obtained for the *Best Financial Practice* survey, Aldrich (1992) indicates that around two-thirds of the survey-based papers presented at two leading international small enterprise/entrepreneurship conferences reviewed by him reported response rates below 50 per cent. Almost one-quarter of these papers reported response rates less than 25 per cent. On the issue of

the adequacy of the sample in terms of the number of SMEs represented, Aldrich (1992) infers that samples in excess of 1,000 units are not common, except where large scale public or archival databases are employed in research. However, around 60 per cent of papers reviewed by Aldrich (1992) reported samples sizes of more than 100.

In the *Best Financial Practice* study report (Australian Manufacturing Council, 1996, p. 78), the measures undertaken to assess non-response bias for the survey are described as follows:

> Although the respondent strata (by size and industry) matched the sample strata quite closely, a telephone survey of 130 non-respondents was undertaken to determine whether there was a response bias in relation to particular issues or questions. The non-respondents were asked 14 key questions from the original questionnaire.
>
> The results from that survey provided evidence that non-respondents were marginally different from the respondents in three areas. The non-respondents were:
> - on average less likely to have suffered from an unexpected liquidity crisis than the respondents
> - less likely to have experienced sales growth during the last twelve months
> - less likely to have sought debt
>
> No significant difference was identified in relation to financial practices.

Overall, the above quotation suggests that non-respondents tended to be businesses that are less growth oriented than respondents.

The time used by respondents to the *Best Financial Practice* survey to fill in the research instrument is shown in Table 5.1 on the next page (data for an ordinal study variable TIME indicating, in response to an inquiry at the close of the survey instrument, how many minutes it had taken to complete). The modal and median time period for completing the survey instrument is 30 to 39 minutes; which, comparatively speaking, would seem a substantial demand on the limited time of notoriously busy SME owner-managers. Note also that there is a relatively long upper tail to the distribution of time taken, with some respondents using 90 minutes or more to fill in the instrument. Omitting cases that do not indicate time taken, a Kruskal-Wallis one-way analysis of variance suggests that time typically used in completing the survey instrument by the remaining respondents does not vary with statistical significance between enterprise size groupings (n=976, H=1.781, df=4, p=0.776).

An indication of respondents' attitude to the research after filling in the *Best Financial Practice* survey instrument is provided in Table 5.2 on the next page (data for a nominal study variable RECONTACT indicating, in response to an inquiry at the close of the survey instrument, a willingness to discuss aspects of the survey in more detail with representatives of the Australian Manufacturing Council). Perhaps reflecting the considerable demands already made on their time, substantially less than 50 per cent of respondents to the *Best Financial Practice* survey indicate a willingness to participate further in the research. Grouping cases which decline with those not answering, a Chi-Square test suggests that the proportion of enterprises willing to provide more

assistance varies with statistical significance between enterprise size groupings, with larger enterprises being more likely to agree to help (n=1,050, χ^2=11.629, df=4, p=0.020). Notwithstanding the findings presented in this paragraph, over 90 per cent of the 1,050 respondents indicated at the close of the survey instrument, a wish to eventually receive a copy of the *Best Financial Practice* study report.

Table 5.1: Time Taken To Complete Survey Instrument

Time Taken	Frequency	Per Cent	Cumulative Per Cent
Less than 20 minutes	107	10.2	10.2
20 - 29 minutes	163	15.5	25.7
30 - 39 minutes	377	35.9	61.6
40 - 49 minutes	195	18.6	80.2
50 - 59 minutes	36	3.4	83.6
60 - 69 minutes	73	7.0	90.6
70 - 79 minutes	2	.2	90.8
80 - 89 minutes	6	.6	91.3
90 minutes or more	17	1.6	93.0
Not answered	74	7.0	100.0
Total	1050	100.0	

Table 5.2: Willingness To Cooperate Further in Study

Willingness to Discuss Survey	Frequency	Per Cent	Cumulative Per Cent
Yes	463	44.1	44.1
No	502	47.8	91.9
Not answered	85	8.1	100.0
Total	1050	100.0	

5.5.5 Data Coding

Information from returned questionnaires was coded into an SPSS datafile by AMC project staff. As received by the present researcher, the datafile is in extremely good order as regards naming, labelling and coding of study variables and their categoric values. No further details are available from the *Best Financial Practice* study report on data checking and coding. Clearly though, these tasks have been carried out with appropriate professionalism.

The findings reported in this thesis are not based on the full *Best Financial Practice* datafile supplied by the AMC. First, the datafile has been reduced to the 1,628 cases reporting the equivalent of 300 or fewer full-time employees. Second, it was necessary to eliminate cases that do not represent truly independent SMEs legally organised as private companies. Third, it was considered appropriate to eliminate a relatively small number of cases from the datafile in order to minimise missing data problems for key study variables such as manufacturing sub-sector, sales revenues, sales growth, export involvement, profitability and owner-management. The sequential steps taken in truncating the *Best Financial Practice* datafile, and their impact on the total number of useable cases, are indicated in the Table 5.3 on the next page (relevant question numbers in the survey instrument are specified). The 1,050 cases remaining in the *Best Financial Practice* datafile following truncation as outlined in the table are considered more than sufficient to permit valid descriptions and analyses as presented in Chapters 7 and 8 of the thesis.

5.6 Data Description and Analysis for the Study

5.6.1 General Considerations

In Chapter 1 of the thesis, the point is made that, because of winding up of the Australian Manufacturing Council by the federal government soon after the *Best Financial Practice* survey was conducted, description and analysis of the information obtained have been very limited – primarily taking the form of textual, tabular and graphical presentations of relative frequencies in the publication *Practising Balance: Integrating Best Financial Practice Into Your Business* (Australian Manufacturing Council, 1996). In an effort to realise more fully the scholarly and policy value of the information, the following two chapters of the thesis present an original, comprehensive and insightful description and analysis of the AMC data directed towards answering the principal research question identified at the outset of Chapter 1. An analytical model for this endeavour is presented towards the close of Chapter 1.

The methods of data description and analysis that can be undertaken in the present research depend upon the nature of the research sample, how the data were gathered, the characteristics of the data obtained, and the specific objectives of the description and analysis stage. As already indicated, the data have been collected via a

Table 5.3: Truncation of *Best Financial Practice* Datafile

Reason for Truncation (from initial 1,763 cases)	Cases Lost	Cases Remaining
Remove cases with more than the equivalent of 300 full-time employees or not reporting employee numbers (Question 1)	135	1,628
Remove cases not claiming to be independent entities or not indicating ownership/control status (Question 2(a))	418	1,210
Remove cases not legally organised as private companies or not indicating legal form (Question 2(b))	74	1,136
Remove cases not reporting ANZSIC code (Question 3)	1	1,135
Remove cases not reporting current annual sales turnover (Question 4)	8	1,127
Remove cases not reporting sales growth experience over last 12 months (Question 6)	7	1,120
Remove cases not reporting whether or not they export (Question 7)	2	1,118
Remove cases not reporting profitability relative to competitors (Question 8)	12	1,106
Remove cases not reporting degree of involvement of owner(s) in business operations (Question 15)	2	1,104
Remove cases for which responses to certain questions suggest the possible existence of a parent company, contrary to the response already given to Question 2(a) (Questions 10, 13, 19, 25, 26 and 29)	54	1,050

structured questionnaire containing essentially closed questions and completed by respondents from a disproportionate stratified random sample of independent manufacturing SMEs in this country. Exclusive use of non-parametric/distribution free statistical measures and tests is suggested by the categorical nature (nominal and ordinal levels) and irregular (that is, non-normal) distributional properties of the data obtained (Everitt, 1977; Andrews *et al.*, 1981; Agresti, 1984; Siegel & Castellan, 1988; Agresti, 1990; Norusis & SPSS Inc., 1992a; Cooper & Emory, 1995; Norusis, 1996).

Most succinctly, Cooper & Emory (1995, p. 444) contrast non-parametric and parametric statistics, and also identify the circumstances in which the non-parametric approach is more appropriate, as follows:

> Nonparametric tests have fewer and less stringent assumptions. They do not specify normally distributed populations or homogeneity of variance. Some tests require independence of cases, while others are expressly designed for situations with related cases. Nonparametric tests are the only ones usable with nominal data; they are the only technically correct tests to use with ordinal data, although parametric tests are sometimes employed in this case. Nonparametric tests may also be used for interval and ratio data although they waste some of the information available. Nonparametric tests are also easy to understand and use. Parametric tests have greater efficiency when their use is appropriate, but even in such cases, nonparametric tests often achieve an efficiency as high as 95 percent. This means the nonparametric tests will provide the same statistical testing power with a sample of 100 as a parametric test with a sample of 95.

Thus, non-parametric measures and tests seem most appropriate to the nominal and ordinal data for 1,050 independent cases available to this research; and they represent only a limited loss of statistical power over parametric methods which are often better known. Nevertheless, Norusis (1996, p. 341) does emphasise that 'The disadvantage of these [non-parametric] tests is that they are less likely to find a true difference when it exists than the tests based on the assumption of normality'. Siegel & Castellan (1988) provide a full appraisal of the strengths and weaknesses of non-parametric statistical methods. The parametric equivalents of the non-parametric measures and tests employed in the study are identified wherever possible.

Non-parametric statistical methods make extensive use of frequency data arranged in so-called contingency tables. In the simplest case, a contingency table is a two-way array or cross-tabulation of frequencies in cells formed by the various categoric values of two variables. Such a table, of course, forms the basis for arguably the best known non-parametric statistical routine – the Chi-Square test of independence – as well as for a range of non-parametric correlation coefficients and other non-parametric tests. Multi-way contingency tables are required for what Tabachnick & Fidell (1989) refer to generically as multi-way (that is, multivariate) frequency analysis. Multi-way contingency tables underpin multivariate non-parametric techniques of dimensional reduction, structural escalation of data and association such as non-linear principal components analysis. They also facilitate a family of non-parametric modelling techniques referred to collectively as log-linear modelling, a relatively well known special case of which is logistic regression. More is said in succeeding sub-sections of the chapter about the various bivariate and multivariate non-parametric statistical methods mentioned in this and the previous paragraph.

With 1,050 cases, the sample used in this research is relatively large by contemporary business research standards, especially that conducted on smaller enterprises. While this is obviously welcome as far as the generalisability of findings are concerned, it is not without statistical detraction. For SME research, Wortman (1986, p. 277) points out that:

> . . . as researchers began to discover that larger sample sizes automatically provided some type of significance in their studies, more and more researchers have utilized larger sample sizes.

Stevenson & Harmeling (1990, p. 9) indicate that 'the use of many statistical tests requires large numbers and parenthetically almost always delivers statistical significance when many data points are available'. In relation to testing for a normal distribution, Norusis & SPSS Inc. (1992a, p. 183) state that 'it is important to remember that whenever the sample size is large, almost any goodness-of-fit test will result in rejection of the null hypothesis'. Clearly, larger sample size makes it more likely that statistical differences will be discovered. This is especially the case when using chi-square-based measures and tests. Norusis & SPSS Inc. (1992a, p. 200) go on:

> The magnitude of the observed chi-square depends not only on the goodness of fit of the independence model but also on sample size. If the sample size for a particular table increases n-fold, so does the chi-square. Thus, large chi-square values can arise in applications where residuals are small relative to expected frequencies but where the sample size is large.

Thus, while it is not uncommon in business research to use $\alpha=0.100$, the benchmark used in this study to denote statistical significance is more demanding at $\alpha=0.050$.

The following adjectives are employed in the thesis to describe verbally the strength of discovered associations between variables:

Table 5.4: Descriptors for Associations Between Variables

Absolute Correlation Coefficient Value	Descriptor
0.000 to 0.200	very weak
0.201 to 0.350	weak
0.351 to 0.450	weak to moderate
0.451 to 0.550	moderate
0.551 to 0.650	moderate to strong
0.651 to 0.800	strong
0.801 to 1.000	very strong

Unless otherwise indicated, all significance tests conducted are two-tailed. Virtually all descriptive and analytical work for this research has been carried out on a Pentium personal microcomputer using the SPSS for Windows Release 7.5.1 (1996) statistical computer package (including add-ons)

5.6.2 Descriptive Statistics

No detailed explanations and justifications seem necessary for the conventional methods employed in this research for describing the findings of the *Best Financial Practice* survey, mainly in Chapter 6 of the thesis. As is customary, frequency and relative frequency tables are used for univariate categorical data. Central tendency is reported via modal categories for nominal variables, and modal and median categories

for ordinal variables. Bivariate categorical data are presented in cross-tabulations of frequencies.

Because they generally facilitate interpretation, wherever possible graphical techniques are employed for reporting descriptive data from the survey. For example, pie charts are often used to reveal the relative proportions of respondents selecting particular answers to questions. Frequency data are sometimes presented in clustered bar charts.

Employing the SPSS statistical software package, the non-parametric Kolmogorov-Smirnov one-sample test with Lilliefors correction is used to examine the normality of distributions for some derived continuous variables (based on object scores from non-linear principal components analysis described below).

5.6.3 Bivariate Associative Analysis

Non-parametric statistical techniques employed in this research for discovering and appraising bivariate associations are those customarily adopted for categorical data. Sources of guidance on their selection include Andrews *et al.* (1981), Siegel & Castellan (1988), Norusis & SPSS Inc. (1992a), Cooper & Emory (1995) and Norusis (1996). Inevitably, the chi-square statistic plays a major role in this area, either directly in the Chi-Square test of independence or indirectly as an underpinning for correlation coefficients and other non-parametric tests.

The mechanics of the Chi-Square test of independence are well known and understood, and they need no elaboration. However, two statistical difficulties to which this test gives rise should be noted. The sensitivity of the chi-square statistic to both goodness-of-fit and sample size has already been mentioned. The relatively large sample in this research necessitates awareness of this issue when interpreting findings. The other difficulty relates to the effect of sparse cells in the contingency table underlying a Chi-Square test upon the test's validity. It is generally held that no more than 20 per cent of cells should have expected frequencies less than five, and no cell should have an expected frequency less than one. Fortunately, statistical packages like SPSS provide a warning when either or both of these conditions are breached. If this is the case, then either the test must be abandoned or cell expected frequencies may be increased by collapsing categories. Amongst other problems it gives rise to, the latter remedy does, of course, result in a loss of information. Everitt (1977, p.40) believes that 'The practice of combining classification categories should . . . be avoided if at all possible'.

While the Chi-Square test of independence may assist with detecting bivariate associations, the chi-square statistic itself cannot be interpreted as a measure of the strength of any associations found. The following correlation coefficients are used in this research to measure the strength of linear bivariate associations in the circumstances identified:

- Between two dichotomous nominal variables – the phi coefficient, incorporating an adjustment to the chi-square statistic for sample size and used principally for 2 x 2 cross-tabulations for which its value lies between 0 and 1.
- Between two polytomous nominal variables – Cramér's statistic, V, again based on the chi-square statistic and having a value between 0 and 1. If one of the cross-tabulation dimensions is 2, then the phi coefficient and Cramér's statistic are identical.
- Between two ordinal variables – Kendall's tau b, a statistic based on concordant and discordant pairs normalised by considering ties on each variable in a pair separately, but not ties on both variables simultaneously. If the cross-tabulation of variables is square, Kendall's tau b has a range of +1 to –1.

All these correlation coefficients are all well known and widely used in business research. All are capable of statistical testing for being different from zero.

Mainly because the Chi-Square test of independence does not take advantage of information inherent in ordinal variables beyond nominal category designations, other non-parametric tests of association are used in this research where one variable is nominal and the other is ordinal:

- Mann-Whitney test – used when one variable is dichotomous (the grouping variable) and the other is ordinal. This test is regarded to be the non-parametric counterpart of the parametric Student's t test.
- Kruskal-Wallis one-way analysis of variance – used when one variable is polytomous and the other is ordinal. This is a generalisation of the Mann-Whitney test to more than two groups which, as the name suggests, is regarded to be the non-parametric counterpart of the parametric one-way analysis of variance (ANOVA).

The goal of these non-parametric tests is to discover statistically significant differences between groups of cases identified on the nominal variable in terms of values of the ordinal variable. Significance testing is carried out using ranks; and, instead of looking for differences in means as in parametric tests, differences between medians are sought.

In closing this sub-section of the chapter, it should be pointed out that use of partial correlation analysis, in which the association between two variables is examined while controlling for the influence of another variable, was contemplated for the research. The Kendall partial rank-order correlation coefficient is an appropriate non-parametric measure for this purpose (Siegel & Castellan, 1988). However, the implementation of partial correlation analysis in the release of SPSS being used does not make this particular partial correlation coefficient available. The cost in terms of researcher time of manually calculating the Kendall partial rank-order correlation coefficient for the many possible combinations of study variables and over 1,050 cases would have been prohibitive.

5.6.4 Preliminary Multivariate Data Analysis

The business context in this investigation is captured by more than 20 study variables reflecting enterprise characteristics and in excess of 40 study variables revealing financial management characteristics of respondent businesses. There are also 11 variables representing financial reporting practices. While this is a considerable number of variables to work with in research like this, modern computers and statistical software packages such as SPSS reduce the imperative that once existed for dimensional reduction of data in order to manage computational load.

Nevertheless, there are sound reasons for still examining means for dimensional reduction amongst the many categorical explanatory variables provided by the *Best Financial Practice* survey. First structural escalation of the data accompanying dimensional reduction may reveal underlying processes determining the values of related variables and making them different from values of other groupings of variables. In other words, understanding of the dynamics of the context is enhanced because hitherto unobservable influences (usually termed factors or components) are revealed which, hopefully, are fewer than the original number of variables. Second, use of composite variables representing factors or components avoids undue reliance on the validity and reliability of any single variable. Third, it is conventionally the case that underlying factors or components revealed by techniques for dimensional reduction/structural escalation of data are as non-correlated with each other as is achievable. Thus, in subsequent statistical analyses such as regression, problems of multicollinearity between factor or component scores, or between values of variables used to represent factors or components, are diminished.

The multivariate statistical technique of choice for dimensional reduction/ structural escalation of data in this research would have been conventional principal components analysis – an exploratory form of the well known and widely used factor analysis – which makes no assumptions about the distributional properties of the variables examined (Ford *et al.*, 1986; Tabachnick & Fidell, 1989; SPSS Inc., 1990; Norusis & SPSS Inc., 1992b; Hair *et al.*, 1995). However, conventional principal components analysis does assume that relationships between the variables are linear, and that the variables are at least interval in measurement scale (SPSS Inc., 1990; Hair *et al.*, 1995). Considering the first of these requirements, Stevenson & Harmeling (1990, p. 10), with subsequent support from Van de Ven (1992) and others, argue that many relationships between phenomena in smaller enterprises are inherently non-linear, and furthermore:

> The practitioner, and by extension the academic, should be most interested in theories that lead to information about when the world will be different from what it was in the past by more than linear extrapolation.

It is, however, the second requirement which is the main problem in the present circumstances – given the exclusively nominal or ordinal nature of the study variables being used.

Fortunately, SPSS includes a related multivariate statistical routine described as non-linear principal components analysis that can be undertaken in an exploratory fashion using any mixture of nominal, ordinal, interval or ratio variables; and which makes no assumptions about the linearity of associations (SPSS Inc., 1990). The SPSS manual states that if all variables are declared numerical (interval or ratio levels) in non-linear principal components analysis, then an analysis equivalent to conventional principal components analysis is produced. It is indicated that 'Both procedures have their own benefits' (SPSS Inc., 1990, p. B-27). Another available technique called multiple correspondence analysis (or homogeneity analysis), which is related to non-linear principal components analysis, handles only nominal variables and is therefore not considered further (SPSS Inc., 1990). Apparently, if all variables are declared nominal in non-linear principal components analysis, then an analysis equivalent to multiple correspondence analysis is produced.

With non-linear principal components analysis, the goal is to account for as much as possible of the variability in a set of variables given the researcher specified dimensionality of the analysis, as well as measurement levels also specified by the researcher for each variable. Ideally, the number of dimensions or principal components is substantially lower than the original number of variables, while still capturing a good deal of the information contained in those variables (SPSS Inc., 1990). The original data set can then be replaced by a new and smaller data set with minimal loss of explanatory power. The technique is claimed to reveal relationships amongst variables, amongst cases, and amongst variables and cases (SPSS Inc., 1990).

In non-linear principal components analysis, cases are referred to as objects and they are all given object scores on each principal component identified by the analysis. Object scores have a mean of zero and unit variance, and they can be saved as new variables in the data file being used. Eigen values are also determined for each principal component. These measure how much variance in the variable set is accounted for by each principal component. Apparently, the number of principal components needed can be ascertained through their eigen values which, in typical circumstances, should be greater than the reciprocal of the number of variables (SPSS Inc., 1990). Ultimately though, the interpretability of the principal components obtained must be influential in determining the actual number retained, which could well be fewer than suggested by the eigen value rule (SPSS Inc., 1990) Component loadings are calculated for all variables which reflect the strength of associations between the variables and the principal components identified. Unlike in conventional principal components analysis, there is no provision in non-linear principal components analysis to rotate the solution to improve the interpretability of principal components. Many of the other statistical sophistications normally present in conventional principal components analysis (for example, measures of sampling adequacy for variables) are also absent in the implementation of non-linear principal components analysis used.

A closely related exploratory dimensional reduction/structural escalation of data technique to non-linear principal components analysis is non-linear canonical correlation analysis. This is a multivariate statistical method for examining collective associations between sets of variables. It is a non-parametric/distribution free counterpart to conventional canonical correlation analysis and it has the same broad objective – to account for as much variance in relationships amongst variable sets as possible. In this research, it would have been particularly helpful for exploring joint associations between larger variable sets such as enterprise characteristics on the one hand and financial management characteristics on the other. Unfortunately, however, the combined effect of missing values for variables in all sets, dealt with listwise by SPSS, made it impossible to implement analyses for the various possible combinations of variable sets. An unacceptably large number of variables had to be dropped from the sets before SPSS would successfully undertake a non-linear canonical correlation analysis for the available data.

In closing this sub-section of the chapter, it should be pointed out that SPSS classifies non-linear principal components analysis as an exploratory optimal scaling technique (so too are multiple correspondence analysis and non-linear canonical correlation analysis). The SPSS manual indicates that 'Optimal scaling is a technique that can be used instead of or as a complement to loglinear models' (SPSS Inc., 1990, p. A-4). Logistic regression, a special case of log-linear analysis, is the approach to multivariate predictive modelling selected for use in this research in the following sub-section of the chapter.

5.6.5 Multivariate Predictive Modelling

According to Abdel-Khalik & Ajinkya (1979, p. 22), a model is 'a representation of reality to explain the behavior of some aspect of it'. Empirical observations on any phenomenon may, to varying degrees, be decomposed into parts as follows:

$$\text{Data} = \text{Fit} + \text{Residual}$$

Thus, each observed state or value for the phenomenon in question comprises a part which is typical of a pattern, however pronounced, referred to as the fit; and a part that is not typical of the pattern, usually denoted the residual or error term. The fit is normally a function of so-called independent (or predictor or explanatory or exogenous) variables and represents the extent to which these variables explain the observed state or value for the dependent (or criterion or response or endogenous) variable. The residual represents that part of the observed state or value of the dependent variable which is accounted for by other influences which have not been studied directly.

By aggregating over all observations using a chosen technique, it may be possible to represent the empirical outcome for the phenomenon studied in the form of a statistical (or probabilistic) model of the general form:

$$y = f(x_1, \ldots, x_n) + u \qquad \text{Eqn 5.3}$$

where y = dependent variable

$x_1, \ldots x_n$ = independent variables

u = stochastic disturbance term representing that part of y which is unexplained by the independent variables

In this way, statistical modelling permits an orderly approach to the analysis of data which yields estimates of the magnitude of effects of interest on a particular outcome, thus allowing the relative importance of the different effects to be assessed. If successful, this procedure may then provide an empirically-validated basis for predicting the state or value of the dependent variable given the state or value of the independent variables included in the model

Agresti (1984, p. 223) provides a justification for extending exploratory research beyond mere reporting of measures of association based on largely categorical data in the following terms:

> . . . models summarize the structure of a table in such a way that, given model parameters, expected cell frequencies can be obtained. Therefore, if a particular model holds, there is no loss of information in using the model to represent the table. Measures of association, on the other hand, generally transform the cell proportions to a single number that describes a certain aspect of the association in the table. Thus a measure of association can be informative in giving us an indication of the strength of association in a table, but it does not give us as much information as a model.

Hence, modelling of the available data might be expected to extend and clarify the associative perspective of the present research, as well as add a predictive dimension.

Modelling in the present context initially involves systematic identification of those factors that determine whether or not financial reporting practices are undertaken at advanced levels, and representation of these explanatory factors in expressions reflecting their relative and combined influences on the practices in question. Ultimately, modelling in this study extends to discerning if financial reporting practices appear to be amongst those factors determining whether or not particular business growth and performance outcomes are achieved, and representation of these and other possible explanatory factors in expressions reflecting their relative and combined influences on the outcomes in question.

Generally speaking, statistical modelling of the type contemplated in this research involves four basic steps:

- Identifying the dependent variable for study and choosing by some means the independent variables which may influence its state.
- Specifying a model in terms of the dependent variable under investigation and the independent variables selected.
- Estimating the parameters of the model which include the coefficients of the independent variables.
- Assessing the goodness-of-fit of the model using an appropriate criterion.

The modelling exercise usually entails specification of a number of models, ranging from bivariate models in which the influence of each independent variable acting alone is assessed, through to a multivariate model which includes all of the independent variables considered in the investigation. The task then becomes a matter of choosing the 'best' model from the range. Hosmer & Lemeshow (1989, p. 1) state the procedural goal of statistical model building in the following terms:

> To find the best fitting and most parsimonious, yet biologically reasonable model to describe the relationship between an outcome (dependent or response variable) and a set of independent (predictor or explanatory) variables.

The statistical reason for seeking simplicity or parsimony in the model ultimately selected for use is explained by Hosmer & Lemeshow (1989, p. 83) as follows:

> The rationale for minimizing the number of variables in the model is that the resultant model is more likely to be numerically stable, and is more easily generalized. The more variables included in a model, the greater the estimated standard errors become, and the more dependent the model becomes on the observed data.

The process of identifying the key dependent variables for study, and choosing independent variables with explanatory potential, is generally the same whatever approach to modelling is to be employed. The ensuing steps, however, are very much technique-dependent. The criteria applied in selection of a modelling methodology for the present study are as follows:

- For reasons already given, the methodology chosen needed to make minimal assumptions concerning the distributional properties of variables employed. This criterion precluded use of simple or multiple linear regression analysis, related techniques, and techniques based on similar assumptions about the nature of the data.
- The technique chosen had to be able to handle either dichotomous or polytomous dependent variables which are either nominal or ordinal in measurement level.
- The modelling methodology chosen had to be able to handle both continuous and categorical independent variables.
- Given the usual computational complexities of statistical modelling, the technique chosen had to be accessible on the statistical computer software package being used, namely SPSS.

After careful evaluation of available modelling methodologies which appear to meet these criteria, the decision was made to use logistic regression (often abbreviated to 'logit') for modelling financial reporting practices and business growth and performance outcomes in the study sample. As indicated in Chapter 4 of the thesis, McMahon *et al.* (1992a, 1992b, 1994a) have applied logistic regression to exploratory modelling of historical financial reporting practices in smaller growth enterprises in the North-East of England. Holmes & Nicholls (1989), Holmes *et al.* (1989) and Holmes *et al.* (1991a) have used logistic regression for modelling historical and future-oriented financial reporting practices in Australian small enterprises.

Two other predictive modelling methodologies that are closely related to logistic regression, and which appear to satisfy most of the criteria laid down above, were also seriously considered:

- Probit modelling – this technique was eventually rejected because its extension to handle polytomous dependent variables is considered impractical due to severe computational difficulties (Aldrich & Nelson, 1984).
- Loglinear modelling – ultimately this approach was rejected because, being a technique designed solely for categorical data, it cannot directly handle continuous independent variables derived in this research from object scores in non-linear principal components analysis. Log-linear modelling also fails to distinguish between dependent and independent variables. All variables used for classification are treated as independent, and the dependent variable is a contingency table cell count. In a study such as this, in which identification of dependent and independent variables is relatively straightforward, logistic regression is considered more useful. Log-linear modelling also has other, though less important, disadvantages *vis à vis* logistic regression (Agresti, 1984).

Logistic regression belongs to the same general class of linear modelling techniques as the better known and more widely used procedure of linear regression analysis. In the words of Hosmer & Lemeshow (1989, p. 1):

> What distinguishes a logistic regression model from the linear regression model is that the outcome variable in logistic regression is . . . dichotomous [or polytomous]. This difference between logistic and linear regression is reflected both in the choice of a parametric model and in the assumptions. Once this difference is accounted for, the methods employed in an analysis using logistic regression follow the same general procedures used in linear regression.

Note that there are some important technical differences between linear regression and logistic regression. For example, Least Squares Estimation (LSE) of unknown parameters in linear regression is replaced with Maximum Likelihood Estimation (MLE) in logistic regression. Whereas LSE produces parameter estimates which minimise the sum of squared errors in the fit between the model and the data, MLE yields parameter estimates that maximise the probability or likelihood of obtaining the observed data set. The residual or error term in linear regression should be normally distributed with zero mean, and be constant for all values of the independent variables. In logistic regression the error term is binomially distributed with zero mean and variance $\pi(1-\pi)$. Other differences between linear regression and logistic regression will become apparent in Chapter 7 of the thesis. Stone & Rasp (1991) compare and contrast linear regression and logistic regression as modelling techniques finding widespread use in financial reporting research.

As a modelling technique, logistic regression may be considered to have two main variants according to the number of categories for the dependent variable:

- Dichotomous dependent variable – this is the most common form of logistic regression in use.
- Polytomous dependent variable – referred to as multinomial logistic regression (sometimes abbreviated to 'multinomial logit' or 'multilogit'), this form of logistic regression is less well-known.

For estimation purposes, the generalised form of the multivariate logistic regression model for the case of a dichotomous dependent variable with values 0 or 1 and continuous independent variables can be expressed as follows:

$$\ln[\pi/(1-\pi)] = \phi + \beta_1 x_1 + \ldots + \beta_n x_n + u \qquad \text{Eqn 5.4}$$

where π = probability that the value of the dichotomous dependent variable, y, equals 1

$x_1, \ldots, x_n$ = independent variables

Φ = constant

$\beta_1, \ldots, \beta_n$ = coefficients

u = stochastic disturbance term representing that part of $\ln[\pi/(1-\pi)]$ which is unexplained by the independent variables

Note that the left hand side of the equation is not the dependent variable, y, itself; but the so-called 'log odds' or 'logit' of y. Where an independent variable is categoric rather than continuous, two treatments are possible. The variable can possibly be dealt with as if it is continuous. Alternatively, indicator (design or dummy or contrast) variables may be created and coded as 0 or 1 for all but one category (usually the last); and coefficients are estimated for each of these indicator variables. The latter treatment is more common for polytomous independent variables whether they are nominal or ordinal. It is usually recommended that dichotomous independent variables are treated as if they are continuous (Hosmer & Lerneshow, 1989; Norusis & SPSS Inc., 1992c).

In polytomous logistic regression, the measurement level of the categorical dependent variable influences the broad approach taken (Agresti, 1984; Aldrich & Nelson, 1984; Hosmer & Lemeshow, 1989; Agresti, 1990):

- Nominal scaling – this is the simpler situation for which the normal approach is to specify k-1 logits as follows (assuming the reference category used is the last, k):

  $$\ln[\pi_j / \pi_k] \text{ for } j = 1, \ldots, k-1 \qquad \text{Eqn 5.5}$$

  This approach treats y strictly as nominal, and any information contained in ordered values of y is lost to the model.

- Ordinal scaling – this situation is more complicated and can be approached in a number of ways, including specification of k-1 'cumulative logits' as follows (again assuming the reference category is the last, k):

  $$\ln[(\pi_{j+1} + \ldots + \pi_k)/(\pi_1 + \ldots + \pi_j)] \text{ for } j = 1, \ldots, k-1 \qquad \text{Eqn 5.6}$$

  This approach recognises the ordinal nature of y, and any information contained in ordered values of y is retained in the model.

Unfortunately, not all commercially available statistical software packages include an implementation of polytomous logistic regression. When polytomous logistic regression is available, it usually treats the dependent variable as nominal in scale (Hosmer & Lemeshow, 1989).

SPSS, the statistical package used in this research, only includes an implementation of dichotomous logistic regression. However, drawing on the work of Begg & Gray (1984), Hosmer & Lemeshow (1989, p. 230) identify as follows a means for conducting polytomous logistic regression when software for dichotomous logistic regression is all that is available:

> Begg and Gray (1984) have proposed a method for approximating the fit of a polytomous logistic regression via fitting individual binary logistic regression models. For example, in a three group problem we would fit a model for Y=1 versus Y=0 using a standard logistic regression method for a binary outcome variable and fit separately a model for Y=2 versus Y=0. The coefficients for the polytomous model are obtained from the two separately fit logistic models. Begg and Gray show that the estimates of the logistic regression coefficients obtained in this manner are consistent, and under many circumstances the loss of efficiency is not too great. It has been our experience that the coefficients obtained from separately fit logistic models will be close to those from the polytomous fit.

Hosmer & Lemeshow (1989, p 231) conclude:

> Thus, in the absence of software to perform a polytomous outcome analysis, we could use the results of individual logistic regressions, realizing of course that the resulting estimates are approximations to the maximum likelihood estimates.

Begg & Gray (1984, p. 17) point out that 'The rationale for the individualized method is that it is computationally less cumbersome, it facilitates variable selection, and it is more readily available on standard computer packages'. Variable selection is facilitated because different independent variables can be used in logits for various categories of the dependent variable. This capability is not available in true polytomous logistic regression (Begg & Gray, 1984; Hosmer & Lemeshow, 1989).

During statistical modelling in this research, it was considered particularly important to retain the information inherent in ordinal data available for the comprehensiveness of financial reporting practices and the business growth and performance outcomes. Agresti (1984, p. 222) provides a rationale for this goal as follows:

> The association parameters in the ordinal methods describe ordinal characteristics of the data, such as monotonicity and stochastic orderings. Hence, descriptive statements made with these methods are almost always more informative than those based on methods that ignore the ordinal nature of the variables. In addition, substantive inferential conclusions made using ordinal methods can differ considerably from those based on a strictly qualitative treatment of the data.
>
> Generally, when the methodology recognizes inherent ordinality, there is greater power for detecting certain forms of association, and there is a greater variety of ways of describing the association.

Agresti (1984) summarises the advantages of using ordinal methods, instead of standard nominal procedures, during statistical modelling as follows:

- Ordinal methods have greater power for detecting important alternatives to null hypotheses such as independence.
- Ordinal data description is based on measures that are similar to those used in ordinary regression and analysis of variance for continuous variables.
- Ordinal analyses can use a greater variety of models, most of which are more parsimonious and have simpler interpretations than the standard models for nominal variables.
- Interesting ordinal models can be applied to settings where the standard nominal models are trivial or have too many parameters to be tested for goodness-of-fit.

Hence, the second of the approaches described above for conducting polytomous logistic regression – that is, via ordered cumulative logits – is employed in modelling financial reporting practices and business growth and performance outcomes in Chapter 7 of the thesis.

The assumptions underlying logistic regression are less restrictive than those of linear regression and are sufficiently undemanding to permit defence of its use with the data available to the present study. Aldrich & Nelson (1984) provide a useful summary of the assumptions which should be met for valid use of logistic regression, as follows:

- The dependent variable should comprise at least two categories (states or values) which are mutually exclusive and exhaustive.
- The observations on the dependent variable should be randomly selected and therefore statistically independent, thus ruling out serial correlation.
- The category of the dependent variable should be determined by observable states or values of independent variables which account for variation in the probability that the dependent variable will fall in a particular category.
- The dependent variable should be linearly related to the independent variables after logit transformation.
- The independent variables may be random variables, or they may be fixed as in an experiment.
- The independent variables should not be perfectly, or even highly, correlated with each other: that is, multicollinearity should not exist. Perfect correlation invalidates the use of logistic regression. If the independent variables are highly, though not perfectly, correlated then problems of computational imprecision, unstable estimates and large sampling error may occur.

Importantly, polytomous logistic regression is a relatively straightforward extension of the dichotomous logistic regression model and requires no further assumptions (Aldrich & Nelson, 1984).

On the issue of multicollinearity between independent variables in statistical modelling, Anderson *et al.* (1989) suggest that, where the absolute value of the correlation coefficient between two independent variables exceeds 0.7, problems due to multicollinearity could arise. Cooper & Emory (1991) propose a benchmark of 0.8.

Fortunately, in this research no correlation coefficient between any pairing of principal components extracted from enterprise and financial management characteristic variables has an absolute value greater than 0.341. However, as indicated in Chapter 7 of the thesis, some caution against multicollinearity is necessary when modelling business growth and performance outcomes.

A possible constraint on use of logistic regression in this research is the adequacy of the data set. Aldrich & Nelson (1984, p. 73) indicate that, if n is the number of independent variables and k is the number of categories for the dependent variable, a value of n(k-1) in excess of 50 is considered to be 'pushing the limits of practicality' in logistic regression. The highly improbable worse case scenario in the present study is 25 independent variables and 3 categories for the dependent variable, making n(k-1) just equal to 50. For judging the adequacy of sample size, Aldrich & Nelson (1984) also give a rule-of-thumb of 50 observations per parameter identified. The highly improbable worse case scenario in this research is 26 parameters, thus requiring 1,300 cases. Despite missing values on some variables, having 1,050 cases in the data file for the *Best Financial Practice* survey appears sufficient. To put the sample size and potential number of explanatory variables in the present study in some perspective, McMahon *et al.* (1992a, 1992b, 1994a) use a sample of 102 cases and have up to four independent variables in their logistic regression modelling of financial reporting practices in smaller growth enterprises in the North-East of England. Holmes & Nicholls (1989), Holmes *et al.* (1989) and Holmes *et al.* (1991a) use a sample of 928 and have as many as five independent variables in their logistic regression modelling of financial reporting practices in Australian small enterprises.

Finally, brief reference should be made to two key statistical tests used in the derivation of logistic regression models:

- Wald test – based on a statistic with a chi-square distribution, this test is used in evaluating whether individual regression coefficients differ in a statistically significant manner from zero. This corresponds to using the Student's t-test for the same purpose in linear regression.
- Likelihood Ratio test – again a chi-square based test, this is used in evaluating whether, taken as a whole, a regression model is a statistically significant improvement over the corresponding 'constant only' model. Norusis & SPSS Inc. (1992c, p. 11) indicate that the Likelihood Ratio test examines 'the null hypothesis that the coefficients for all of the terms in the current model, except the constant, are 0. This is comparable to the overall F test for regression'.

Other forms of statistical testing used in evaluating the goodness-of-fit of logistic regression models are described when used in Chapter 7 of the thesis.

5.7 Chapter Review

This chapter of the thesis has sought to provide a detailed description and justification for the scholarly approach and method employed in the research study. After critically appraising prior smaller enterprise research from a methodological viewpoint, the present research has been characterised as follows:

- Paradigmatic plurality is achieved in the research through its reliance upon neoclassical microeconomics and Austrian economics, with some adaptation to accommodate recent strategic management thought.
- Given the underdeveloped nature of existing financial reporting theory, especially as it applies to smaller business enterprises, the research is necessarily exploratory in nature.
- Due particularly to financial and time constraints which apply, a cross-sectional research design has been employed.
- Because of difficulties usually experienced in collecting reliable data from smaller enterprises, and also financial constraints which apply, the research uses excellent secondary data collected on behalf of the Australian federal government.
- The research employs a large random sample stratified disproportionately over enterprise size groupings and ANZSIC codes, with the sample being broadly representative of the population of larger Australian manufacturing SMEs.
- The research relies upon a postal survey using a structured questionnaire with closed questions focused on enterprise characteristics and performance, and financial management characteristics and practices (including financial reporting practices).
- Exclusive use in the research of non-parametric/distribution free statistical analysis is dictated by the categorical nature and/or irregular distributional properties of the data obtained.
- Given the nature of the research question and various constraints which apply, reporting of the research findings is descriptive, associative and predictive in nature.
- Analytical techniques employed in the research include descriptive statistics, cross-tabulations, non-parametric measures and tests, non-linear principal components analysis and logistic regression modelling.