

CRANFIELD UNIVERSITY

Robert Galavan

**Exploring the belief systems of senior managers
Antecedents of managerial discretion**

SCHOOL OF MANAGEMENT

PhD THESIS

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ABSTRACT

Upper-echelons theory has been an extremely active stream of research for over two-decades and, as a counterbalance to the population ecology perspective, has provided evidence to support the position that managers influence firm outcomes. Upper-echelons theory posits that, as managers are boundedly rational and selectively perceptive, a behavioural component derived from their idiosyncratic characteristics should be evident in organisation outcomes. While extensive research has found support for these posited relationships, the operationalisation process subsumes the presumed micro psychological processes into a black-box.

Adopting a realist perspective, this thesis goes beyond accepting that organisational outcomes are shaped by managers characteristics and explores the underlying generative mechanisms at work. While upper-echelons theory presumes that a process of selective perception explains the black-box processes, in the two-decades since its publication it has received little empirical attention. In this light, the selective perception literature is extensively reviewed, ultimately rejected, and an alternative model developed.

Over time, both strategic choice and population ecology theorists have moved from their extreme positions of opposition and a theory of managerial discretion has been proposed to bridge the divide. This thesis builds and extends the concept of managerial discretion as an alternative framework to explain the black-box processes of upper-echelons theory. The theoretical model developed, proposes how, through the process of perceived, enacted, and actual discretion, managers characteristics shape outcomes. The model provides an extensive base for future research and this thesis tests the initial stage, exploring the relationship between managerial characteristics and perceived discretion.

In addition to calls to explore the black-box of upper-echelons research there have been calls to move beyond the use of demographic measures as proxies for managerial characteristics, and to apply a more fine grained approach through the direct examination of psychological characteristics. While this approach has been called for since the original publication of upper-echelons theory, little has been done about it. This thesis redresses that deficiency by directly assessing psychological characteristics, while at the same time capturing the traditional demographic measures.

ACKNOWLEDGEMENTS

A PhD programme is quite a solitary and self-indulgent process; and although solitary might imply independence, nothing could be further from the truth. The luxury of working solitarily on the thesis requires an extensive network of support to make it possible and worthwhile.

Having read many theses by other authors over the years, I was always bemused by references in the acknowledgements section to quiet children suddenly being released to make noise now that the parent has finished studying. Well, thankfully I have to say, quiet is not a word I associate with my wonderful children, Stephen and Nicole. While I have worked away in the study, the background noise has been a chorus of television, video games, and occasional bickering. The regular welcome interruptions – even of not always acknowledged as such – with questions, requests, complaints of inattention and boredom, and the occasional unusual interruption to demonstrate the hamsters latest trick among other things are a constant reminder of the rich and complex world we as social scientists seek to explain. So to my children, thank you, not just for putting up with dad entrenched in the study for the past four years, but for teaching me so much about life.

While I have taken the luxury of time to complete this thesis, many of my other duties as a parent and partner have been neglected. The weight of this burden has been taken by Carol, my wife, partner, soul mate, friend, teacher, confidant and inspiration. As we rapidly approach a quarter of a century together she still surprises me, encourages me, challenges me, and supports me. During the time I have studied for this and other awards, Carol bore our children, raised them, ran the house, recreated her own career, completed her Masters degree, and built her own successful business. In retrospect perhaps the PhD was the easy option! When we both left school at 16 years of age Carol had a vision for our future that she unfolded at a pace she judged I could deal with. Thank you Carol for sharing the vision and letting me live it with you. So what's next!

By most standards a PhD is an epic journey and safe travel on such journeys requires an excellent guide. While many have difficulty finding their guide for the journey, I have been extremely lucky to find two, Andrew and Nada, my supervisors, and now friends. It was a chance meeting, or perhaps it was preparation coinciding with opportunity (maybe I should explain the whole story to them now), that led me several years ago to sit in Nada's office, then at Cranfield University. We chatted together and Andrew joined from the car phone on one of his regular trips to London. Within 60 minutes, Nada and Andrew had offered to supervise my work, and although it was a few weeks before I formally accepted their offer, I think I had already made one of the best decisions in my life before I left that room. For your wisdom and support, I shall be forever grateful.

Perhaps unusually for this section, I want to acknowledge someone I have never met or spoken to, yet at the same time feel I know well. Donald Hambrick, author of upper-echelons theory with Phyllis Mason, built in that seminal work a platform onto which others could climb and then build. To paraphrase Newton, I have seen further by standing on the shoulders of giants. I also want to acknowledge the help afforded by so many other academics from diverse communities around the world, too many to mention, who responded to questions and enquiries so willingly, often on foot of just a speculative email.

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individual calculations that this software implemented during the comparison of matrices in the final study would not have been possible without it. John Towriss then brought his experience to bear when reviewing the results of those calculations and the statistical analysis that followed. Jocelyn Harris has worked fastidiously, and literally for a month of Sundays, to proof read the final drafts of this thesis. In the process she even managed to remind me that I had a sense of humour. Obviously any errors and omissions that remain are entirely my own, but the precision of the document owes much to her eagle eye.

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CHAPTER 1 - INTRODUCTION

1.1 INTRODUCTION

The research presented in this thesis is focused on the exploration and explanation of causal relationships in, what has been termed, the "black box of organisational demography" (Lawrence, 1997). Specifically, the research focuses on identifying the effects of experience and cognitive style on the perceived discretion of managers to influence firm outcomes. The research stream from which this study is developed has its origins in upper-echelons theory (Hambrick and Mason, 1984), which is in turn a development of the behavioural theory of the firm (Cyert and March, 1963; March and Simon, 1958). Upper-echelons theory has been an extremely active and fruitful area for researchers over the past two decades. It has also, more recently, been subject to criticism (Boal and Hooijberg, 2001; Lawrence, 1997) that in its predominantly instrumental form it has failed to explain the nature of the relationships that exist between the posited, and now well tested, connection of managerial demography and firm performance. It is the clear objective of this research to address that criticism and while the central contribution of this research is the theoretical explication of the *black box*, its instrumentality, in particular to the field of strategic management, is also evidenced by its contextual setting of long-term organisational success.

Strategic choice (Child, 1972; Child, 1997) theorists argue that managers matter to firm performance; upper-echelons theory, adopting a strategic choice perspective, asks in what ways managers matter. This research seeks to explain what it is about managers, their experiences, and their personality that shapes the way they perceive their domain of activity. The development of this study stems from a personal desire to understand the mechanisms that explain the persistence in patterns of managerial behaviour that occur, often despite the presence of overwhelming evidence of a need to change or see things differently. On the surface the explanation is provided by the behavioural theory of the firm (as described in Hambrick and Mason, 1984) and in particular selective perception (Dearborn and Simon, 1958) which argues that

managers functional experiences shape their perception of the issues they face. Yet however attractive the concept of selective perception is, the lack of supporting evidence from subsequent studies (Waller, Huber and Glick, 1995; Walsh, 1988) and subsequent challenges to the original findings (Walsh, 1988), left a personal unease and provided the motivation to explore, to explain, to test how managers matter. Is it the blinkers of selective perception shaped through years of experience or do more fundamental factors of personality prevail in shaping managers?

This research focuses on the theoretical explanation of the relationship between managers characteristics and their perception of managers discretion to influence organisational outcomes; and as will be demonstrated in the chapters that follow, discretion is a key concept in the exploration and development of upper-echelons theory.

While the objective of the study is primarily to develop and test theory, the context within which the research is set, long-term organisational success, provides interesting instrumental evidence of its utility.

1.2 AIMS OF THE RESEARCH

The focus of this research is a theme that developed over the initial 18 months of the Cranfield University PhD programme. While one starts with a general sense of a question or an area of interest, one needs to answer early questions in an iterative process before converging on a focal point. The early questions asked in this process focused on understanding the ways in which characteristics of leaders at the strategic apex of organisations shape outcomes. Built into that question was an implicit assumption that leaders do shape organisational outcomes. There is indeed a plethora evidence to support the view that managers do shape organisational outcomes and the argument is well made in strategic choice theory (Child, 1972); but, there are of course other views. Indeed, population ecology theory presents a challenging counter balance, arguing that environmental selection, not managers, shapes outcomes (Hannan and Freeman, 1977; Lieberman and O'Connor, 1972); and thus presents an apparent dichotomy between population ecology and strategic choice. This apparent dichotomy

was bridged by Hambrick and Finkelstein (1987) with the introduction of the concept of managerial discretion which, it is argued, mediates the influence of competing forces; it was this insight that ultimately proved to be a pivotal point in the study.

The concept of managerial discretion, as proposed by Hambrick and Finkelstein (1987), proved attractive in reconciling apparently opposing views of population ecology (Hannan and Freeman, 1977; Lieberman and O'Connor, 1972) and strategic choice (Child, 1972) while providing an implicit connection to the institutional approach (DiMaggio and Powell, 1983). Yet however conceptually attractive the framework appeared as a general perspective, it has significant practical research limitations. As presented, the framework would require both multi-level and multi-unit analysis and how one would operationalise the concept of managerial discretion, a summary variable (Cannella and Monroe, 1997:6), is not clear. These difficulties are born out by the extremely limited (Aragon-Correa, Matias-Reche and Senise-Barrio, 2004:964) empirical research on managerial discretion that followed in the literature. The ultimate focus of this thesis is in some ways a facet of the frustration of having an attractive integrating concept without the supporting empirical evidence.

A more promising research stream, providing extensive empirical support, developed from upper-echelons theory (Hambrick and Mason, 1984). This research stream connected the characteristics of managers to the strategic choices of firms and firm outcomes and has provided extensive support for the instrumental value of the theory (Cannella and Monroe, 1997). There are however two significant issues associated with the research stream. Firstly, upper-echelons theory posits that the psychological characteristics of managers influence strategic choice and firm performance, yet few studies actually test the prediction by using psychological characteristics (Cannella and Monroe, 1997:5). More typically studies use demographic proxies for psychological characteristics and the value of these proxies have been called into question (Markóczy, 1997). Secondly, the theoretical premise on which upper-echelons theory is built, is developed from the concept of selective perception proposed and tested by Dearborn and Simon (1958). The Dearborn and Simon (1958) study, while extensively referenced in organisational behaviour textbooks, finds little support in replication

studies (Beyer, Chattopadhyay, George, Glick, Ogilvie and Pugliese, 1997; Walsh, 1988).

The focal point of the study follows from the issues identified above and aims to address the lack of studies using psychological characteristics, and to explore not just whether characteristics effect organisational outcomes, but also to explain which characteristic differences of managers may lead to different outcomes. In this way the study presents an iterative approach to theory building that it is claimed the field lacks (Lawrence, 1997:20).

1.3 RESEARCH OUTLINE

Of central importance to research is the relationship between the theory and the evidence (data) used to test the theory (Rose, 1982:13). Theory and data are sometimes described as different languages (Hughes, 1976:55) and consequently difficult to translate. The framework used for the analysis is therefore of central importance as it “shows how the key components... are systematically related to one another in order to link evidence to theory” (Rose, 1982:14). The framework used for this study, described in the context of the Rose (1982:14) framework is shown in Figure 1-1.

1.3.1 Structure of the thesis

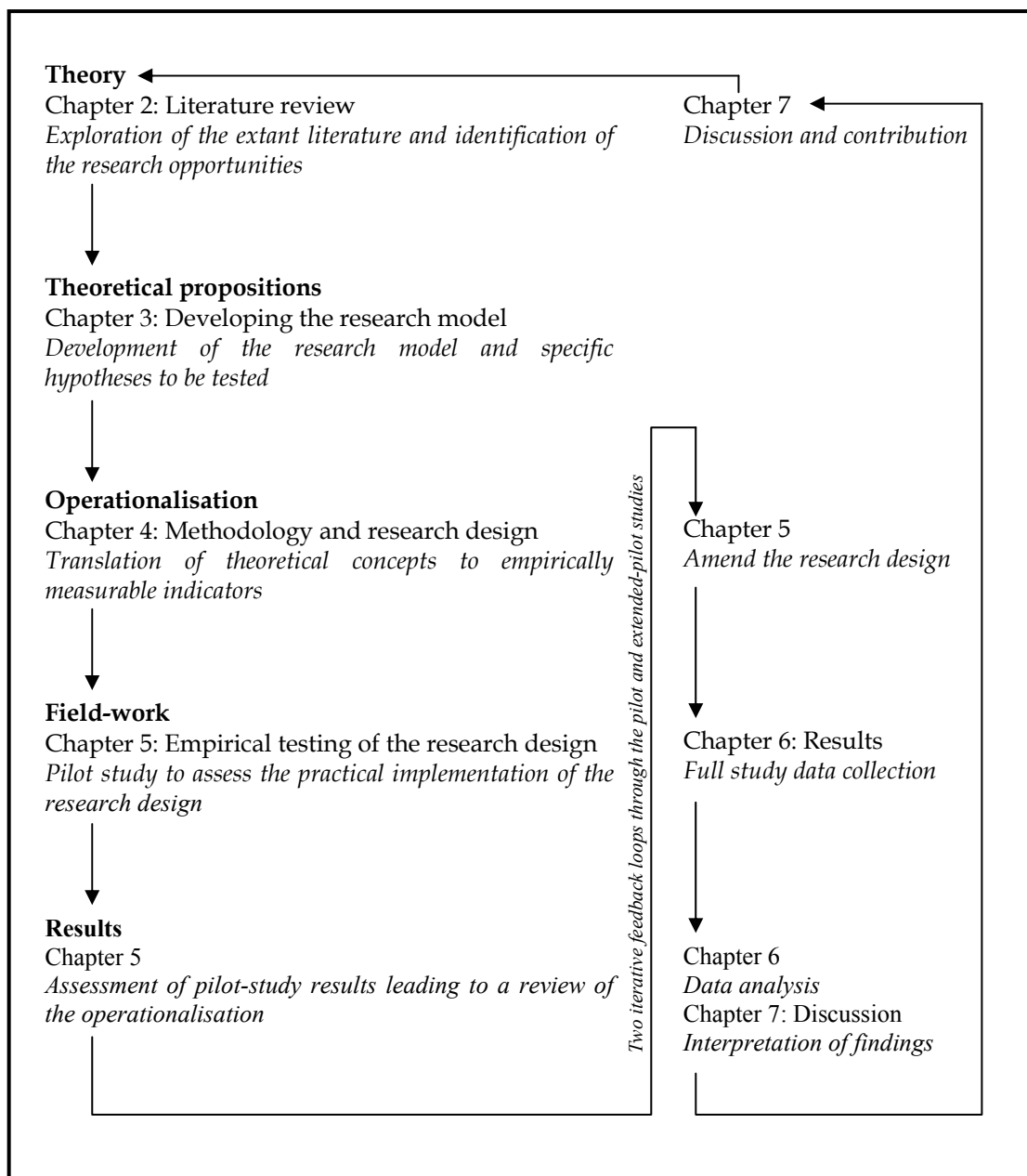
This thesis is developed in six chapters that follow the research outline described in Figure 1-1. The process is described below.

Chapter 1 and Chapter 2 provide the foundation for the thesis, in which the rationale for the study is discussed and the extant literature reviewed. Through a review of the context within which the upper-echelons research stream was developed, a consideration of the multidisciplinary inputs to the field, and a critical review of the development of the field, research opportunities and specific theory development needs are identified.

Having, in Chapter 2, identified a requirement for exploration of the black box in demographic research, in Chapter 3 a broad theoretical model is developed. The model

provides the substantial context within which the focused conceptual framework for the study is developed. With the research framework in place, the research question is specified and specific hypotheses to address the question are formulated.

Figure 1-1: Research framework



Source: Compiled by the author based on Rose's (1982) ideal model

Chapter 4 bridges theory and evidence, translating the theoretical model to a set of empirical measures used in the study. This operationalisation is set in the context of a

realist philosophy that describes the nature of the knowledge to be acquired, and the means of accessing that knowledge. The validity of the measures to be used and the ethical considerations associated with the study are also considered in this chapter.

In Chapter 5 the operationalised research model is tested through an iterative process involving a pilot-study and extended pilot-study, before progressing to the full-study. The full-study data analysis is considered in Chapter 6, and in Chapter 7 the implications of the findings are discussed, triangulated with previous study findings, and linked back to theory, thus reversing the translation process of Chapter 4. Chapter 7 concludes with an extensive discussion on the contribution of this thesis, its limitations, and suggestions for future research.

1.4 RESEARCH CONTRIBUTION

The study provides contributions to the academic community in the form of a contribution to theory, and to the practitioner community in the form of a contribution to knowledge. The emphasis is primarily a contribution to theory.

The strategic leadership and upper-echelons research streams have played an important role in management research by bridging macro and micro approaches to organisational study. Lawrence (1997:18) asserts that "theories are always in process", yet the substantive proposition on which upper-echelons theory (Hambrick and Mason, 1984) is built, selective perception (Dearborn and Simon, 1958), has been called into question (Beyer et al., 1997; Waller et al., 1995; Walsh, 1988) and despite this, there have been no clear developments of the theory. This research aims to redress this issue through the development and testing of theory that builds on the experience in the stream to date.

The study's development of a model to be tested presents researchers with a new perspective to view the upper-echelons framework. The study empirically tests a subset of this broader model and provides several directions for future study.

Of interest to practitioners will be the differential effect of psychological predisposition and experience on perceived discretion. This may be particularly interesting to those in organisations charged with the selection and development of future leaders. Understanding how experience and personality affect the perceived discretion of managers may directly aid the development of selection criteria and the preparation of development plans to give managers new experiences.

As part of the data collection process, feedback on some of the personality data collected from participants in the study was used for feedback and development. In many cases this feedback has been built into the fabric of development programmes and is already contributing to managerial knowledge.

1.5 SUMMARY

The extensive research conducted in the upper-echelons research stream, while providing support for the strategic choice perspective, has not abated calls from its originator (Hambrick in Cannella, 2001) and others (Lawrence, 1997; Priem, Lyon and Dess, 1999) to move beyond explaining if managers matter, to a more fine grained approach that explains how managers matter to organisational outcomes. Central to this thesis is the development and initial testing of a model that specifically addresses this call. The research framework developed and tested in this thesis is a direct response to the often called for, but rarely delivered, fine grained micro research required for development of the field.

The principal objective of the study is to contribute to the development of upper-echelons theory by building on prior research in an iterative process of theory building. This research builds on previous work through the development of an integrative framework based on a thorough review of the literature. The literature review identifies significant challenges to the presumed black box process of selective perception, and goes on to identify perceived managerial discretion as an alternative mechanism. On this basis, a conceptual framework is developed, and specific hypotheses tested in a rigorous process that concludes with the identification of the specific contributions of the study, the implications for and development of the theory, and indicators for future

research. The following chapter describes the upper-echelons research stream in the context of the extant literature.

CHAPTER 2 - LITERATURE REVIEW

2.1 INTRODUCTION

The ultimate focus of this study is to advance the understanding of strategic leadership and upper-echelons theory. This chapter provides a review of the literature and sets the broader context within which upper-echelons theory, and consequently this study, are located. It goes on to identify directions for further development of the field.

This study focuses on senior executives, but it is by no means unique in doing so, and top managers have been the focus of a range of research perspectives. In the transformational leadership perspective organisational outcomes have been identified, at least in part, as due to the charismatic ability of managers to transform followers (Bass, 1991; Yukl and Van Fleet, 1992). The visionary leadership perspective explores the process leaders go through as they try to articulate visions for their organisations (Kakabadse, Nortier and Abravomici, 1998; Westley and Mintzberg, 1988). Another perspective, agency theory, concentrates on managers as agents of shareholders but with self interest agendas (Fama, 1980; Jensen and Meckling, 1976). Strategic leadership theory, specifically as characterised by upper-echelons theory, posits that organisations are a reflection of their leaders characteristics (Hambrick and Mason, 1984) and in a related, but more explicitly psychodynamic perspective it is argued that organisations are a reflection of their leaders personality characteristics (Kets de Vries, 1993; Miller and Toulouse, 1986).

Each perspective has its strengths and its limitations and each add a valid perspective on the role of top management in organisations. Even so, studies must find a balance between comprehensiveness and clarity of focus, and this PhD is no different from other studies in this regard. While recognising the extremely valid approaches of transformational leadership, visionary leadership, agency theory and others, this study explicitly focuses on the strategic leadership and the related psychodynamic perspectives.

While upper-echelons research is focused on leaders and is described as an aspect of *strategic leadership research*, it is worth clarifying that upper-echelons theory, and this study, focus not on the relational leader-follower aspects of executive roles (as is the general concern of *leadership research*), but on executives strategic roles as they shape firm outcomes (Hambrick in Cannella, 2001). So while this is a study of *leaders* (senior executives), it is not a study of *leadership* in the orthodox sense. It might be more appropriately characterised as a strategy study exploring leaders.

2.2 THE HISTORICAL CONTEXT

Studies that are characterised as strategy orientated bring with them a focus on organisational outcomes or firm performance. While this study has such a focus, its scope is limited to dealing with managers beliefs about the potency of their influences over organisational outcomes and firm performance. The specific focus of this study is on strategic leaders, and it is set in the context of the influence these strategic leaders have on organisational outcomes through their strategic roles, rather than through their relational roles. Ultimately this study adapts a perspective closely associated with strategic choice (Child, 1972), acknowledging the role that leaders play in shaping organisational outcomes, and examining the personal characteristics that shape their views. For those with a behavioural orientation such an approach will seem wholly acceptable. It must however be acknowledged that there are alternative perspectives to strategic choice which present a strong counterargument in which forces, other than managers choices, shape organisational outcomes; indeed some argue that managers are largely impotent when faced with the reality of environmental and organisational constraints (Liebersohn and O'Connor, 1972).

While this study takes a perspective closely associated with strategic choice theory (Child, 1972), it also bridges the apparent chasm between strategic choice and population ecology theories (Hannan and Freeman, 1977) through the development of the discretion concept introduced by Hambrick and Finkelstein (1987). This chapter sets the context within which the apparently polar perspectives of population ecology and strategic choice have developed. Where population ecology (although unique in its application of ecology theory) has parallels with the leader free themes of economics

and strategic positioning, strategic choice draws on psychology, sociology and behavioural theories.

In very broad terms theories from the literature can be characterised as tending on the one hand towards a rational economic explanation of the functioning of firms which embody assumptions of homogeneity shaped by system level forces, and on the other hand towards a behaviourally oriented explanation of firm outcomes, encompassing heterogeneity, and originality shaped by human behaviour.

2.2.1 Theory of the firm – an economic perspective

The field of economics has played an extremely influential role in organisational studies from as early as the 1700's. Classical economics began with the work of Adam Smith in his seminal writing, *The wealth of nations* in 1776, when he proposed a theory of labour that explained output as a function of labour inputs. In this theory of labour it was proposed that an increment of labour was achieved by compensating the producer, and that labour would be expended up to the point at which the increment of that compensation equals the increment of effort required to acquire it and no further. In a more formalised development of classical economics Ricardo (1817) similarly explained that the value of a commodity will depend on the relative quantity of labour which is necessary for its production, but also adding that it is the necessary quantity of labour, not what is paid for the labour, that sets its value. The result of these developments was a broadly accepted view of organisational actors as rational economic mechanisms, transforming the value of labour to another form.

Ultimately this theory of labour was displaced by neoclassical economic theory (see for example Menger, 1933-1936) which, driven by an assumed profit maximisation motive of firms, theorists argued could explain the outcomes of a theory of labour while also accounting for scarcity and uniqueness in a way that classical theory could not. In this theory individuals are assumed to maximise utility, and firms are assumed to maximise profit.

Central to neoclassical economics is a theory of marginalism. Classical theorists had struggled with the paradox of *value in use* versus *value in exchange*. For example, water is an absolute necessity of life and as such is of high value. On the other hand precious stones are alluring but clearly not essential to life. However, the price of precious stones on the market (*their value in exchange*) is greater than that of water. The solution to this paradox comes on two fronts explained by the neoclassical theorists. Firstly a theory of supply and demand takes into account the scarcity or supply of a product. If water were scarce (supply) and buyers in the market required it (demand) then this would increase its price. However as supplies become plentiful, the price will fall. This change in price is explained by the theory of marginalism, with neoclassical theorists explaining that it is the marginal value of the product that sets the price. In other words price depends on the value a person will place on the *next* litre of water or the *next* precious stone. If one is dying of thirst then clearly there is a high value to be placed on the next (marginal) litre of water and precious stones will be of little interest. If however you live on a lake of pure fresh water then the next litre of water will be of little (marginal) value. It is this theory of marginalism that dominated 20th century neoclassical economics and still pervades today.

Neoclassical economics treats individuals as rational entities with specific assumed behavioural characteristics. Individual actors referred to as *homo oeconomicus*, are assumed to be “choice mechanisms” that are both “invariant and perfectly exact” thus, having rational preferences, maximising utility (profits in the case of firms), and acting on full and relevant information (Georgescu-Roegen, 1967:187). While theorists did not argue that this is a representation of reality, it was claimed that the “personal ideal type, Economic Man, is recognized as a useful and possibly indispensable part of the theoretical system of economics” (Machlup, 1972:117) thus framing neoclassical economics in the context of positivistic science.

This development of neoclassical economics utilising Cartesian mathematical logic and the positivist approach of the natural world scientists was achieved without any recognition of the psychology of those who enacted the system. Simon (1976:131) noted that this was accomplished by applying “the assumption of utility maximisation

or profit maximisation on the one hand, and the assumption of substantive rationality on the other”.

The major challenges to the ideal economic model, *homo oeconomicus*, of neoclassical economic theory comes in two broad forms including; the marginalist debate of the 1930's (Machlup, 1967) which captured behaviouralism and explores the firm by taking into account goals, expectations, choice, and control in the decision process (Cyert and March, 1963:10), and the development of transaction cost economics which forces the internal exploration of organisations (Coase, 1937) with a view to explaining why firms exist. Transaction cost economics and behaviouralism have in common a treatment of firms as heterogeneous entities shaped not only by their environment but also by their internal characteristics, and this is in sharp contrast to the homogenous rational characteristic assumed in neoclassical economics.

While neoclassical economics is described as a *theory of the firm*, Machlup (1946:21) in his famous analogy of the automobile driver, compared the *theory of the firm* to the *theory of overtaking*. Explaining that when fog affects driving conditions the speed of cars will slow down, but this understanding will explain nothing about any specific driver, just that in the long run, across the population, drivers will slow down. Thus the *theory of overtaking* refers to overtaking not drivers, whereas the inappropriately labelled *theory of the firm* refers to a *theory of markets* not firms. Arguing vehemently for the retention of marginalist economics Machlup (1967:6) later explained that the type of action assumed to be taken by the theoretical *homo oeconomicus* “cannot be predicted actually to be taken by any particular real actor” as the “theory serves only to explain and predict effects of mass behaviour”. Essentially Machlup (1967) is arguing that different theories are required to address different questions. This may in some way explain why the behaviourally oriented work of Simon has had a profound effect on the field of organisational studies but relatively little impact on the field of economics.

Arrow (1987:734) explains that behaviourally oriented studies answer

new questions, why economic institutions have emerged the way they did and not otherwise; it merges into economic history, but brings sharper [microanalytic]... reasoning to bear than has been customary.

The neoclassical theory assuming the profit (utility) maximisation principle is therefore appropriate for answering some questions, such as what will happen (maintaining the overtaking analogy) to the speed of cars as fog encroaches, but is of limited use to explain what speed a specific car will be driven at (Machlup, 1967). To answer the latter question, knowledge of the driver and their specific circumstances is required. In an organisational context, to explain for example what level of new product release a specific firm will have, an understanding of the heuristics, routines, planning processes, decision process, resources, slack, and expectations of the actors is required. These are the types of issues that the behavioural theory (Cyert and March, 1963) of the firm addresses and it is in stark contrast to the uniform profit maximisation approach.

Therefore, rather than cast the behavioural theory of the firm as a challenger to economic throne of neoclassicism, they can be seen as complimentary approaches. The profit maximisation assumption explains system level behaviour, but has no empirical parallel at the firm level. The behavioural theory of the firm provides information about individual firm behaviour, but is not necessarily generalisable at the system level.

Recognising the contrast between the more micro oriented behavioural theory of the firm and the system level oriented neoclassical theory of profit maximisation one could expect the strategy field (concerned with why firms do the things they do and the effect of these actions) to have embraced the behavioural approach. However, this is not the case and even though the field of strategic management is quite eclectic,

drawing on the fields of psychology, and sociology, the dominant perspective is nevertheless economics.

A central interest of the field is to explain why one strategy is more successful than another. In addition, of specific interest to those working with managers is not only what makes a strategy successful, but also how these strategies come into being in organisations. This is the challenge of being able not only to comment on strategy formulation, but also on strategy implementation. In a parallel between the role of the profit maximisation theory and its counterpart, the behavioural theory of the firm; the role of orthodox strategy – based on economic theory (explaining why a strategy is successful at the industry level) – and its counterpart in sociology and psychology (explaining how particular strategies develop in organisations) is apparent.

For example, in the literature on diversification, Teece (1982) explains using a transaction cost economics perspective, why multi-product firms are successful and thus explains, rationally, why firms would choose to develop in this way. Fligstein (1985), while addressing the same issue, takes a sociological perspective and explains, behaviourally, the growth in the number of multi-product firms as a function of external shocks shaping the social processes of firms.

Following neoclassical economic assumptions about profit maximisation in perfect conditions and the consequential firm homogeneity that arises, Harvard's industrial organisation *structure-conduct-performance* approach attributes the variation in firm performance to variation in industry structures (Bain, 1956; Mason, 1957). Industry characteristics are proposed to affect an industry's competitive structure, which in turn affects the conduct of competitors, which in turn affect firm performance. This approach essentially sees firm behaviour as a function of market forces.

The Harvard structure-conduct-performance model is not without challenge. The Chicago school (Demsetz, 1973; Stigler, 1968) posited that competitive industry structures were a consequence of managers behaviours as they furthered their objectives; as opposed to their behaviour being a reaction to the industry structures they encountered. This view brings the role of managers to the fore. In response, the Harvard school rewrote the structure-conduct-performance chain to conduct-structure-performance (Caves and Porter, 1977; Porter, 1979) and included the influence of behavioural variables. In a development of the work of Coase (1937) on transaction cost economics, Williamson (1975) challenged the assumptions of homo oeconomicus arguing that firms optimise on costs driven by risk, bounded rationality, and differentially limited information availability. Although developed in the 1930's, transaction cost economics only garnered broad interest in the 1970's largely through the work of Williamson (1975; 1985; 1991a; 1991b). These developments have led to transaction cost economics being described as the ground where economic thinking, strategy, and organisational theory meet (Rumelt, Schendel and Teece, 1994:28).

2.2.2 Theory of the firm – an organisational perspective

While economics has been the dominant influence in the development of the strategy field (Baum and Dutton, 1996), there are other significant influences such as organisational theory (see Prahalad and Bettis, 1986) and cognitive psychology (see Walsh, 1995) as well as sociological influences dealing with political (Fligstein and Mara-Drita, 1996), and cultural (DiMaggio, 1997) influences in a tradition that goes back to Durkheim (1933), Weber (1947), and Marx (1887).

Classical organisational theory as characterised by Weber's (1947) theory of bureaucratic administration is premised on control exercised on the basis of knowledge. From a sociological perspective, power is a principal process of control. Weber (1947) distinguished between authority and power, defining power as something a person could impose at will without taking account of the other, whereas authority required the legitimacy of power to be acknowledged by the other. He went on to classify authority as deriving from charisma, tradition, or rational legality.

Weber (1947) argued that this rational legal authority produced the most efficient form of organisation, a bureaucracy. While bureaucracy is today popularly associated with slow and inflexible organisations, at the turn of the 20th century it provided a framework for behaviour that avoided the corruption, unfairness and nepotism of earlier organisations. Weber's objectives were idealistic and were intended not just to reform organisational inefficiency but in doing so to address socio-political issues. The bureaucratic organisational form, Weber (1947) argued, would ultimately lead to a greater social equality in society.

Classical organisation theory assumes that there is a best way to organise (Weber, 1947) and manage (Fayol, 1949; Taylor, 1911), and while extremely influential this assumption was ultimately challenged from a more psychological perspective. The Hawthorn experiments of the 1920's provided an empirical base from which the challenge to organisational theory could be mounted, as it explored the effect of issues like fatigue and monotony on worker production (Burrell and Morgan, 1979). Argyris (1957) argued that classical principles of organisation lead to circumstances where employees have minimal control over their working lives, are expected to be subordinate, passive and dependent, and to work to a short-term perspective. These conditions, he argued, lead to psychological failure as people are treated more like children than competent human beings.

While sociology and psychology developed in parallel with economics, neoclassical organisation theory, to some extent, blends economics, sociology and psychology. One of the earliest and most influential neoclassical organisation writers was Barnard, a practitioner turned theorist. Influenced by the results and supported by the researchers involved in the Hawthorne studies, Barnard produced his widely influential book, *The functions of the executive* in 1938 (Burrell and Morgan, 1979:148) in which he adds the concept of the organisation as a system to the economic, sociological and psychological orientation of organisation theory. Barnard (1938:73) defined an organisation as “a system of consciously coordinated activities or forces of two or more persons”. Rather than provide normative prescriptions for organisations, Barnard

(1938) described the reality of organisational life, a reality in stark contrast to the assumed profit maximising homo oeconomicus of the prevailing economic theory.

Simon (1957) observed that in organisational settings, there are usually uncertainties and that in such circumstances managers are subject to cognitive limits on their rationality. As a result of the complexity of the choices faced by managers, including information and time limitations, rational decisions and choices are impossible. Where economic theory assumes the *maximising* behaviour of homo oeconomicus, Simon (1955; 1956; 1957) identifies the *satisficing* behaviour of managers as they make the best decision within the constraints imposed by the available time, resources, and cognitive capacity.

The development of a behaviourally based explanation of the decision-making process in organisations facilitated further significant developments leading to the introduction of the concepts of bounded rationality (March and Simon, 1958) and the behavioural theory of the firm (Cyert and March, 1963). In retrospect these concepts posed a significant challenge to the orthodox economic theory of the firm, by considering the firm to be a unique organisation influenced by the characteristics of individuals, social processes, and organisational routines. This explanation of firm heterogeneity and inimitability provided an important foundation for understanding firms within a context that incorporated individual psychological factors and group social processes, and contradicted the assumptions of firm homogeneity that underpins the rational economic perspective.

The principle of bounded rationality, or perhaps more accurately the problem of bounded rationality as a limit to rational economic problem solving was defined to arise because

The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behaviour in the real world – or even for a reasonable approximation to such objective rationality (Simon, 1957:198).

In this respect, the inability of managers to consider and process all of the information necessary to make a fully rational choice implied that they dealt with a limited set of information – creating a framework within which they acted rationally – hence the term bounded rationality. At the time, the implication of this insight was extremely significant: as Simon (1957:199) explained, the goal of classical economic theory, which is to predict the behaviour of a rational man, cannot be achieved without an “empirical investigation of his psychological properties”. Simon (1957:199) went on to note that a manager’s “constraints are part of his own psychological make-up”, and in doing so preceded by over 30 years the related work of Child (1972) and Whittington (1988) which will later be described as important contextual aspects of the current study.

The concept of bounded rationality, while acknowledging the constraint imposed by psychological make-up, did not try to explain the source of those constraints; this was attended to in the later work of March and Simon (1958) when they introduced the concept of selective perception which was empirically tested in the work of Dearborn and Simon (1958). March and Simon (1958:150) argued that past experiences provide managers with “given... knowledge and assumptions about future events”, and Dearborn and Simon (1958) went on to find evidence to suggest that managers’ departmental experiences shape their perceptions.

The work of Cyert and March (1963) on a behavioural theory of the firm was clearly aimed at presenting an economic model that described the firm, yet it encapsulated the existence of forces other than those described by the rational economic or machine metaphor of scientific management. A central focus of their work was on organisational decision making (1963:19), and at least two aspects of their work are particularly salient in the context of the current study. The first is the recognition of a bias “reflecting special training or experience”, the second a bias “reflecting the interaction of hopes and expectations” (Cyert and March, 1963:122). These biases, in among a range of other factors, influence their view that organisations are heterogeneous because of the influence of behavioural factors and the difficulties associated with imitating standard operating procedures, an insight that is echoed much

later in the resource based view of strategy (see Barney, 1991 for a discussion of unique resources and inimitability).

This development of a theory of the firm provided for an integration with, rather than an abandonment of the rational economic model, and is most impressive when considered in the context of the poorly developed understanding of the psychological aspects of learning and choice processes (Simon, 1957:242) that existed at the time. While the work provided relatively few well developed insights into psychological processes per se, it provided as Simon (1957:242) described it, “a marking stone” between economics and psychology; and to this day marks an area of significant interest to researchers of many related disciplines. The integration of the psychological sociological and economic perspectives supports

the idea that the choices people make are determined not only by some consistent overall goal and the properties of the external world, but also by the knowledge that decision-makers do and don't have of the world, their ability or inability to evoke that knowledge when it is relevant, to work out the consequences of their actions, to conjure up possible courses of action, to cope with uncertainty (including uncertainty deriving from the possible responses of other actors), and to adjudicate among their many competing wants (Simon, 2000:25).

Thus while economic approaches to strategy have been to the fore, there is no shortage of theories waiting to lay claim to its crown. In a separate stream of psychological studies, generally without reference to economic theory, researchers searched to identify the personal characteristics of effective leaders. The following section reflects on the key aspects of this research.

2.2.3 Theory of leadership – a psychological perspective

Early studies of leadership set out to identify the personal characteristics (traits) of effective leaders. The early studies (see reviews by Gibb, 1947; Stodgill, 1948)

showed initial promise but suffered from a lack of stability in replication studies, leading to a call for researchers to consider not only traits, but also the interaction of contingent demands on leaders (Stodgill, 1948). In critiquing this early work on traits it is important to recognise the extremely early stage of development that the psychological trait theory was in. There was little in the way of substantial theory to guide researchers as to what were valid traits, and equally little to guide the operationalisation of stable psychometric measures. Nevertheless, leadership research largely abandoned trait approaches until the 1970's.

Developments in the field of psychology and psychometric measurement in the intervening periods provided researchers with new opportunities to explore the predictive qualities of managers traits. Building on these advances and taking contingent situational variables into account, Mischel (1973) was able to demonstrate the predictive qualities of personality, particularly in what were described as weak situations where there are less onerous organisational norms. A particular critique of early trait research was that the traits did not remain stable over time. Latter day studies of popular psychometric instruments such as the Myers-Briggs Type Indicator (MBTI)¹ (Myers, McCaulley, Quenk and Hammer, 1998), the five-factor based NEO-FFI² (Costa and McCrae, 1992) instruments (described more fully in following chapters), and insights recognising the situationally contingent stability of other traits (Schneider, 1983), have largely neutralised the challenges and there are now several well established trait leadership theories including achievement motivation theory (McClelland, 1961), and charismatic leadership theory (House, 1977). In related fields, research on intelligence has expanded from standard tests of IQ (intelligence quotient) to include multiple intelligences (Gardner, 1983), stratification of cognitive ability according to discretionary role requirements (Jaques and Cason, 1994), and non-cognitive based emotional intelligence (Goleman, 1996).

¹ MBTI® and Myers-Briggs Type Indicator® are registered trademarks of Consulting Psychologists Press and Oxford Psychologists Press

² NEO-FFI© is the copyright 1978, 1985, 1989, 1991 of Psychological Assessment Resources

In a move away from trait approaches LMX theory (leader-member-exchange) (Graen and Uhl-Bien, 1995) focuses on relationships as a predictor of important outcomes such as employee commitment. In a focus on followers rather than leaders, implicit leadership theory (Lord, Binning, Rush and Thomas, 1978) evaluates the cognitive processes behind the evaluation of leadership. Although follower focused, implicit leadership theory has implication for trait theories, as followers are likely to evaluate leaders on specific traits or categorisations.

More recently a categorisation of theories has emerged and been described as, new leadership theories (Bryman, 1993), which include charismatic leadership (House, 1977), transformational leadership (Burns, 1978), and visionary leadership (Nanus, 1992). While these theories have been captured in popular management language, there has been little progress in explaining the process by which they influence follower behaviour.

There are broadly two strands identifiable in the works described in this section. The first, early theories, with a focus on supervisory management and the role of traits, cognition and relationships on leader effectiveness. The second, the new theories of leadership, focus on providing guidance and purpose for followers. The result is a body of literature on leadership that has little to say about strategic leaders in the context of their organisational challenges. It is in this void that strategic leadership research as characterised by the upper-echelons (Hambrick and Mason, 1984) perspective sits. Strategic leadership sits closer to trait theories by virtue of its goal to identify antecedents of leadership behaviour and effectiveness, but it brings a new dimension by locating strategic leaders in their organisational context. It is different from the new leadership theories in that it deals with leadership roles as they relate to strategic choice rather than the relational roles of leaders.

2.3 THE DETERMINISM-VOLUNTARISM DICHOTOMY

Neoclassical economics maintains a focus on explaining the mass behaviour of organisations and is in contrast with organisational theories based on psychological and social perspectives that seek to understand individual firm behaviour. A similar

contrast is to be found between the ecology based population ecology theory (Hannan and Freeman, 1977) and the strategic choice school (Child, 1972).

While economics, sociology and psychology dominate organisational literature, other approaches including those from ecology (Hannan and Freeman, 1977) have been proposed to explain firm viability (why some forms of organisation survive, rather than why individual firms survive). Population ecology argues that the inertial forces of organisations make any illusion of managerial choice redundant. A counterbalance to this view is the work of Child (1972) on strategic choice arguing that powerful power groups shape organisations through an essentially political process. The following sections introduce and ultimately integrate these two apparently opposing and dichotic views. Thus, through the integration of the perspectives the significance of managerial discretion, a central focus of this study, emerges. This is followed by an exploration of upper-echelons theory (Hambrick and Mason, 1984) and a review of the challenges and criticisms of the research stream.

2.3.1 The population ecology and strategic choice perspectives

The population ecology view posits that organisations are inertial, managers have little if any impact on the destiny of their organisations, and ultimately that prosperity is decided by environmental selection (Hannan and Freeman, 1977). This view is predicated on the principle of isomorphism which dictates that similar environments require similar and optimally configured organisational forms (Hannan and Freeman, 1977:938). It is the contention of population ecology that organisational inertia does not allow organisations to adapt to the required configuration.

Hannan and Freeman (1977) contrast the ecological perspective of selection with the organisation based theories of selection. On the selection side of the dichotomy they identify management literature which describes how “organizations are affected by their environments according to the ways in which managers or leaders formulate strategies, make decisions or implement them” (Hannan and Freeman, 1977:930). Included in the selection side of the dichotomy are sociological perspectives (Parsons, 1956; Selznick, 1957; Weber, 1947) and decision-making perspectives (Cyert and

March, 1963; March and Simon, 1958). Hannan and Freeman (1977:931) argue that the selection aspect has been largely ignored and that issues of organisational inertia suggested by Burns and Stalker (1961) and Stinchcombe (1959) have been largely ignored. They argue that the process of selection comes into account because of sunk costs, information limitations, internal politics, and historically derived normative agreements (Hannan and Freeman, 1977:931).

According to the selection perspective, organisations that do not have the optimum form for their environment, that is are non-isomorphic, are simply deselected. In their study of the effect of leaders in major corporations Lieberman and O'Connor (1972:118), in support of the population ecology view, argue that "belief in a political leader's ability to alter affairs may generate a feeling of indirect control" in the same way "that belief in supernatural forces provides the Trobriand Islanders with a feeling of control over important events which they are impotent to affect". Such a view in effect reduces the role of a leader to one of psychological comforter.

While the development of a population ecology perspective bears little resemblance to the neoclassical economic perspective, there are nevertheless similarities in their focus on system level explanation and the absence of behavioural influences. The economic perspective, the theory of the firm (previously explained to be better described as a theory of markets) focuses on a system level explanation of the dynamics of competition. The economic view eschews the study of the individual manager or organisation replacing it with a homogeneous rational economic actor providing explanation of mass behaviour (Machlup, 1967:6) . Strategy theorists followed this lead and Porter's (1980) popular work embodies a school of strategy that explains performance as a result of competitive dynamics and structure to the extent that leading academics joke that "you can tell if a case had been written by Mike Porter: it didn't have any people in it" (Cannella, 2001:37).

The population ecology approach although strongly challenged by strategic choice (Child, 1972) perspectives is still an active research paradigm. Population ecology has been applied to explain intensity of competition as a function of the similarity of

resource requirements (Baum and Mezias, 1992). It has also been applied to explain firm political activity, specifically why firms become politically engaged in their own right, rather than relying on their trade associations or other collective interest groups (Gray and Lowery, 1997; Lowery and Gray, 1988). In marketing management research, population ecology approaches have been blended with others to provide analytical frameworks that explain issues of latent demand (Wang, 2000). The multi-level characteristic of a population ecology approach has also enabled its application to internal organisational issues such as the limits of growth in bureaucratic settings as a function of rules growth (Schulz, 1998).

In contrast to the inertial population ecology perspective, strategic choice theorists argue that organisations have significant freedom to influence their outcomes. In an extensive discussion on the role of strategic choice Child (1972:216) argued, at the time against the trend, that

when incorporating strategic choice in a theory of organization, one is recognizing the operation of an essentially political process in which constraints and opportunities are functions of the power exercised by decision-makers in the light of ideological values... and ... Only when these political factors can be adequately measured is greater predictive certainty likely to be achieved.

The predominant interest at the time of Child's (1972) writing centred on the ability of managers to effect the structure of organisations. Strategic choice scholars arguing that managers made structural choices, which in turn determined performance, the population ecologist scholars arguing that structure is inertial, and that environmental demands (for isomorphism) determine performance. Since these studies, population ecology views have been directed at many other targets beyond the effect on structure and can now be considered to refer to a general concept of organisational inertia.

At the time of Child's (1972) writing he was somewhat of a lone voice arguing the capability of managers to influence outcomes. The tide has however turned and the

strategic choice paradigm is now a major stream in performance research. Hambrick and Mason's (1984) formulation of the strategic choice perspective in their upper-echelons theory spawned much of the output. Strategic-choice perspectives have since been applied to the effect of executive discretion on the attention patterns of firms (Abrahamson and Hambrick, 1997); the effect of executive tenure on organisational outcomes (Finkelstein and Hambrick, 1990; Miller, 1991) and the effect of CEO discretion on levels of remuneration (Finkelstein and Boyd, 1998).

Hambrick (in Cannella, 2001) postulates that the popularity of upper-echelons theory was partly a backlash to population ecology by those who wanted to put decision makers back in the framework, and also as a counteraction to the rise of the economic-based view of strategy.

2.3.2 Integrating the concepts

Population ecology and strategic choice are often presented as dichotic in nature, however this representation is far too limited to represent the dynamic complexity of organisational and environmental reality. Indeed Child (1997:58) later suggested that the

concept of strategic choice was misleadingly interpreted as justifying a sharp distinction between organizational agency and organizational environment, with the former represented by voluntaristic perspectives and the latter by deterministic approaches

although overall the process was seen as “an *interactive* one... between choice and constraint” [italics in original]. It rebalanced the perspective of organisations as environmentally determined entities and recognised the dynamic political process of managerial choice and agency. In doing so this echoed the challenge that the behavioural theory of the firm (Cyert and March, 1963) had issued to the orthodox economic perspective.

Strategic choice identifies the need for managers to evaluate their organisations position and it presumes that their “prior values, experience and training ... colour this evaluation to some degree” (Child, 1997:46, 48). Child (1997:49) discusses this in the context of a “problem of human agency” through the exploration of Dawe’s (1979:398) agency paradox, which describes how human agency allows the freedom of choice to create organised social systems: doing so shapes future experiences and influences, which in turn creates constraints for future choice. The logic of this argument infers that organisational and environmental factors, shaping human values through a process of experience and training, creates constraints to discretion; and that therefore, the removal of external constraints presents managers with unlimited choice. In doing so this argument ignores any limits to agency shaped by internal human factors and this separation of internal and external constraint was explored by Whittington (1988).

Whittington (1988) added to the apparent dichotomy of either no choice or free choice, dependent on environmental constraints, when he argued that to see the environment as the sole determinant of organisation structure and consequently survival was too simplistic and so added the concept of action determinism. Action determinism proposes that even in the absence of external constraints managers do not have truly free choice. Their choices are in some way determined by their “built-in preference and information processing systems” (Whittington, 1988:524). That is, managers bring to any situation an inherent bias or set of givens that they may or may not be aware of. Whittington (1988:522) argues that

The stark dichotomy of environmental determinism and voluntarism is attractive because it appears to offer a simple solution to the problem of strategic choice. All that is necessary for strategic choice is to dissolve away environmental constraint. Smash the imprisoning walls, and with one bound the actor is free.

Drawing on Elster’s (1984) model which separates organisational and individual filters in the process of choice, Whittington (1988:523) describes environmental determinism

in terms of Dawe's (1979) external constraints (choice limited, constrained and determined by environmental forces), and action determinism in terms of an internal mechanism that denies any choice between alternatives. Rather than accept or reject either alternative deterministic accounts of human action, Whittington (1988:523) argued for a Realist sociology or "non-deterministic account of *both* human action and environmental structure" [italics in original] explaining that

Misled by a simplistic dichotomy between environmental determinism and voluntarism, they have been trapped into too glib a repudiation of structure and too causal an assumption of human agency.

Indeed this Realist approach which acknowledges both social and psychological aspects (Bhaskar, 1978; Harré, 1979) is fundamental to the philosophical framework of the current study (and is described in detail in a later chapter). The integration of structure and agency in the Realist perspective is brought about by the structure (environment) providing the resources necessary for the exercise of free will (agency) (Bhaskar, 1978).

The point is captured by Whittington (1988:533) in the following passage:

The point of the Realist perspective, then, is not simply to make explicit that the strategic decision-makers within our society are disproportionately white, male and wealthy. Nor even is it just to recognise the role of class, gender and ethnic structures in propelling particular actors to positions of strategic decision-making power – that is, in empowering them as agents in the first place. All this is important. But finally social structures are significant because they make a difference to strategic choice. The difference is felt both in what agents seek and in what they can realize.

The important addition from these insights is that it is unnecessary to view strategic choice and population ecology as a dichotomy of voluntarism and determinism but rather a non-determined interaction of human agency and environmental selection. The focus of the study is to explore the antecedents of human agency, specifically the perception of managerial discretion. In the context of the Realist perspective this incorporates the constraints that result from environmental exposure (values, experience and training) and constraints based the internal psychological make-up of the actor (their processing capabilities and style).

2.4 LOCATING STRATEGIC LEADERSHIP IN CONTEMPORARY STRATEGY

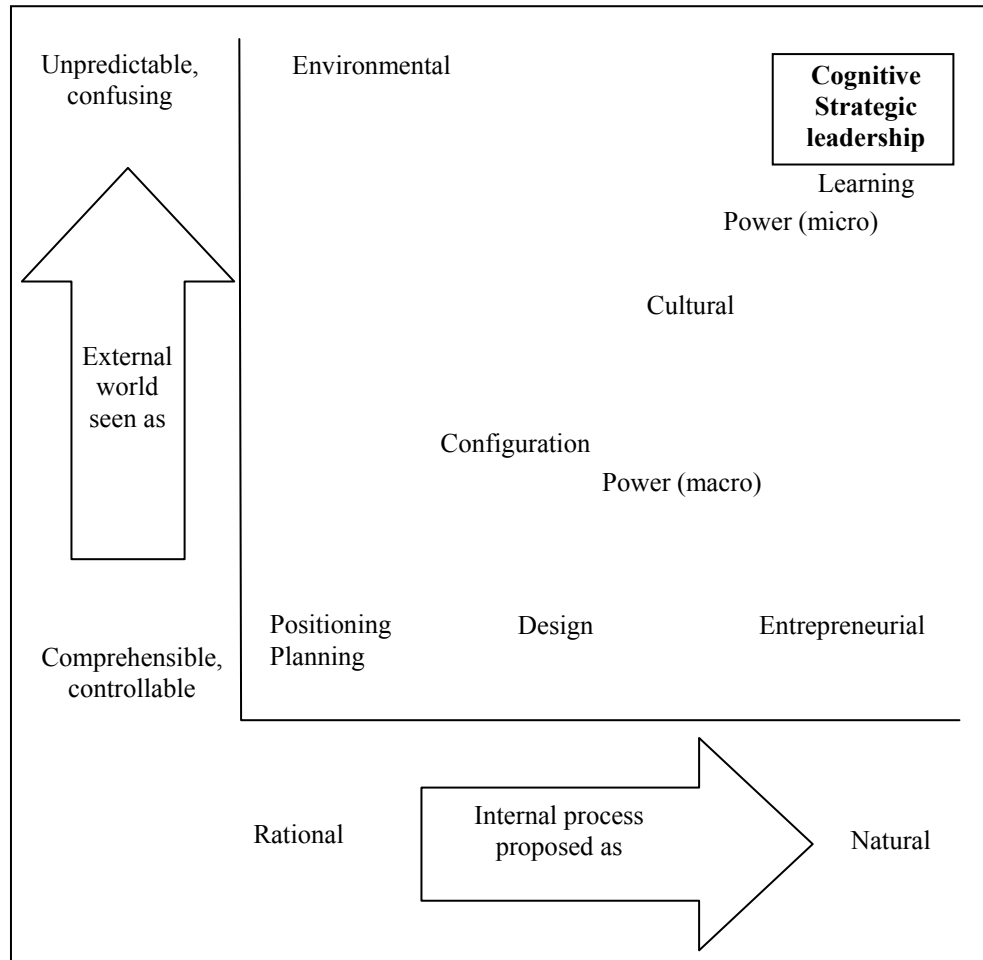
Strategic leadership is closely aligned with the cognitive perspectives of strategy and has been described as a “kind of bridge between the more objective schools of design, planning, positioning, and entrepreneurial, and the more subjective schools of learning, culture, power, environment, and configuration” (Mintzberg, Ahlstrand, and Lampel, 1998:151). A visual representation of the relationship between the schools is provided in Figure 2-1.

The contrast to the cognitive school is the positioning school which developed rapidly in the 1980’s following the publication of Porter’s (1980) work on competitive strategy. The fundamental premise developed from the positioning school is the existence of a small number of generic strategic positions in the economic landscape that allow for easier defence and consequently higher profitability. Many *tools* of the positioning school such as generic strategies (Porter, 1985), five-forces analysis (Porter, 1980), value-chain analysis (Porter, 1985), and the Boston Consulting Group growth-share matrix (Henderson, 1979) are now commonplace in popular strategy text books (for example Johnson and Scholes, 2002).

This extremely influential positioning school is a significant development, but still a close relative, of an orthodox economic view of the firm and largely ignores the role of managers and their cognition. Discussing the strategy industry founded on the positioning, design, and planning schools, Hamel (1997:80) comments that “the dirty little secret of the strategy industry is that it doesn’t have any theory of strategy

creation". Any theory of strategy creation would require an understanding of the cognitive processes of individual managers and how they interact with the organisation and the environment.

Figure 2-1: Strategic leadership in strategy space



Adapted from (Mintzberg et al., 1998:369)

In this context, strategy, at least the perspective of realised strategy (Mintzberg and Waters, 1985), must take into account the forces that shape the development of strategy, rather than simply describe the optimal condition. Although not often characterised in this way, Hambrick and Finkelstein's (1987) work on managerial discretion as an interplay between individual, organisational and environmental forces, is located not only as a bridge between environmental determinism and individual voluntarism (characterised in strategy space as environmental and entrepreneurial) but

also as a gateway to a theory of strategy development. While the focus of the current study is not to provide a theory of strategy development, it is located tangentially to that space. The work of Hambrick and Finkelstein (1987) is explored and contextualised later in this and the following chapters.

2.5 STRATEGIC LEADERSHIP RESEARCH

Strategic leadership research and in particular upper-echelons theory is readily identifiable in the literature as a stream of work stemming from an original article by Hambrick and Mason (1984). While the development of upper-echelons theory Hambrick and Mason (1984) was creative, it was not in itself an act of creation. Rather, the authors played the role of catalyst, bringing together ideas, seeded in much earlier work, within a framework that provided a clarity and specificity that drove progress in the field. Upper-echelons theory is unusual in that it is both a theory and a method. Commenting on the success of upper-echelons theory, Hambrick later acknowledged that they were

simply reopening an avenue that had been established decades before. After all, senior managers had been an integral part of the writings of Barnard, Selznick, Chandler, Andrews, and others (Hambrick in Cannella, 2001:37).

Hambrick (in Cannella, 2001:37) describes organisational research in the mid 1980's as having been "beheaded, by many in the academic community" through the removal of a focus on senior managers and that their work "attempted to redress this imbalance" and so "caught a lot of people at the right time".

One of the earlier avenues that Hambrick mentioned was the influential work on the study of managers presented by Barnard (1936:301) where he described, in terms of his own experience, fundamental challenges faced by managers, one of which

is that of adjustment to a new kind of work or a new position. I recall that several times when my position was changed, even though I had in advance all the essential knowledge required, it took many months to function adequately and acceptably. A different point of view seemed to call for a rather complete mental readjustment.

Written from the perspective of practitioner turned reflective reporter, and writing at a time before the world had seen commercial television or encountered the atomic bomb, this opening comment in his speech set a context for the later developments in upper-echelons research which is still relevant today. Barnard recognised the challenge of managers to change their point of view as they take on new roles, and so set the scene for the related question of upper-echelons research – do roles shape managers points of view? In addition to the recognition that the experience of new roles presented challenges that required managers to adapt their *point of view*, he also carefully separated the influence of experience and knowledge from mental processes; claiming that “a difference in mental processes quite independent of knowledge or experience is at the root of these very important practical difficulties” (Barnard, 1936:302).

Much of Barnard’s work that followed (for example Barnard, 1938) focused on organisations as cooperative social systems, but even at this early stage of the development of the field he had some interesting insights. In a challenge to the predominant school of scientific management (Taylor, 1911) and with resemblance to the developing human relations school (Mayo, 1933), Barnard (1938:13) postulated that the behaviour of individuals “are the result of psychological factors”. Psychological factors being described as the “combination, resultants, or residues of the physical, biological, and social factors which have determined the history and the present state of the individual” (Barnard, 1938:13); he goes on to describe free will or choice of an individual as being partly constrained by these past combinations. The same sentiment, possibly more precisely articulated, is echoed in the concept of action determinism described by Whittington (1988).

2.6 UPPER-ECHELONS PERSPECTIVE

The previous sections have described the general context within which the current study is located. The remainder of the chapter, in the context of what has gone before, develops the more specific aspects of upper-echelons theory as they apply to the current study.

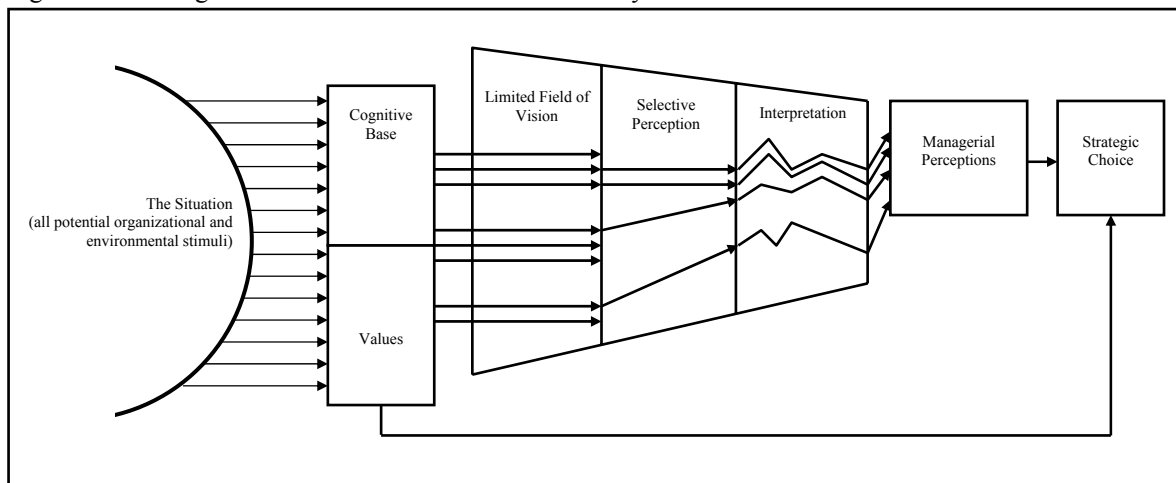
In their development of upper-echelons theory Hambrick and Mason (1984) implicitly built on Child's (1972) concept of strategic choice. In their influential paper they argued for a "new emphasis in organisational research" (Hambrick and Mason, 1984:193) exploring organisational outcomes as "reflections of the values and cognitive bases of powerful actors in the organization" arguing that "such linkages can be detected empirically" (Hambrick and Mason, 1984:193). Upper-echelons theory has its roots in the behavioural theory of the firm (Cyert and March, 1963; March and Simon, 1958) and the notion of bounded rationality (Simon, 1957) and more specifically selective perception (Dearborn and Simon, 1958). By their very nature strategic decisions are complex and often involve much more information than the decision maker(s) can process, coupled with often intractable and iterative cause effect relationships. The nature of the issues that strategic decision-makers face voids the use of a rational economic model. Consequently the choices managers make contain a behavioural component which in some way reflects their own idiosyncrasies. In the upper-echelons model the effect of these idiosyncrasies is treated in much the same way that Whittington (1988:524) notes the effects of "built-in preferences and information processing systems". In that way upper-echelons theory embodies a theory of action determinism.

Hambrick and Mason (1984) describe the process through which these idiosyncrasies become enacted in organisational decisions. They provide descriptors of these idiosyncrasies categorised in two groups of psychological characteristics. The first group, which they call the *cognitive base*, refers to knowledge or assumptions about events, alternatives and consequences; the second group, which they call *values*, refers to principles for ordering the first group according to preferences. The model,

described in Figure 2-2, posits that *cognitive bases* and *values* (knowledge, ordering and preferences) mediate managerial *perceptions* of the environment and the choices they make and in this way determine the choices that managers make.

It is important to clarify that this study is focused on the antecedent cognition of strategic, as opposed to operational, decisions; although the difference between the two is not dichotic. Instead the difference can be represented by a continuum anchored at either end by a variety of concepts such as unstructured versus structured, non-routine versus routine, long-term feedback versus short-term feedback and programmed versus non-programmed respectively. The concepts that separate strategic and operational decision-making are not exclusive but instead form part of a more complex difference.

Figure 2-2: Strategic choice under conditions of uncertainty



Source: Hambrick and Mason (1984:195)

Key aspects of the difference between operational and strategic decision-making process are the nature of the output decision and the input data. In operational decision-making outputs are often incremental and contain an element of the *right* answer. For example making decisions about the appropriate delivery frequency for suppliers and materials in a manufacturing plant (Holström and Aavikko, 1994). Decisions of this nature can be enhanced by decision support tools that can extract the data needed, for example, “directly from the production management system” (Holström and Aavikko, 1994:4). In contrast strategic decisions such as the timing of

market entry require managers to *know* the “rents currently earned by the market’s occupants... the structural entry barriers... the incumbents’ expected reaction... other members of the queue of potential entrants, and their likely behavior... any relevant resources already in the hand of the entrant; and... the irreversible costs of gathering information and making the decision” (Caves and Porter, 1977:242).

Hambrick and Mason (1984:195) contrast strategic choices with operational choices “which lend themselves more to calculable solution”. The importance of separating the concepts arises because “strategic choices have a large behavioural component” (1984:195). As a result the effect of individual differences are more likely to be amplified in strategic decisions rendering the effect of individual differences an important component to be understood by strategy researchers.

2.6.1 The argument for demographics

As noted earlier, upper-echelons is, unusually, both a theory and a method. The focus of upper-echelons *theory* is to describe the influence of psychological characteristics on strategic choices and outcomes; but doing so raises practical issues associated with operationalising the theory (Hambrick and Mason, 1984:196; Cannella and Monroe, 1997:5; Cannella, 2001:38).

Hambrick and Mason (1984:196) describe the practical issues with testing the theory, noting that “cognitive bases, values, and perceptions of upper level managers are not convenient to measure or even amenable to direct measure” and so suggest the use of observable background characteristics as proxies for psychological characteristics. They provided three reasons for this proposal:

1. Top managers reluctance to participate in psychological tests,
2. the lack of psychological analogs for background characteristics and
3. the requirement for observable characteristics in the selection/development of managers and in competitor analysis.

Taking each of the above points individually:

- 1) There are without doubt difficulties associated with accessing top managers for the length of time needed to complete complex psychological instruments. However, there are also opportunities for researchers, perhaps working in a quasi consulting capacity, to engage with executives and collect direct psychological data. Working with executives on development programmes (as is the case with this study) may also offer opportunities. While acknowledging that such data is difficult to access, this does not reduce its importance.
- 2) The argument that the characteristics of a priori interests, tenure and functional background, do not have close psychological analogs is a perplexing argument which, if taken literally, gives precedence to the operationalised variable over the underlying construct. That is, it argues the reason for not measuring the construct (psychological characteristic) directly is because it does not reflect the operationalised variable (observable characteristic) accurately. This is in fact a more suitable argument *for* measuring the construct directly.

A more accurate explanation, although it is not explicit in the paper, would recognise background characteristics as reasonable proxies for cognitive base (knowledge) but not for values (psychological ordering principles and preferences). This separation of the components of cognition is important to the facilitation of an enhanced understanding of the relationships that exist within the model (and is dealt with in an extensive discussion later in the thesis).

- 3) The requirement for observable characteristics to be used in selection/development and competitor analysis can be dealt with separately. In the case of the development and selection of senior managers at the strategic apex it is a common practice to have them complete a range of psychometric instruments aimed at providing assessment of or feedback on aspects of their psychological characteristics. Thus collecting data becomes of an integrated selection or development process.

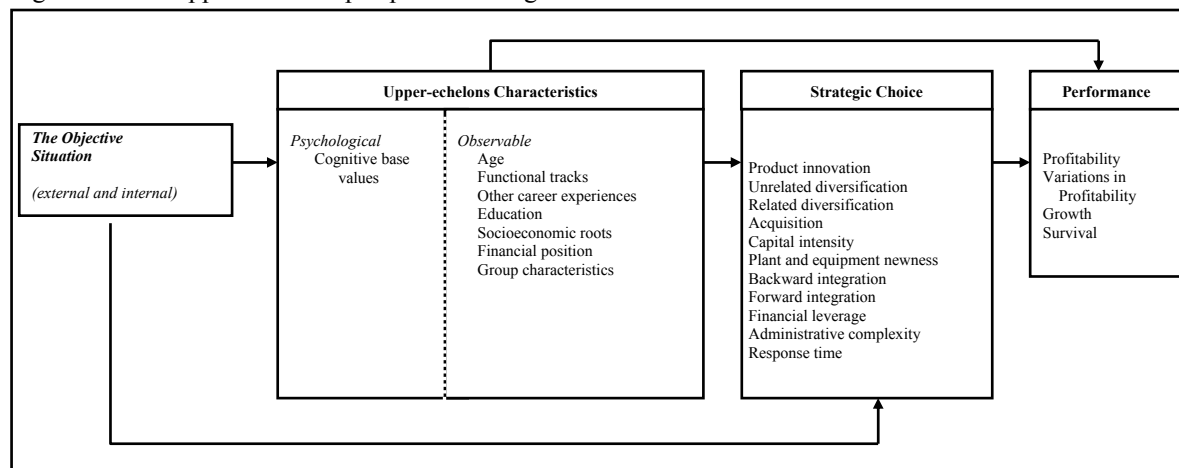
In the case of competitor analysis observable characteristics are much more readily available than psychological profiles. However, even in such cases it may be possible to access psychological characteristics by accessing information about and from the subject and indirectly making a psychological assessment (Aragon-Correa et al., 2004).

Pfeffer (1983) also made a call for the use of demographic variables in leadership research but differs entirely on the principle supporting his call. Hambrick and Mason (1984) clearly identify demographics as loose proxies for much more complex underlying psychological characteristics, whereas Pfeffer (1983) argued more controversially that demographic variables might prove superior to more direct measurement of attitudes, cognitions and values.

2.6.2 Operationalising upper-echelons theory

To develop a research agenda Hambrick and Mason (1984) portrayed a less detailed framework for the development of upper-echelons research hypotheses, as shown in Figure 2-3 below. Central to this model is the explicit proposition that *psychological* characteristics as operationalised by *observable demographic* characteristics will influence strategic choices and in turn an organisations financial performance. Thus, in line with the orientation of the strategy field, firm performance is the primary dependent variable (Meyer, 1991).

Figure 2-3: An upper-echelons perspective of organisations



Source: Hambrick and Mason (1984:198)

Since the publication of upper-echelons theory there has been much research supporting the relationship between observable demographic characteristics and both strategy and firm performance, including the relationship between top-management team characteristics and firm performance (Eisenhardt and Schoonhoven, 1990; Finkelstein and Hambrick, 1990; Norburn and Birley, 1988; Thomas, Litschert and Ramaswamy, 1991), top-management team tenure and strategy (Finkelstein and Hambrick, 1990; Gabarro, 1987; Wiersema and Bantel, 1992), the effect of individual characteristics on strategic preferences (Jensen and Zajac, 2004), the effect of experience on potential technological alliances (Tyler and Steensma, 1998), the effect of functional background on successful strategy implementation (Gupta and Govindarajan, 1984; Miles and Snow, 1978), functional background on individual performance in teams (Randel and Jaussi, 2003) and even in non-business fields looking at the relationship between the characteristics of bishops and ordination outcomes (Yuengert, 2001). An indication of the popularity of the upper-echelons conceptual framework is the 600 times it has been cited since publication³, and while some “complex psychological issues are bypassed” (Hambrick and Mason, 1984:196) by the use of demographic measures, the utility of this approach is clear.

Although much less numerous there have been studies held up to the “psychologist’s finer lens” (Hambrick and Mason, 1984:196) confirming the relationship between the psychological characteristics of managers and both firm strategy and firm performance. These studies have mainly used experimental approaches and support relationships between Jungian type and capital investment appraisal decisions (Nutt, 1986), cognitive complexity and the pace of evaluation (Wally and Baum, 1994) but not the nature of the decision model (Hitt and Tyler, 1991), need for achievement and organisational structure (Miller and Droge, 1986) and locus of control and firm performance (Boone, van Olffen and van Witteloostuijn, 1998). There have also been a few notable field studies supporting relationships between locus of control and strategy, structure and environment (Miller, Kets de Vries and Toulouse, 1982),

³ Web of Science Citation Index, October 2004

managers' neuroses and organisational dysfunctionality (Kets de Vries and Miller, 1984) and locus of control to firm performance (Miller and Toulouse, 1986).

2.6.3 The contribution of upper-echelons

Overall it must be acknowledged that there is support for the basic premise of upper-echelons theory, that organisations (their strategies and performance) are a reflection of their top managers idiosyncrasies and biases. The upper-echelons empirical research noted above, particularly the demographic based research, is heavily representative of a macro perspective, relating observable characteristics to strategy and performance. Its simple representation of a complex process could be considered both its strength and its greatest weakness.

The addition of demographic variables to strategic leadership research provided access to a broad range of research issues. The direction many researchers took following the lead of Pfeffer (1983) and Hambrick & Mason (1984) is by definition instrumental, that is, concerned with prediction over explanation. Hambrick (in Cannella, 2001:40) acknowledges the instrumental approach of upper-echelons theory but points to the opportunities to explore the model in different ways, not only being concerned with managers characteristics as independent variables but also considering for example the possibility of managers characteristics being dependent variables of industry discretion.

2.7 MANAGERIAL COGNITION – THE MISSING LINK

Running against the grain of the strategic leadership research stream Stubbart (1989) identified managerial cognition as the missing link in strategic leadership research. Based on anecdotal evidence that “few researchers in strategic management accept consciously the economists model of think-alike managers”, he made a call for more research into “how strategic managers think” (Stubbart, 1989:326). This call is in contrast to the most popular instrumental approach to strategic leadership research in the upper-echelons stream which, hopes to identify the relationship between individual characteristics and performance, but cares little for explaining the intervening process, preferring to treat it as a “black box” (Lawrence, 1997:2). In an effort to explore the

intervening processes, Stubbart (1989:329-331) proposed a framework for managerial cognition in a tripartite arrangement of intentions, representations and computations.

Intention was defined as the purposeful response of managers in the face of environmental demands. This view contrasts with the extreme behavioural view of managers acting only as a result of habit or instinct and with the population ecology view of environmental determinism. Stubbart (1989) recognises the role of behavioural influence but gives primacy to the effect of intention to achieve organisational goals.

Stubbart (1989) defines representation as an aspect of mind to be a symbol-processing system including in this definition Descarte's broad concept of imprints or mental representations. Using an approach indicative of its time, Stubbart (1989) also used computer programmes as a metaphor for minds, proposing that "a useful knowledge representation scheme must include both an explicit syntax and a well-defined semantics" (1989:330) and that this benefits researchers because they must specify their theories and their assumptions in detail, rather than rely on abstract pronouncements about maps, schemas[,] mental models, mindsets, etc". The importance of studying the cognitive maps of strategic managers arises because the "mental representations guide cognition and actions relative to strategic choices" (1989:330).

Stubbart's (1989) notion of computation or what people do with representations, is based on a static logical proposition, eschewing the integration of gut feeling or intuition. Stubbart (1989) recognised the controversial nature of his if-then logic of computation as a representation of human thinking, but nevertheless suggested it be empirically tested. Of course it is now known that his logic, based extensively on first order cybernetics, was already doomed in its attempt to represent the complexity of human nature and their attendant social systems. Developments in understanding of the non-integrability of dynamic systems theory (Tabor, 1989), the iterative nature of chaotic systems and their sensitivity to initial conditions (Stewart, 1989), and the absence of equivalence between the individual and the statistical levels of description (Prigogine, 1997), have all stunted the search for system level artificial intelligence

solutions. Given the continued struggle to accurately model determinate systems, opportunities for modelling systemic level interactions, given iteration, remain illusive, although there is some work being undertaken on modelling dynamic systems (Hall, 1999) and this may bear fruit in the future.

Stubbart's (1989) work leaves two concepts that remain central to the strategic leadership research agenda. One, the need to accurately represent the cognitive maps of strategic leaders, and two, to account for both goal oriented behaviour and the effects of personal preferences; both of which demand research that pushes beyond a purely instrumental approach.

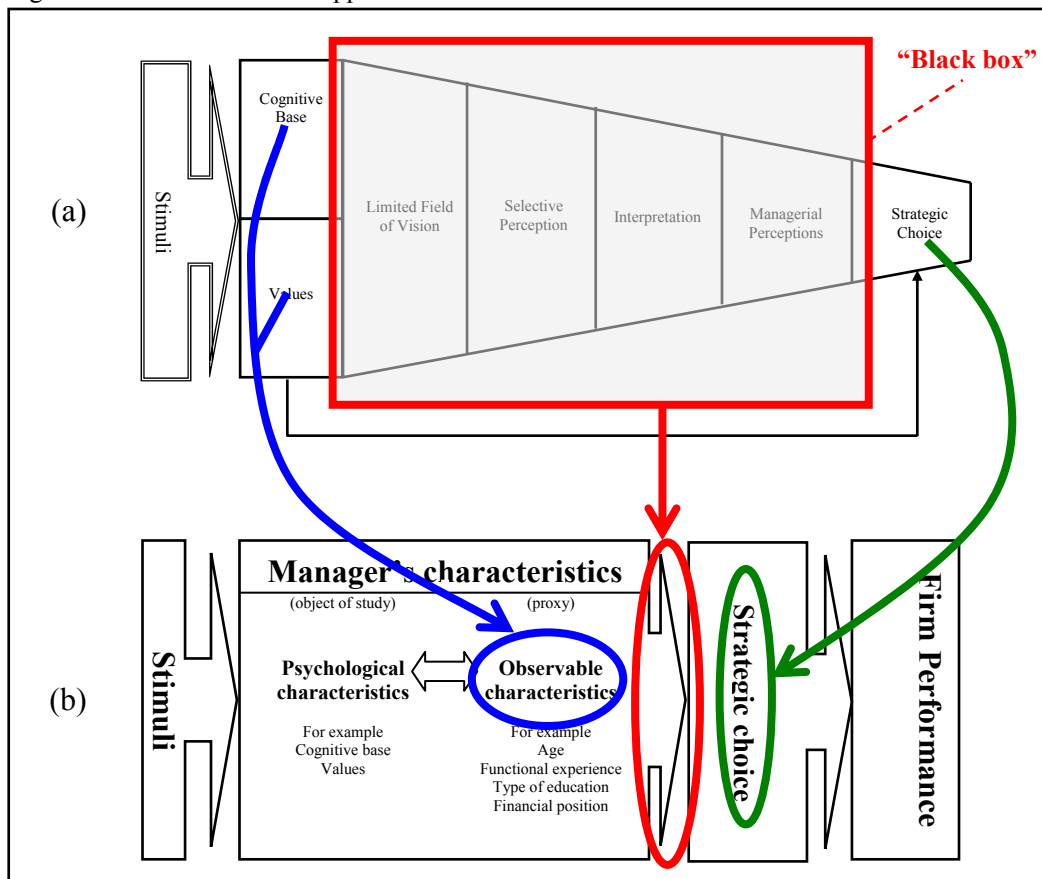
Until recently however, most researchers have adopted the instrumental approach to strategic leadership research and more recent discussions (Carpenter, Geletkanycz and Sanders, 2004) have raised concerns about this approach on several levels (Lawrence, 1997), with some even going as far as calling for a moratorium on the use of demographic variables as surrogates for psychological constructs (Boal and Hooijberg, 2001:523; Markóczy, 1997; Priem et al., 1999). Lawrence (1997:2-3) reveals concerns about "how organizational demographers interpret the relationship between demographic variables and outcomes" noting that their interpretations "typically include subjective concepts, yet most organizational demography studies neither measure the subjective concepts or test the related inferences". Instead they treat all that lies between the independent and dependent variables as what Lawrence (1997) terms a black box, and show little concern for explanation. Lawrence (1997) argues for an iterative research process where the inductive exploration of phenomena leads to preliminary theories that are then tested. The results of these preliminary studies should then lead to better specification of the theory, which is further tested, and so on. Lawrence (1997) argues that it is in the specification of these linkages that organisational demographers have proved wanting.

2.7.1 Exploring the black box

The creation of the *black box* (Lawrence, 1997) arises in the operationalisation of the upper-echelons (Hambrick and Mason, 1984) theoretical model shown in Figure 2-4

(part a) below. The operationalised model shown in Figure 2-4 (part b) below holds strategic choice as the dependent variable. However, the process detail of Figure 2-4 (part a) has been collapsed into a causal arrow in Figure 2-4 (part b), and cognitive base and values have been replaced with the proxy of observable characteristics in the form of demographic measures.

Figure 2-4: The black box in upper-echelons research



Source: Adapted from Hambrick and Mason (1984)

The result of operationalising the theoretical model in this way was to provide extensive empirical support for the relationship between observable characteristics and both strategic choice and firm performance, with the implicit assumption that the posited process within the black box is correct.

2.7.1.1 Selective perception

There have been several approaches to accessing and understanding the processes within the black box, but with them comes an inherent warning about specificity of method. One such stream of study deals with the ‘selective perceptions’ of managers. Selective perception is an explicit component of the theoretical model of upper-echelons *theory* (see Figure 2-4a above), but falls into the black box of upper-echelons *method*. In a study that predates upper-echelons theory, Dearborn and Simon (1958) found a relationship between functional experience and managers perceptions. This study is widely regarded and referenced as confirming the theory of bounded rationality and consequential selective perception. In fact some widely accepted textbooks (Randolph and Blackburn, 1989) have stretched the relevance of these findings to explain the effect of organisational characteristics on selective perception. In a replication and extension of the Dearborn and Simon study, Walsh (1988) reversed the findings, identifying little support for the relationship between functional experience and the content of managers belief structures, while finding only partial support for the relationship between belief structure content and information processing. Walsh (1988:889) also noted

it is not clear that Dearborn and Simon’s data supports their conclusion... Although the results of this conceptual replication of Dearborn and Simon’s work largely contradicted their own and everybody else’s interpretation of their results, the actual results of the two studies do not appear to be contradictory.

These two studies therefore can be seen to provide little support for the selective perception view. That is managers who, for example, have a functional background in finance do not tend to selectively identify financial issues to the exclusion of others.

In a separate study Waller et al. (1995) found no support that the functional background of CEO’s determined their attention to different sectors of their organisation’s environment. They did find that functional background partially

determined the attention CEO's paid to different measures of organisational performance.

In an extension study Beyer et al. (1997) disagree with the appropriateness of the focus in the Walsh (1988) and Dearborn and Simon (1958) studies. They argue that "the most basic concern in measuring managers' selective perception should be whether the managers are general, broad perceivers or specialised, narrow perceivers. The issues of where they direct their perceptions is logically secondary" (Beyer et al., 1997:717). In the study their finding that goal orientation is related to the breadth or narrowness of perception is the only relationship supported by the study. Broadly the results of their research supported Walsh's (1988) findings that functional experience does not determine (the content of) belief structures⁴ and that (the content of) belief structure does not determine the selective perceptions of managers.

In seeking to explain the differences between Dearborn and Simon's (1958) findings compared to Walsh's (1988), Beyer et al. (1997) conclude that there is considerable support for the effect of *goal orientation* on selective perception. They found that subjects instructed to find "*all of the important problems*" identified a broader range of issues than those instructed to find "*the most important problem*" [italics in original] (Beyer et al., 1997:724). This raises important issues in relation to the context sensitivity of measures of perception and adds a potentially important mediating variable to the strategic leadership framework.

2.7.1.2 Accuracy of perception

A further approach to assessing influences on managerial perceptions is to compare managers perceptions about their environment with objective or archival⁵ information

⁴ Beyer et al. (1997) use the term "belief structure" throughout their paper. This terminology is confusing as it refers to the "content of belief structures" as used by Dearborn and Simon (1958) and Walsh (1988) although Walsh (1988) used both terms and does not distinguish between them. For the purpose of clarity I separate the two terms noting 'content of belief structure' and 'belief structure' as equating more closely to 'cognitive content' (knowledge of) and 'cognitive structure' (causal inference) respectively following the terminology of Finkelstein and Hambrick (1996).

⁵ Boyd et al. (1993) use the term archival rather than objective arguing that all environmental data contains a measure of subjectivity.

and to identify the variables that influence the accuracy of that perception (Boyd, Dess and Rasheed, 1993; Sutcliffe, 1994). It is noted that the issues of “precise operationalization” (Boyd et al., 1993:204) and the importance of “accurate” (Boyd et al., 1993:211) labelling of constructs are also identified as important in this approach. In a theoretical paper, Boyd et al. (1993:212) propose a model to explain differences between archival measures and perceptual measures based on the properties of a mediating filter which includes individual, work group, organisational and strategic focus issues. This model extends the upper-echelons (Hambrick and Mason, 1984) concept by adding macro-environmental and organisation level issues. In the paper Boyd et al. (1993) use only "use of media for communication" to propose the impact of individual factors on accuracy of perception (Boyd et al., 1993:212) which may be indicative of their limited belief in the influence of managerial characteristics on accuracy of perception.

Sutcliffe’s (1994) research findings support a limited relationship between team characteristics (tenure) and perception of the environment, in that tenure is a determinant of the perception of environmental munificence but not environmental uncertainty. The findings also support the relationship between scanning activity, organisational decentralisation and environmental perception. Increased organisational decentralisation is related to an increase in the perception of environmental uncertainty. An increase in scanning activity is related to an increase in the perception of both environmental instability and environmental munificence. In this context scanning activity refers to the intensity and frequency of scanning undertaken. One might reasonably assume that organisations that take part in more scanning activity place a value on recognising environmental issues and so the results may in fact be representative of a goal orientation effect similar to that found by Beyer et al. (1997).

In Sutcliffe's (1994) study individual factors were operationalised with demographic proxies. She offered three arguments for the use of demographic characteristics as opposed to more direct psychological measures. “First background characteristics are more likely than psychological characteristics to influence the information processing of a team as a whole” (Sutcliffe, 1994:1362). This statement is presented as a sweeping

generalisation for which no further support is offered. “Second, because group composition is likely to be under the control of the top decision makers, the potential applicability of findings related to team demography is high” (Sutcliffe, 1994:1362). However given the extensive use of psychometrics in executive selection and development, presumably the group composition could equally be influenced by psychological characteristics. “Third, findings linking psychological characteristics to individuals’ environmental perceptions are inconsistent...”, quoting Boyd et al. (1993:1362) in support of this argument. This third reason is even less substantial given that Boyd et al. (1993) provided a theoretical proposition and did not produce any research findings. Boyd et al.’s (1993) rejection of psychological characteristics in the paper relied on previous empirical studies (Gifford and Slocum, 1979; McCaskey, 1976) which test a narrow psychological dimension of ambiguity tolerance as a predictor of environmental perception (which is a different dependent variable to accuracy of perception), studies that use cognitive complexity (Downey, Hellriegel and Slocum, 1977; Lorenzi, Sims and Slocum, 1981) as a predictor of discrepancy in archival-perception comparisons and a single study (Duncan, 1972) that rejects the relationship between tolerance for ambiguity and accuracy of perception.

2.7.1.3 Issue interpretation

In yet another approach Thomas et al. (1994) examined the relationship between individual and group level characteristics and issue interpretation. They found only limited support for the role of individual characteristics (level and tenure, but not experience, role or education) in predicting issue interpretation. They did however find strong support for the impact of group level issues (political activity and identity) on issue interpretation. This study is interesting for a number of reasons. Firstly it used an industry specific sample allowing them to fix the issue content (cognitive content) and rate the extent to which these content issues were seen as political or strategic which they label issue interpretation. As a dependent variable this is different to the label of selective perception (Beyer et al., 1997; Dearborn and Simon, 1958; Walsh, 1988) which required participants to select issues from cases keeping both the cognitive content and selective perception as variables. That is, the difference between issue interpretation and selective perception can largely be categorised within Finkelstein

and Hambricks (1996) cognition model. Selective interpretation leaves both cognitive content and cognitive structure included within the dependent variable. Issue interpretation includes only a portion of cognitive structure within the dependent variable by fixing the cognitive content in the form of a predetermined list.

2.7.1.4 The use of observable characteristics in cognition research

The above studies identify some of the potential associated with research that opens the *black box* (Lawrence, 1997), to commence the process of explaining how individual characteristics influence firm performance. It is also clear from the range of terminology used that researchers should be cautious and pay particular attention to the careful specification and labelling of the constructs they hope to measure. Good theorising demands strict attention to method in observing, relating, synthesising and explaining the data (Weick, 1995).

The results of the studies do however raise further questions in relation to the role of demographics as an independent variable within the black box. Table 2-1 below shows that while demographic characteristics have proved to be good predictors in macro organisational studies, the results are less than conclusive when used in more micro studies dealing with specific cognitive characteristics. In other words the use of demographics seems to support the macro proposition of upper-echelons theory, but does not support the theoretical model of selective perception on which it is built.

Table 2-1: Summary of findings on demographic to cognition relationships

Study	Independent variable	Dependent variable	Finding
Dearborn & Simon, 1958	Functional experience	Selective perception	Significant (Walsh (1988: 889) asserts that their data does not support this finding)
Walsh, 1988	Functional experience	Belief structure (Cognitive content)	Null
	Belief structure (Cognitive content)	Information processing (Selective perception)	Minor
Thomas et al., 1994	Experience	Strategic and political issue interpretation	Null
	Role	Strategic and political issue interpretation	Null
	Type of education	Strategic and political issue interpretation	Null
	Tenure	Strategic and political issue interpretation	Null and significant respectively
	Level	Strategic and political issue interpretation	Null and significant respectively
Sutcliffe, 1994	Experience	Strategic and political issue interpretation	Null
	Tenure	Accurate perception of environmental munificence and instability	Null and significant respectively
Beyer et al., 1997	Functional experience	Belief structure Cognitive content)	Null
	Functional experience	Selective perception	Null

Source: Compiled by the author

The question therefore arises, as to how to begin exploring the black box in a more meaningful way. How to, in addition to demonstrating that individual factors do influence firm outcomes, explain the process through which individual characteristics influence organisational outcomes? Harrigan (1983) suggested that a more fine-grained approach was needed to explore the richness and complexity that lies within the black box. Certainly multi-method approaches will be important and qualitative studies will aid the development of new theory to be tested for generalisability. There are also within the field of strategic leadership and more specifically within the upper-echelons, management discretion and strategic leadership frame, several outstanding questions relating to managerial cognition that still requires answers.

2.8 MANAGERIAL DISCRETION - AN INTEGRATING CONCEPT

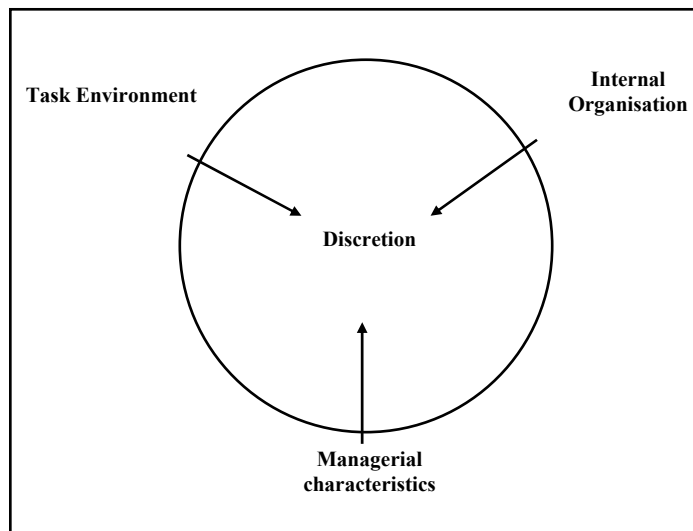
Strategic choice (Child, 1972) was originally developed in response to the prevailing population ecology view (Hannan and Freeman, 1977). In the extreme interpretation of strategic choice managers have complete freedom when making decisions. Whittington (1988) made an important addition to the free will extreme of strategic choice, when he introduced the concept of action determinism. He argued that managers are never truly free to make choices as they bring with them a set of givens that influence and in some way determine the decisions they make.

Hambrick and Finkelstein (1987) acknowledging that the two camps of strategic choice and population ecology were moving closer together, attempted, with their model of managerial discretion, to further reconcile these views. They argued that “top managers of some organizations have more discretion than their counterparts in other organizations, and, moreover, that a given executive can have more discretion at some times than at others” (Hambrick and Finkelstein, 1987:370), capturing in that statement the role of inertia and choice respectively.

Hambrick and Finkelstein (1987:371) propose that discretion, defined as “latitude of managerial action”, is the integrating concept. The addition of a theory of managerial discretion expands the remit of upper-echelons theory beyond the confines of strategic choice (Child, 1972) and action determinism (Whittington, 1988). It embraces a wider

framework that seeks to explain why some managers have more discretion or latitude of action than others, and why managers have more discretion at some times than others. This more complete model, shown in Figure 2-5 describes how the nature of the organisation, the environment and the leader, through a process of interplay, influence strategic decisions⁶ and ultimately firm performance.

Figure 2-5: The forces affecting discretion



Source: Adapted from Hambrick and Finkelstein (1987:379)

This model of discretion also brings into play the internal organisation, recognising the complex interplay of factors that influence strategic developments. The complete discretion framework identifies latitude of action or discretion as not only constrained by environmental influences but also organisational influences and the characteristics of the manager. This multi-factor model reflects more accurately the complexity of the relationship between strategic choice and population ecology views. That is, it is not simply enough to say that in the absence of environmental constraints managers are free to make whatever strategic choices they wish. Even given the absence of any organisational or environmental constraints the manager's own preferences, biases and

⁶ Child (1997) argues that his 1972 paper was never intended to provide an opposing view to organisational determinism, but rather to engage with its proponents. Nevertheless in the interim it has been generally acknowledged and cited extensively as an alternate view (Cannella and Monroe, 1997; Hambrick and Finkelstein, 1987; Hitt and Tyler, 1991).

capabilities will constrain their choices, although they may not even be aware of the mechanisms at work.

2.8.1 Multi-level and measurement issues

The greater utility of this model also brings with it additional complexity for the researcher. Hannan and Freeman (1977:933) used the analogy of bioecology levels of analysis (individual, population and community) and warn that the choice of unit “involves subtle issues and has far reaching consequences for research activity”.

They identify at least five levels that face the organisation researcher:

1. member
2. subunits
3. individual organisation
4. populations of organisations
5. communities (populations of populations of organisations).

Recognising and identifying these levels is an important part of discretion research because the discretion model explicitly identifies three levels, individual, organisation, and task environment. These difficulties do not mean that this type of multi-level research is not possible as its careful application can lead to interesting and potentially more insightful results (Thomas et al., 1994).

A relationship between these levels described above and their more commonly used terminology is given in Table 2-2 below.

Table 2-2: Levels of analysis

Hannan and Freeman, 1977	Hambrick and Finkelstein, 1987	Common term
1. Member	Individual	Individual
2. Sub-unit		Group or team
3. Individual organisations	Organisation	Organisation
4. Populations of organisations	Task environment	Industry
5. Community		Global economy

Source: Compiled by the author from Hannan and Freeman (1977) and Hambrick and Finkelstein (1987)

The development of the discretion framework also provided researchers with other obstacles. Hambrick and Finkelstein (1987:400) noted that “the direct measurement of discretion will be extremely difficult”. Today the issue of measurement remains as one of the most contentious issues in the strategic leadership area. Significant disagreement exists about what to measure (Boal and Hooijberg, 2001), and the meaning and validity of the measures (Markóczy, 1997; Priem et al., 1999).

Despite the difficulties associated with operationalising managerial discretion (Hambrick and Finkelstein, 1987) the introduction of the concept presents an opportunity to reframe the upper-echelons (Hambrick and Mason, 1984) perspective which is dealt with in the next chapter.

2.9 SUMMARY

Rooted in work exploring the role of human agency in organisations (Barnard, 1938; Child, 1972; Cyert and March, 1963; March and Simon, 1958; Simon, 1957; Whittington, 1988), the field of strategic leadership research, particularly the upper-echelons (Hambrick and Mason, 1984) perspective presents a counterbalance to the population ecology (Hannan and Freeman, 1977), competitive strategy (Porter, 1980), and neoclassical economic (Menger, 1933-1936) perspectives that remove top managers from the analysis. While upper-echelons has been a fertile ground for research over the past two decades, on further exploration it is clear that the field has lacked the iterative theory building (Lawrence, 1997) that good theory requires (Whetten, 1989; Whetten, 2002). This has led to calls for a more fine grained approach to the research (Harrigan, 1983), calls to explore the black box of cognition (Lawrence, 1997), and calls for a moratorium on demographic research (Boal and Hooijberg, 2001; Markóczy, 1997), all of which have echoes in Hambrick and Mason's (1984) original caution that upper-echelons theory presents a lopsided macro view and that demographic variables may contain more noise than purer psychological measures (Hambrick and Mason, 1984:193, 196).

The review of the literature identifies two clear areas for development within the research stream. Firstly, an exploration of the black box with the intent to provide an

iterative approach to theory development that has been relatively absent in the upper-echelons stream. Secondly, to review the appropriateness of continually applying demographic variables as psychological proxies. In the following chapter these themes are addressed and a research framework is developed.

CHAPTER 3 - DEVELOPING THE RESEARCH MODEL

3.1 INTRODUCTION

The previous chapter concluded with the identification of two clear aspects of strategic leadership research that require further development. Firstly, the need to explore the black box (Lawrence, 1997) of organisational cognition, in order to explain not if, but how, managers characteristics influence organisational outcomes. Secondly, to redress the predilection of strategic leadership researchers to rely on observable demographics rather than the psychological characteristics that they purport to represent.

In this chapter the identified research gap is clarified and a research framework and hypotheses are developed. The research framework is a development of the selective perception process assumptions that underpin upper-echelons theory (Hambrick and Mason, 1984). Through an examination of relevant cognition research, together with an integration of the insights from previous work on managerial discretion, the concept of perceived managerial discretion is described and located in the research framework. Rather than simply treating individual demographic characteristics as proxies for purer psychological methods, both demographic and psychological measures are included in the framework. This builds on the approach of Finkelstein and Hambrick (1996), and subsequently allows the differential effects of demographics and psychological measures to be assessed.

The process of developing the framework begins with an exploration of cognition as it applies to strategic leadership research.

3.2 COGNITION

Human cognition is a complex phenomenon and the seventy seven different labels that Walsh (1995:284-285) found associated with management descriptions of cognition is testimony to the diversity within the field. Walsh's (1995:282) structure of research in

the field presented in Figure 3-1 offers some guidance on locating the current study in the broader context of cognition research.

Before progressing this section, the terminology should be explored. When describing cognition a number of different terms are used in the literature to describe the way humans organise information. Various terms associated with cognition include mental template, mental schema, mental map, cognitive map, belief system, and cognitive structure, which in some cases mean the same thing and in others do not. A variety of terms are used over the following paragraphs following the guide of the authors being discussed. Ultimately this thesis will utilise *cognitive map* as a term to describe the way information is organised. Included in that term are both the concepts or content of the knowledge and the way it is related or organised.

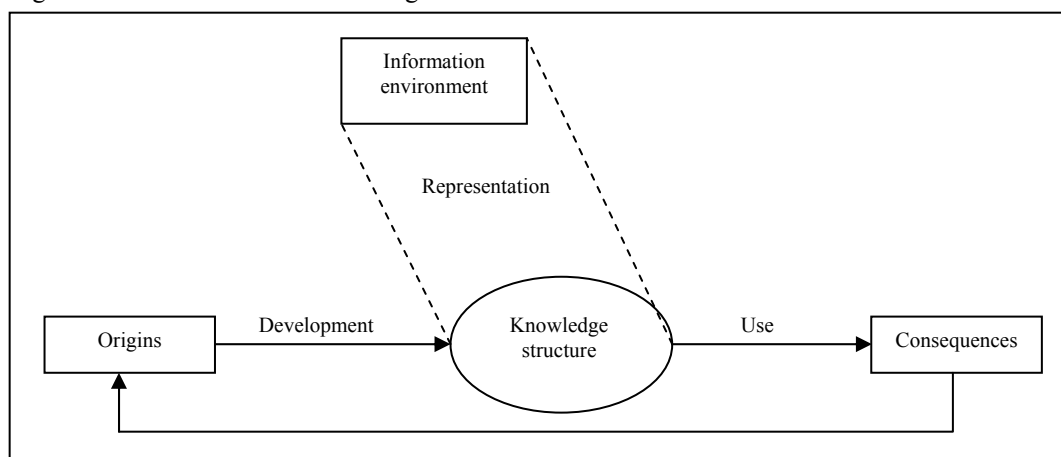
The central component of the framework, knowledge structure, is a “mental template that individuals impose on an information environment” (Walsh, 1995:281). This is the way in which individuals create a map that represents aspects of the world they live in. Where a traditional topographical map might represent a physical landscape, a mental or cognitive map represents more intangible concepts. The map holds within it the meaning of concepts and how they relate to other. This organisation of information occurs as a mental preparation for the subsequent interpretation of situations, choices and actions. The organisation of this information is developed out of past experiences, and it represents organised knowledge about a given concept (Fiske and Taylor, 1984:149). It contains within it both a content (concept), and an organisational (relational) component.

For an individual, one benefit of having a prepared cognitive map is that it speeds up processing (Mischel, 1981). For example, if you have learned to drive a car, you have a cognitive map developed that explains how to get the car to accelerate. The concept of the accelerator pedal and the concept of speed are related in a mental schema; when one needs to accelerate the car one presses on the pedal, thus acting on the basis of a mental schema. Without the pre-prepared schema each time one wanted to accelerate one would need to consider the dynamics of acceleration and speed; issues of velocity,

inertia and power; drive chains, gearing and engine combustion. Even if you understood these issues the time to process them would be prohibitive, consequently the cognitive map provides an efficient shortcut to the mental processing.

Studying the cognitive maps of leaders has provided rich insights into the way they see the world (Axelrod, 1976; Huff, 1990; Huff and Jenkins, 2002) and the effect of their maps on decision making (Fuglseth and Gronhaug, 2002). Cognitive maps will form a central part of the current study, but will not explore their meaning or implications in the manner in which other studies have. In contrast, the current study will explore the antecedents of cognitive maps, those factors of experience and personality that shape the development of cognitive maps. Thus, using the terminology from Figure 3-1, this study is concerned with the identification of the *origins of knowledge structure* or in other words, the personality and experience based antecedents of cognitive maps. Later in this chapter the specific aspect of the cognitive map used in the study will be defined in terms of perceived managerial discretion.

Figure 3-1: The structure of knowledge research



Source: Walsh (1995:282)

Finkelstein and Hambrick (1996:57) in a spirit of “theories are always in process” (Lawrence, 1997:18) further developed the concept of the executives cognitive model.

They divide the managers cognitive model into three elements ranging from the most basic to the most complex:

1. cognitive content,
2. cognitive structure and
3. cognitive style.

Cognitive content relates directly to the notion of cognitive base as described in the original upper-echelons perspective (Hambrick and Mason, 1984:195), which refers to the knowledge and assumptions a manager brings to a situation. Cognitive content, in this context, is the collection of data relevant to the knowledge structure domain in question; cognitive content is therefore an antecedent of cognitive structure. That is not to say that this is necessarily a direct translation. Experiences, and the attendant data from one domain, may emerge as an influence to the cognitive structure and causal inferences in another domain. Built from past experience this conception of cognitive content has similarities with, but is not the same as Walsh's (1995) description of the cognitive content of cognitive structure. Cognitive content, as applied in the context of this study is explicitly an antecedent of cognitive structure, derived from prior experience.

Cognitive structure relates to the principles for arranging the cognitive content; a component of the Hambrick and Mason's (1984) earlier notion of values, encompassing the beliefs about causality a manager brings to a situation. Cognitive structure is a widely used concept within the strategy literature and is most commonly accessed through the application of cognitive maps (Axelrod, 1976; Huff, 1990; Huff and Jenkins, 2002; Tolman, 1948). Typically studies using a cognitive mapping method adopt an ideographic approach (Daniels, Johnson and de Chernatony, 2002) which is heavily influenced by an interpretivist philosophy (Russell, 1999); in contrast this study will adopt a nomothetic approach in line with the realist philosophy that underpins this study, and is consistent with the developments of Markóczy (1995) and recently acknowledged by Hodgkinson (2002). The nomothetic approach provides

greater alignment with the structure-agency interaction of the realist approach (Bhaskar, 1978) that is central to this thesis.

Cognitive style has resonance with the concept of values introduced in the original upper-echelons perspective (Hambrick and Mason, 1984:195). As presented in the Finkelstein and Hambrick (1996) text it is a much wider concept, including the preferences a manager has for collecting and processing information. Potentially it has many more facets including locus-of control (Rotter, 1966), Jungian preferences such as those assessed by the Myers-Briggs Type Indicator (Myers et al., 1998) and broad personality traits such as the big-five (Norman, 1963). Whereas cognitive content is a facet of external experience, cognitive style refers to the internal processing preferences, styles, and capabilities of the person.

Without question this three-element model of cognition is insufficient to explain the full gambit of human cognition, however it does provide a useful conceptual frame for disaggregating the broader concept. The elements are not mutually exclusive and in some contexts may be inextricably linked. No doubt they are closely related, influence each other and ultimately effect the decisions and actions of managers. As they stand they provide a useful frame of reference for managerial cognition scholars exploring the black box of cognition. For this reason the notation of this tripartite arrangement will be used to provide consistency of language in the development of the research framework. Cognitive content will be applied to describe the elements of information content derived from experience. Cognitive style will be applied to describe style preferences shaped by personality, and cognitive structure will be used to describe cognitive maps which represent the beliefs about how concepts are related and organised. Ultimately in the study cognitive content and cognitive style are representative of the independent variables that shape cognitive structure, the dependent variable.

3.3 DIFFERENT APPROACHES TO COGNITIVE RESEARCH

Markóczy (1997), referring to the lack of empirical evidence to support the proposed relationship between managers' cognitive bases and their individual characteristics,

tried to redress the deficiency with her study into the relationship between some of the most cited managerial characteristics and managerial beliefs. A note of caution must be injected here in furthering Lawrence's (1997) call for more precise specification of the linkages involved, and also the need for careful labelling of the elements being researched. One could infer from Markóczy's (1997) introduction to her study that she was exploring upper-echelons characteristics as described in Hambrick and Mason's (1984) model, testing the relationship between observable managerial characteristics and their psychological cognitive bases. However the process used to explain the comparison uses a suspect logic and a broader exposition of the terminology and relationships is apposite.

Hambrick and Mason (1984) build their model from the March and Simon (1958) argument that decision makers bring their own *givens* to a situation. They propose that these givens refer to two *psychological* elements of upper-echelons characteristics. *cognitive base* which is the *knowledge* that a manager brings to the situation and *values*⁷ which reflect "principles for ordering consequences or alternatives according to preference" (Hambrick and Mason, 1984:195).

Markóczy (1997) in her explanation of the term *individual beliefs*,

- a) relates cognitive base to knowledge (following Hambrick and Mason's (1984) terminology), then
- b) uses Moser's (1995:234) definition of knowledge, as a subset of beliefs, to correlate individual beliefs back to cognitive base.

In other words following this logic *cognitive base* is a proxy for *individual beliefs* because they both share *knowledge* in their definition. In doing so Markóczy (1997) proposes her study as a test of Hambrick and Mason's (1984) observable characteristics as acceptable proxies for cognitive base. Markóczy (1997) then goes on to expand her definition of *beliefs* to include a contextual element (a valid limitation of

⁷ The use of the term 'values' in this context is different from the more common use of the word which defines things we hold central to us.

knowledge) with beliefs about cause and effect. However these beliefs about cause and effect are closer to the concept of *ordering*, described as *values* by Hambrick and Mason (1984) than they are to *cognitive base*. It must be acknowledged that the descriptions used by Hambrick and Mason (1984:195) are ambiguous. Included in *cognitive base* is knowledge about alternatives and consequences, which could imply cause effect and included in *values* is ordering which implies cause effect, and preferences which does not.

The result of this labelling issue is a bundling together of the terms *values* (it gets no mention in Markóczy, 1997) and *cognitive base*. The combination is then operationalised as a causal map labelled *individual beliefs*. Despite these labelling issues, Markóczy's (1997) central finding that demographics are not necessarily particularly good substitutes for psychological characteristics (cognitive base and values) remains valid. It does however lack the precision to identify whether this is true of both cognitive base and values or merely the aggregate of the two. Clearly future research will benefit greatly from a better specification of the terms.

In a critique of what Hodgkinson (2002) described as Daniel and Johnson's (2002) ideographic approach to cognitive mapping, he suggests a move to nomothetic approaches. He suggests Sutcliffe and Huber's (1998) approach, using likert-type items as an exemplar of this approach. While in using a nomothetic approach there is a gain in terms of ability to compare and statistically manipulate the data, Hodgkinson (2002:68) recognises a loss of perceptual richness. Hodgkinson (2002) identifies two approaches that while not completely circumventing the problem, move strongly in the right direction. The first was developed by Hodgkinson (1997) and involves the elicitation of cognitive maps using a procedure with similarities to the reperatory grid technique (Kelly, 1955). Although not fully developed to allow statistical comparison of the maps, it presents potential for further developments. The second approach suggested by Hodgkinson (2002:68-69) is the approach applied by Markóczy and Goldberg (1995) described above.

In a review of the literature no critical commentary on Markóczy and Goldberg's approach (1995) was identified. The most pertinent critiques related at a general level to the ideographic versus nomothetic debate (Turner, 1983). This lack of critical review is in part due to the relatively recent emergence of the approach, an approach that requires significant mathematical and statistical nimbleness. Perhaps in this regard Markóczy (2001a) is her own strongest critic, as she acknowledges that the benefits of the approach need to outweigh the difficulties presented by its complexity.

In the context of the current study it became clear, as is explained later in the thesis, that a mapping approach was operationally the closest and most appropriate representation of the cognitive structure concept. The approach proposed by Markóczy and Goldberg is complex, although the mathematical aspects are modified and simplified in the current study. Acknowledging the complexity of the analytical techniques to be employed, it was decided that the benefits of using a mapping approach, which maintained a similarity in the structural characteristics of the operationalised measure with the structural characteristics of the cognitive structure concept, outweighed the disadvantages and this view is supported by Hodgkinson (2002).

3.4 IDENTIFICATION OF THE RESEARCH GAP

Taking a social constructionist perspective one can see that an individual's cognition, particularly in relation to discretion, may be influenced by the power structure within which they operate. From a social constructionist point of view "everything we know is built from our embroidered interaction with the world, that is how we know what we know and why we do the things we do" (Anderson and Goolishian, 1988:372) and so in some way the manager is a reflection of their social group. This argument also has echoes in institutional theory (DiMaggio and Powell, 1983).

The distribution of power may also mediate the effect of an individual's motivational need for power, although it is not clear whether the effect of such an influence would affect the cognition of the individual or the contextual application of that cognition in the development of firm strategy.

Referring to research in marketing, Priem et al. (1999:943) note that psychographic variables have been found to have better predictive abilities than demographic variables and better capture the attitudes, interests and opinions of those being studied. In particular the measurement of stable constructs help researchers to understand the relationship between deeply held individual characteristics and their manifestation in structured cognition and choice. The use of psychometric variables is particularly important from a constructivist perspective. Taking a constructivist point of view an individual perceives the world through a variety of interactions and makes sense of their perceptions creating their so called reality. This so called reality, what the person “supposedly found is an invention whose inventor is unaware of his act of invention, who considers it as something that exists independently of him; the invention then becomes the basis of his world view and action” (Watzlawick, 1984:10). This internalised worldview as the basis for action is then a combination of how the person experiences and the way the person processes that experience; both of which are well-accepted aspects of personality preference, described in the work of Carl Jung (Jung, 1923; Jung, 1971) and empirically supported (Nutt, 1986) in the decision-making literature.

Priem et al.’s (1999) suggestion to explore executive judgement captures their attempt to acknowledge the criticism that demographic studies confirm that managers do matter to firm performance, although they fail to specify how they matter. Priem et al. (1999) suggest the use of causal maps to explore these relationships.

Hambrick and Mason (1984) acknowledged at the outset of their paper on upper-echelons that researching the model should take a multi-disciplinary approach and that they take “... a lopsided macro view while making relatively crude assumptions about the psychological processes of top managers” (Hambrick and Mason, 1984:193). Despite this warning most of the research that follows maintains this lopsided macro view and does little to explain the intervening psychological and sociological factors, instead preferring to view everything in between managerial characteristics and organisational outcomes as a black box. Some seventeen years after the publication of the seminal paper on upper-echelons research (Hambrick and Mason, 1984), Hambrick

(in Cannella, 2001:38) was still highlighting that “demographics are exceedingly limited, imprecise, and noisy surrogates for executive and team psychology” and still calling for balance to the lopsided macro view by researching “the multitude of factors at work inside the black box”.

In light of the preceding limitations it is possible to highlight the following research gaps:

- a) An understanding of the relationship between the components of cognition (content, style and structure)
- b) An understanding of the relationship (or not) between demographics and cognition
- c) The differential effect of psychological characteristics and demographic characteristics on cognition

3.5 DEVELOPING A CONCEPTUAL FRAMEWORK

One of the criticisms levelled at upper-echelons research has been the piecemeal approach to testing variables (Boal and Hooijberg, 2001:519; Fredrickson, Hambrick and Baumrin, 1988:268). Most research has concentrated on testing one or two variables at a time. The risk with this type of approach is that intervening or moderator variables are acting with or against each other masking the true relationships that exist underneath. The risk of attempting to capture all of the variables is that the research becomes extremely difficult to operationalise. This research, conscious of the need to balance comprehensiveness with researchability, attempts to capture the necessary variables in order to present an acceptably complete model, while simultaneously avoiding such a level of complexity that risks failure.

While in the interest of completeness it would be attractive to build a complete research model to test all aspects of the black box, it would quickly reach a stage of unmanageable complexity. The conceptual framework for this research, developed below, identifies the boundaries of this study in the context of existing upper-echelons theory (Hambrick and Mason, 1984). A comprehensive model is proposed in Figure

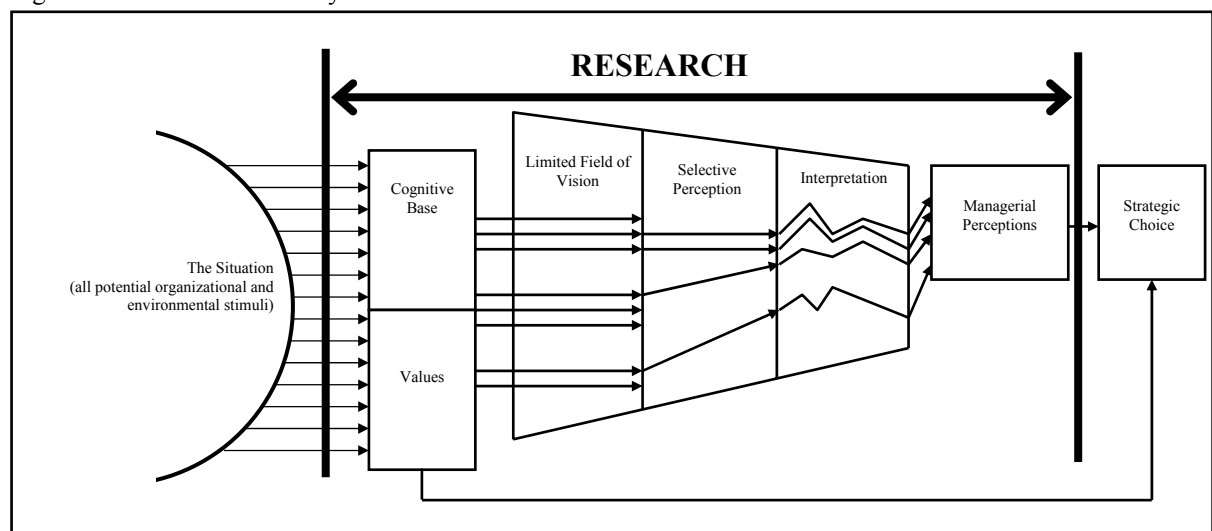
3-4 to provide a context for the current study and to provide a basis for further exploration of the black box in future research.

3.5.1 Limits for the current research

Referring back to the original model of upper-echelons theory (Hambrick and Mason, 1984) the limits of this study are identified and described in Figure 3-2. This study deals with the relationship between *individual characteristics* (in the form of cognitive base and values) to the concept of *managerial perceptions*. The research boundary excludes the strategic choices made by managers and also excludes the multi-level issues associated with objective environmental stimuli.

These same limits are reflected in the upper-echelons conceptual research framework in Figure 3-3 below. As can be seen in the research framework (Figure 3-3) much of the complexity associated with the theoretical model (shown in Figure 3-2) has been eliminated and is reduced to a simple causal arrow. Graphically this causal arrow represents the black box of organisational demography referred to by Lawrence (1997).

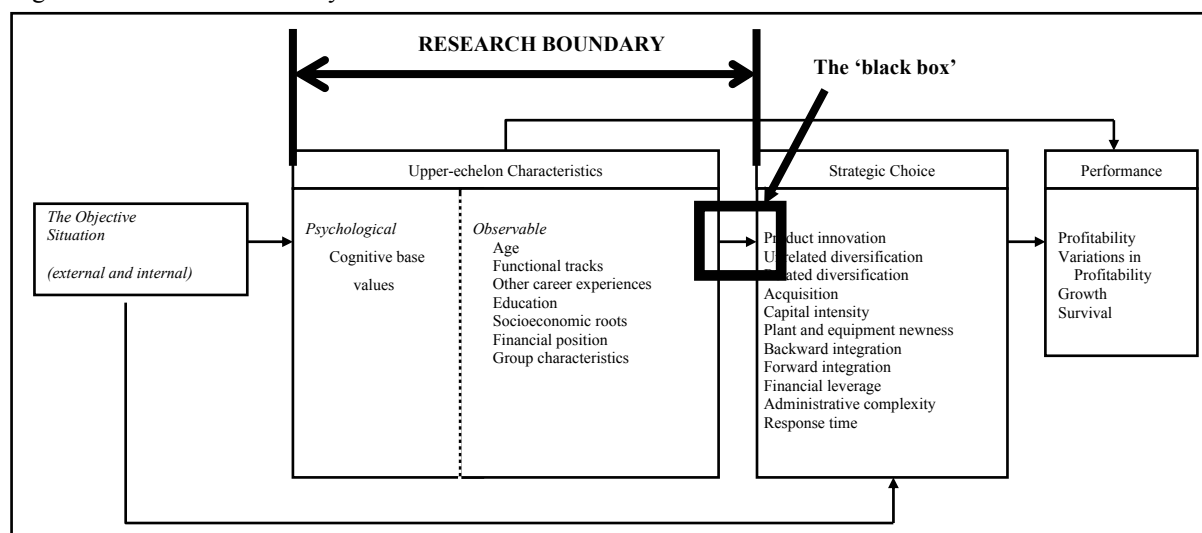
Figure 3-2: Research boundary



Source: Adapted from Hambrick and Mason (1984:195)

In the upper-echelons model, research focuses on the prediction of strategic choice and performance from observable characteristics. The current study eschews the use of observable characteristics as proxies, preferring to access more directly the psychological characteristics of managers while maintaining the demographic measures as indicators of experience. In the upper-echelons model the process by which psychological characteristics convert to strategic choices is treated as a black box. In the current study an element of the black box, managerial cognition, becomes the dependent variable in the research.

Figure 3-3: Research boundary reflected on the research model



Source: Adapted from Hambrick and Mason (1984:198)

Following the terminology of Figure 3-3, the effect of both psychological and observable characteristics on managerial cognition (an element in the black box) is explored separately.

3.5.2 Conditions for selective perception

An important aspect of upper-echelons research is the situational context in which choices are made as it is only under appropriate conditions of time pressure and information overload that bounded rationality is induced. As the situational context (field study data collection) proposed for this study will not induce bounded rationality, it is both valid and important to exclude actual strategic choices from the

study. Here the distinction between the discretion to make choices and the actual making of choices is discussed. For clarity the concepts of *discretion to make choices* and *actual choices* are labelled as *perceived discretion* and *actual discretion*. Although there has been relatively little empirical work that considers perceived rather than actual discretion it is nevertheless an important distinction and worthy of study (Carpenter and Golden, 1997). The separation of the concepts provides important distinctions in the development of an integrated model of discretion that follows.

There are of course other treatments of discretion in the literature. For example, Jaques (1989:132) describes roles in organisations based on the time-span of discretion which is the “the target completion time of the longest task” and he assesses the cognitive capability of people to deal with these tasks. In this context discretion is defined as a cognitive capability rather than style, preference, knowledge, or structure. Others have used the concept of managerial discretion to describe agency costs (DiMaggio and Powell, 1983; Jensen and Meckling, 1976; Morellec, 2004) associated with the managers discretion to make decisions that balance their empire building needs against the need to maintain control of the organisation. While these treatments of discretion are of interest to researchers, they share little in common with the current study except the use of the term managerial discretion. The applications of managerial discretion in these contexts is therefore outside the scope of the current study.

The development of the research framework for this study involves the reformulation of Hambrick and Mason’s (1984) upper-echelons framework to provide a more detailed representation of the processes within the black box. The existing model has a number of issues that need to be addressed.

Firstly, the model is an integrated representation of cognition and decision making based on a behavioural theory of the firm (Cyert and March, 1963; Simon, 1957), specifically building on the concepts of bounded rationality (Simon, 1957) and selective perception (Dearborn and Simon, 1958). While the concept of selective perception is an attractive one, there is little empirical support for it (Beyer et al., 1997; Walsh, 1988). In fact Walsh (1988:889) challenges Dearborn and Simon’s (1958)

original finding that their results support the presence of selective perception. The lack of empirical support for the selective perception concept could be attributed to differences in the approach to operationalisation. For example Beyer et al. (1997) found that the instructions given to subjects influenced the results. By manipulating observational goals, asking some subjects to find “the” and others “all” the important problems, they obtained different results (Beyer et al., 1997:724).

A more serious issue in selective perception research is the situation in which relationships are examined. In particular from a strategic management perspective researchers are interested to find the relationship between personal characteristics and selective perception under conditions of bounded rationality. While Dearborn and Simon (1958), Walsh (1988) and Beyer et al. (1997) all test selective perception it can be argued that it was not under conditions of bounded rationality. Senior managers making strategic decisions are aware that they are dealing with uncertain conditions and without all the facts. Under these conditions one might reasonably expect them to rely more heavily on things they *know*. One can expect this *knowledge* to arise as a result of their predominant education and experience. However, managers taking part in experimental studies such as Dearborn and Simon's (1958), Walsh's (1988) and Beyer et al's (1997) might :

- a) Reasonably conclude that they are in fact dealing with ‘full’ information because the documented case is fictional and no other information exists,
- b) be less involved and more objective in their findings than they would be in a real organisational setting because they are not expected to implement the outcomes of their decisions and it has no personal consequence
- c) feel they need not make significant judgements about trade-offs between search time and information quality. For example they would be aware that they are not in a genuine competitive setting and may feel certain that others completing the study will be dealing with identical information within a similar time frame, a luxury not afforded to executives in the uncertain world of strategic decision making.

For these reasons, attempts to measure selective perception experimentally, if they are to replicate real life situations, need to ensure that managers are making decisions under the fully loaded conditions that might lead to selective perception. Viewed in this way selective perception is not a limit to discretion but rather a factor affecting choices and thus outside the scope of this research. In other words a manager may describe a broad range of possible actions (their perceived discretion), but under conditions of time pressure, information overload and a goal orientation that includes certainty of outcome, a manager may selectively make choices on the basis of pre-existing knowledge and experience.

One can conclude that the test of selective perception is valid only under the range of conditions described above which, given the extreme nature of strategic decisions and their attendant consequences, will be difficult to replicate in experimental conditions. In fact researchers may need to closely observe or take part in decision-making processes to fully test this proposition.

This study is therefore not concerned with where managers place their attention when making choices but rather in their beliefs about cause effect relationships that might exist and their perception of managers ability to influence those relationships. This is based on the logic that if no relationship exists then no influence can be exerted. If a relationship does exist then the manager's belief about whether that relationship can be influenced is a likely antecedent to its selection and attention in any subsequent strategic choices.

3.5.3 Separating choice and discretion

A second issue is that the upper-echelons model (Hambrick and Mason, 1984) assumes that perception leads directly to choice. This however assumes that the optimal choice for the firm is the optimal choice for the manager. A more realistic view is that managers make choices which, to different extents, satisfy the organisations needs and their personal goals. Managers who recognise this trade off may see the decision-making process as a politicised power play which according to McClelland (1970) has a range from a personal 'I win you lose' concern to a concern for group goals. Thus,

while managers may perceive a range of options, their own personal orientation, values, and motivation will affect where they make their choice within that perceived range.

The important dimension of the observations above is the clear separation of discretion and choice. Discretion does limit choice, but not to the extent of eliminating choice. Discretion creates the *perceived range of possible action alternatives*. Which of these actions is ultimately selected will be the result of a more complex and *context specific goal dependent process*. This study is therefore concerned with the range of possible actions a manager perceives to be available rather than the enacted choice among those alternatives.

3.5.4 Separating perceived and actual discretion

A third issue to be addressed is the need to fully integrate Hambrick and Finkelstein's (1987) discretion model. In the previous chapter, discretion was discussed as a consequence of action (individual) determinism, organisational determinism and environmental determinism. While the simplicity of this model is attractive it nevertheless ignores the multi-level complexity of the discretion concept. As this study is focused on the individual level of analysis and the individual unit of analysis, complications arising from these multi-level issues can be largely ignored. At the same time it is acknowledged that they may play a significant part in the full explanation of the model.

Hambrick and Finkelstein's (1987) original representation of the discretion framework was intended only to provide an understanding between the apparently opposing views of strategic choice and population ecology. Because of this it dealt with a single concept of discretion as directly consequential to organisational, environmental and managerial influences. Despite the fact that discretion in choice can only be exercised within the limits of its perception there has been little research on this specific topic.

The concept of a cognitively constructed frame of reference limiting choice is not new. Kelly (1963:19,22) recognised the hierarchical nature of the concept when he wrote

that “if one accepts all the usual superordinating constructions of the situation, he may, indeed, find his course of behavior determined with very little latitude left to him” and that “the man whose prior convictions encompass a broad perspective, and are cast in terms of principles rather than rules, has a much better chance of discovering... alternatives”. In other words the actors construed cognition of the situation creates limits for their actions.

In one of only two studies of perceived discretion known to the author, Carpenter and Golden (1997:189) discuss the need to recognise the limits of situational determinants of discretion because “managers may differentially interpret common strategic situations”. That is “cognitions are thought to mediate stimulus-response relationships” (Carpenter and Golden, 1997:189). In their study, Carpenter and Golden (1997) asked subjects to assess the level of discretion they believed they had in a set of predetermined circumstances. In circumstances where industry experts identified low discretion the study reported that “internals” on Rotter’s (1966) locus-of-control scale identified greater perceived discretion than externals thus supporting the view of differential interpretation based on psychological characteristics. They note that the study provides “preliminary empirical support for Hambrick and Finkelstein’s (1987) theorizing that individual differences are associated with differences in managerial discretion” (Carpenter and Golden, 1997:202). In a second study of perceived discretion (Key, 2002) it was found that both individual and organisation characteristics, in the form of Locus-of-control (Rotter, 1966) and culture respectively, did influence perceived discretion, but that individual and organisational demographic measures did not.

Following Carpenter and Golden’s (1997) guide that discretion can only be acted on if perceived, the discretion concept is separated into two components, labelled perceived discretion and actual discretion. This is done to more accurately represent the intermediate steps between environmental stimulus and firm performance. It is proposed that at the individual level, environmental stimuli are processed by the manager, who then develops an understanding of the situation. This understanding of the situation is a consequence of the objective reality as mediated by personal factors.

This understanding of the situation dictates what is *possible* from the manager's perspective. These possibilities create the limits of action that the manager can consider. It therefore represents the outer limits of their perceived discretion and contains within it the range of possible actions that the manager can conceptualise.

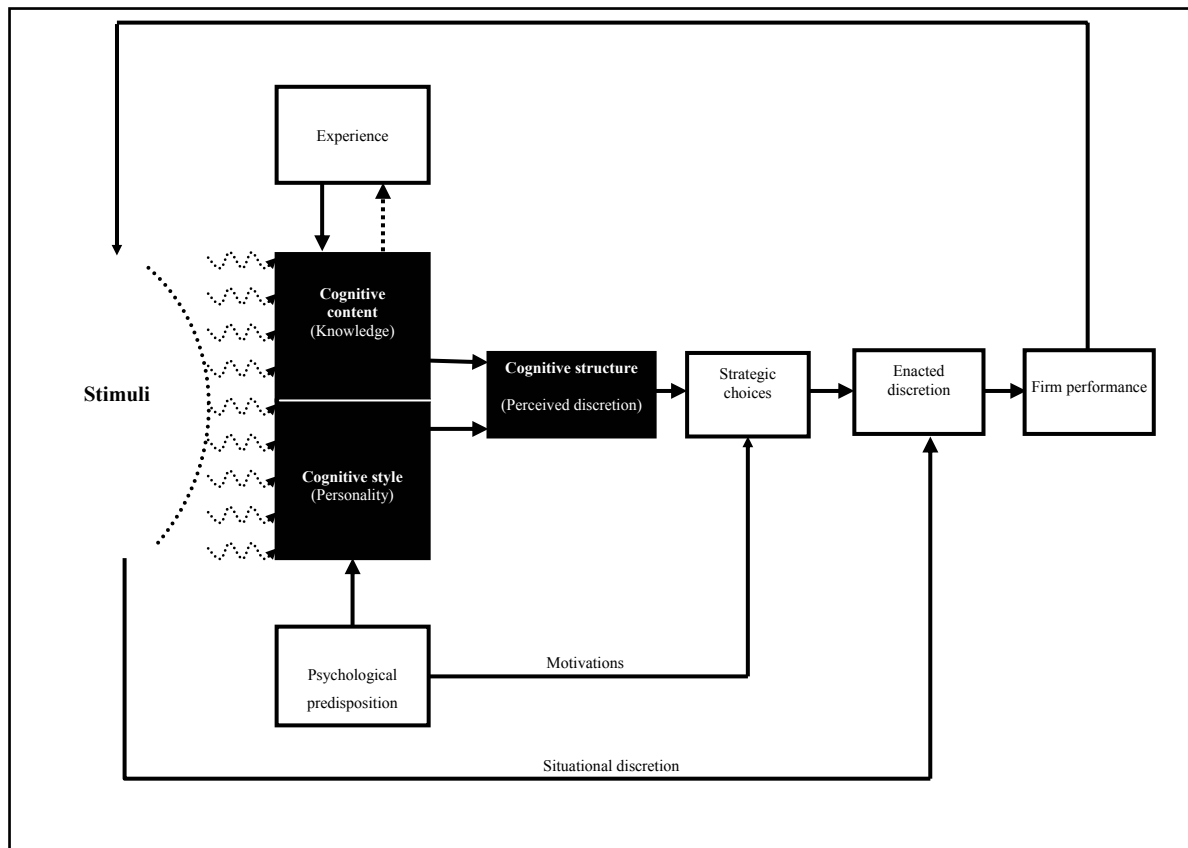
Within the perceived discretion of the manager there will be different categories of possibility constructed along lines of risk, security, potential etc. The actual choices made by managers may therefore be more influenced by their categorisation of the possibilities and their goal orientation as it relates to these categories. The exploration of these issues is beyond the scope of this study.

3.6 AN INTEGRATED MODEL OF DISCRETION

Following the above line of thought, actual discretion can only be defined in action. Actual discretion is the result of choices as enacted in their context. Actual discretion is therefore equivalent to performance. It could be concluded that learning takes place when perceived discretion differs from actual discretion, in other words when things don't happen the way they should. However, this objective knowledge of firm performance must also be processed through the individual lens of the manager and the quality of that lens will determine the quality of the learning experience.

Figure 3-4 above presents a representation of concepts that are broadly similar to the perceptual filters that Hambrick and Mason (1984) originally labelled cognitive base and values. In this research framework they are labelled cognitive content and cognitive style in keeping with the later terminology proposed by Finkelstein and Hambrick (1996). This model presents experience as the antecedent (and suitable proxy) of knowledge; and psychological predisposition as antecedent (and suitable proxy) of Personality. Cognitive structure as captured by perceived discretion is therefore a manager's understanding of the current situation as influenced by his/her knowledge combined with the influence of personality.

Figure 3-4: An integrated model of managerial discretion



Source: Compiled by the author

The elements of Figure 3-4 that are reversed in black are the elements under consideration in this study. The remaining elements of the framework are presented to demonstrate the focal elements of the study in their full context. The logic of the framework proposes that strategic choices are the result of both a manager's perceived discretion to act and their motivation to do so. Once choices have been made and managers attempt to implement those choices, firm performance becomes a consequence of enacted discretion and how the enactment of discretion plays out in the situation.

A description of the key elements of the model is provided below.

3.6.1 Cognitive structure

The term cognitive structure is used to indicate more than a collection of knowledge or even a particular theme or style associated with that knowledge. It includes components of knowledge and style but represents that knowledge and style in an ordered and structured way. By exploring the ordering and structuring of this knowledge, managers' beliefs or givens in relation to their situation can be better understood.

The means of assessing understanding or capturing cognitive structure are varied, and appropriate methods are decided in the context of the research question. Cognitive structure captures the beliefs of managers in relation to a specified domain and can be represented in the form of a cognitive map. Causal map, cognitive map and mental map are descriptive terms often used in the literature (Axelrod, 1976; Eden, Ackerman and Cropper, 1992; Eden, 1992; Huff, 1990; Huff and Jenkins, 2002; Tolman, 1948) to describe knowledge that is situated and connected in the subject mind. Other terms used are world views (Mason and Mitroff, 1981; Starbuck and Hedberg, 1977) and mindscapes (Maruyama, 1982). The term belief system has been used to describe these maps (Markóczy, 1997), although given the complexity of a human belief system it seems far too grandiose a title for such a meagre representation.

Within the perceived discretion of the manager there will be different categories of possibility constructed along lines of risk, security, potential etc. The actual choices made by managers may therefore be more influenced by their categorisation of the possibilities and their goal orientation as it relates to these categories. Cognitive structure is therefore an appropriate variable to focus on as it captures the richness (Hodgkinson, 2002:68) and complexity of the concept. The current study focuses on an aspect of cognitive structure, labelled as perceived managerial discretion.

3.6.2 Cognitive style

Cognitive content style bears similarity to the perceptual filter that Hambrick and Mason (1984) originally labelled values. This is an extremely broad concept and could include left-brain right-brain orientation (Mintzberg, 1976), Jungian typologies (Jung,

1923), attributional complexity (Fletcher, Danilovics, Peterson and Reeder, 1986), cognitive complexity (Schneier, 1979), and motivational needs (Maslow, 1987; Stum, 2001) among others. The current study focuses on personality variables, an aspect of cognitive style.

3.6.3 Cognitive content

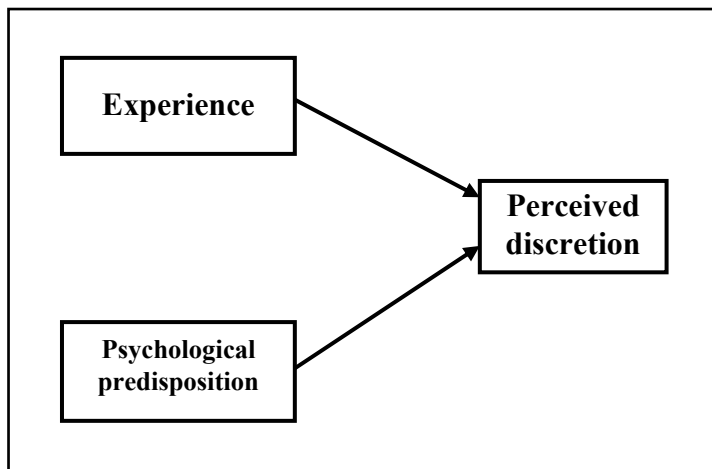
Cognitive content is what one knows or assumes to know. Cognitive content can be seen as a building block of cognitive structure. In fact if one were taking a purely rational approach, eschewing the influence of style, one could possibly define cognitive structure as the arrangement of cognitive content. Cognitive content will stem from experience, either directly or indirectly. The current study focuses on a set of experience variables.

3.7 THE CONCEPTUAL MODEL

The conceptual model presented in Figure 3-5 below is an amended subset of the integrated framework described in Figure 3-4 above and identifies the elements of empirical research that fall within the limits of the current study. The dependent variable for which explanation is sought is perceived discretion. That is, the perception a manager holds in relation to the discretion available to influence outcomes. Contained within this variable is the structure of perceived relationships between relevant concepts and the managers perception of the discretion available to influence those relationships. The variable does not incorporate choice nor does it incorporate action. The dependent variable is limited to the perception of the options to act that are available to a manager - without reference to any choices which may subsequently be made or enacted.

The model was developed to explore the black box (Lawrence, 1997) in upper-echelons research which relies on selective perception (Dearborn and Simon, 1958) as an underpinning theory. It is therefore no surprise that the conceptual model developed in this study has comparisons to the models employed in earlier studies of selective perception and three comparisons are provided in Figure 3-6 below.

Figure 3-5: Conceptual model

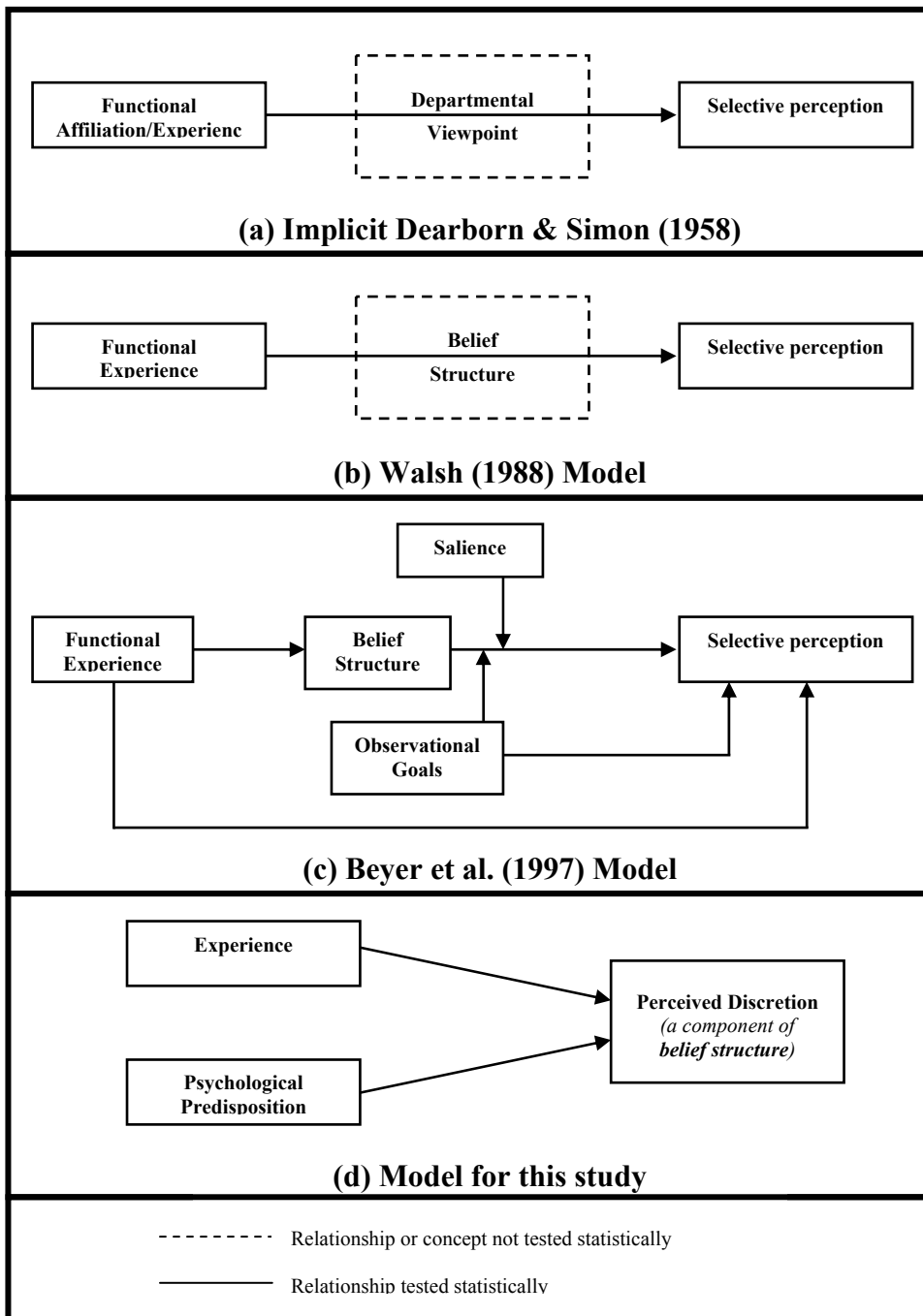


Source: Compiled by the author

The final dependent variable in the three studies (Beyer et al., 1997; Dearborn and Simon, 1958; Walsh, 1988) is selective perception. In the development of the conceptual model for this study it was argued above that, selective perception is more appropriately assessed under conditions of full cognitive loading likely to produce the effects of bounded rationality. Selective perception is not therefore considered in this study, and perceived discretion becomes the dependent variable.

Where as all three studies use demographic variables associated with functional experience, this study expands the range of experience variables in line with previous research in the upper-echelons stream (Andersson, Gabrielsson and Wictor, 2004; Eisenhardt and Schoonhoven, 1990; Finkelstein and Boyd, 1998; Finkelstein and Hambrick, 1990; Gabarro, 1987; Geletkanycz and Hambrick, 1997; Gupta and Govindarajan, 1984; Hambrick, Geletkanycz and Fredrickson, 1993; Hambrick, Seung Cho and Chen, 1996; Hitt, Dacin, Tyler and Park, 1997; Jensen and Zajac, 2004; Kor, 2003; Markóczy, 1997; Mellahi and Guermat, 2004; Norburn and Birley, 1988; Randel and Jaussi, 2003; Ritchie, Anthony and Rubens, 2004; Thomas et al., 1991; Thomas and Ramaswamy, 1996; Thomas et al., 1994; Tyler and Steensma, 1998; Wiersema and Bantel, 1992) and in line with the broader conception of experience that this study takes.

Figure 3-6: Comparison of models



Source: Adapted and extended from Beyer et al. (1997)

In the studies of Dearborn and Simon (1958), Walsh (1988) and Beyer et al. (1997), the independent variable of experience is a direct subject of the study arguing that experience shapes perception. This is in contrast to the upper-echelons research stream, built on the theory of selective perception, but which argues that experience

demographics are proxies for purer psychological measures. In this study those purer psychological measures are added directly to the model, and the demographic measures are retained. This allows the differential effect of demographic measures and psychological characteristics to be examined.

3.8 THE RESEARCH QUESTION

The explicit research question is:

What are the effects of experience (cognitive content) and psychological predispositions (cognitive style) on perceived managerial discretion (cognitive structure)?

3.9 LEVEL OF EXPLANATION

The level of explanation that is sought is an assessment of whether cognitive styles in the form of personality characteristics, and/or cognitive content, in the form of previously gathered knowledge and experience, can explain variation in perceived managerial discretion. Explanation of the nature of this perceived discretion or the nature of the variation is not sought.

The study is conducted in the context of long-term organisational success, within which the data collection is framed. The study does not seek to explain managers perceived discretion in this context. The context provides the vehicle within which the concept of perceived discretion is explored. The study seeks to explain whether cognitive content or cognitive style can explain variation in perceived discretion, without specific reference to the nature of that discretion.

3.10 DEVELOPING HYPOTHESES

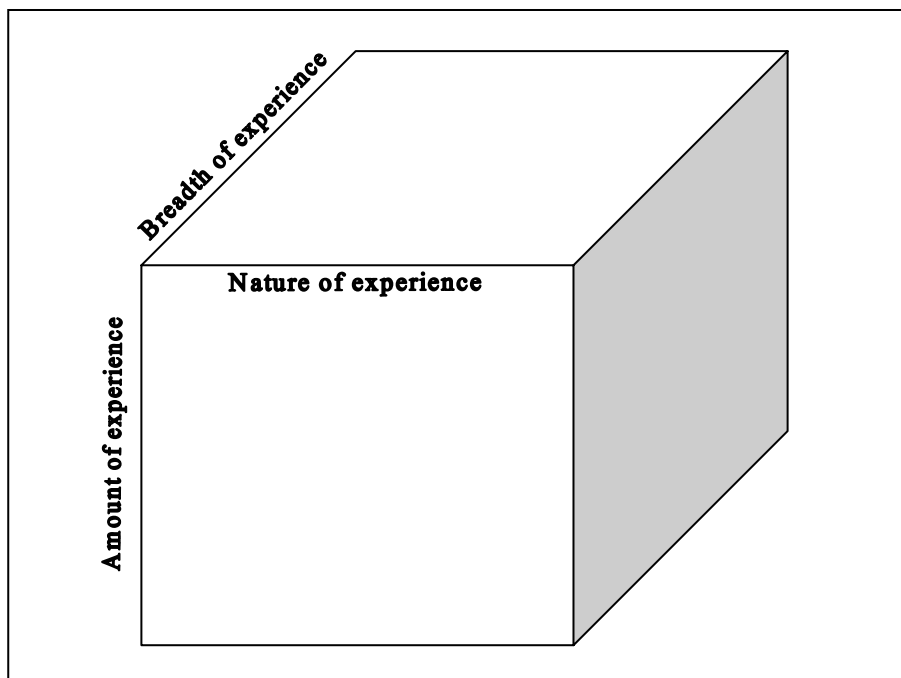
Based on the literature review and the gaps identified, the following research hypotheses are proposed and formed in two strands. The first dealing with the effect of experience on perceived managerial discretion. The second dealing with the effect of psychological predisposition on perceived managerial discretion.

While it is recognised that the null hypothesis (no relationship) is the one actually being tested statistically (Isaac and Michael, 1995:192), for clarity of language the research or alternative hypothesis is presented. Therefore, when considering results, if support is stated for the research (alternative) hypothesis it implies statistical rejection of the null hypothesis (Tabachnick and Fidell, 1996:33-34).

3.10.1 Experience hypotheses

The experience hypotheses have been developed to provide a comprehensive overview of relevant experience and to facilitate reference back to previous studies. Experience can be conceived across three general dimensions of amount, breadth, and nature of experience as shown in Figure 3-7 below. While conceived as separate dimensions they interact with each other. For example an assessment of the functional nature of experience would be incomplete without some sense of the amount of experience along that dimension. The dimensions are offered as a non-exclusive method of identifying general categories.

Figure 3-7: The experience cube



Source: Compiled by the author

The fundamental argument in Dearborn and Simon's (1958) study is that the time managers spend in specific organisation functions will shape their views. It is argued that this happens through exposure to functional activities and goals. In his replication study Walsh (1988) used a measure of functional diversity to test this argument. Following the logic of selective perception theory, managers with breadth of experience in different functional areas should demonstrate a perceived discretion that is different to their more functionally specialised peers.

H1 *Managers similarity in heterogeneity of functional experience will coincide with similarity in their perception of managerial discretion.*

There is evidence to support the argument that managers beliefs solidify as they age (Hambrick et al., 1993). While on cursory inspection age may seem like a reasonable pure measure of amount of experience, there is within it a strong element of nature of experience. As this study data is captured in a single 12 month period the age data collected captures the amount of experience, but also captures generational or nature of experience data.

H2 *Managers similarity in age will coincide with similarity in their perception of managerial discretion.*

In a similar vein management experience is both a measure of amount of experience, and of nature of experience.

H3 *Managers similarity in length of management experience will coincide with similarity in their perception of managerial discretion.*

The nature of a managers functional background has been extensively proposed as a factor influencing beliefs, perception and performance (Beyer et al., 1997; Bowman and Daniels, 1995; Chattopadhyay, Glick, Miller and Huber, 1999; Dearborn and Simon, 1958; Randel and Jaussi, 2003; Waller et al., 1995). In this study the functional nature of experience is extended and it is hypothesised that the hierarchical nature of experience will influence perceptions of managerial discretion.

H4 *Managers with similar functional backgrounds will show more similarity in their perception of managerial discretion than will managers with different functional backgrounds.*

H5 *Managers in similar hierarchical positions will show more similarity in their perception of managerial discretion than will managers with different hierarchical positions.*

It is argued that managerial discretion is in part a function of organisational and business environment (Hambrick and Finkelstein, 1987). In addition to the clear effect that these factors have on actual discretion, it is proposed that they will, through the nature of the experience managers gain in an environment, be manifested in their perceived discretion.

H6 *Managers working in similar industries will show more similarity in their perception of managerial discretion than will managers working in different industries.*

H7 *Managers working in larger organisations will show more similarity in their perception of managerial discretion than will managers working in smaller organisations.*

The nature of education has been proposed to influence managers interpretation of issues (Thomas et al., 1994). Hambrick and Mason (1984) also propose that education will influence strategic choice and firm performance.

H8 *Managers with similar education will show more similarity in their perception of managerial discretion than will managers with different educational backgrounds.*

3.10.2 Psychological predisposition

The scope of potential psychological measures that could be argued to influence perceived managerial discretion is immense. For this study the choice has been made to focus on stable personality constructs that are well developed in the literature and for which readily accessible and well validated instruments are available. There is a discussion later on the merits of the particular instrument. The five hypotheses in this strand correspond to the factors of the 'Big Five' (Norman, 1963; Tupes and Christal, 1961) model of personality.

Apart from the obvious talkativeness, extroverts are characterised as active and assertive, liking both action and stimulation (Costa and McCrae, 1992). This propensity to assertion and action is proposed to influence managers perception of discretion to act in a range of situations.

H9 *Managers introvert/extravert preferences will coincide with similarity in their perception of managerial discretion.*

Open individuals are described as having an intellectual curiosity and an independence of judgement (Costa and McCrae, 1992). It is proposed that managers with these characteristics will be more open to believe in broader possibilities, thus shaping their perception of discretion.

H10 *Managers with similar levels of open styles of information gathering will show more similarity in their perception of managerial discretion than will managers with different levels of openness.*

Individuals with lower levels of concern for people are more competitive and willing to fight for their self interests (Costa and McCrae, 1992). It is proposed that these characteristics will shape a persons perception of managerial discretion, particularly in their perception of managerial discretion to influence people rather than systems or processes.

H11 *Managers with similar levels of concern for people will show larger similarities in their perception of managerial discretion than will managers with different levels of concern.*

Individuals with high levels of conscientiousness are purposeful, strong-willed and determined (Costa and McCrae, 1992). This disciplined and determined attitude is proposed to shape the nature of perceived managerial discretion, with the drive to achieve, influencing beliefs about what can be achieved.

H12 *Managers with similar levels of conscientiousness will show larger similarities in their perception of managerial discretion than will managers with different levels of conscientiousness.*

Individuals with higher levels of emotional stability are more calm, even tempered and relaxed (Costa and McCrae, 1992). Individuals with these characteristics should demonstrate less anxiety about the challenges of the future and so demonstrate more similarity in their perception of managerial discretion.

H13 *Managers with similar levels of emotional stability will show larger similarities in their perception of managerial discretion than will managers with different levels of emotional stability.*

3.11 SUMMARY

In this chapter the tripartite arrangement of cognition as content, style and structure proposed by Finkelstein and Hambrick (1996) was explored. While recognising the limitation of this or any simplified representation of human cognition, it was argued that this conceptual arrangement provided significant potential. The work of Markoczy (1997) was discussed, and aired two salient points. One, the need to be explicit and accurate in the labelling of terms and two, the lack of empirically supported correlation between the explicitly defined proxies of observable characteristics and managerial beliefs in upper-echelons theory (Hambrick and Mason, 1984).

The integrated framework developed addresses both of the above issues. The issue of labelling is addressed by applying the labels for cognition suggested by Finkelstein and Hambrick (1996) and explaining their relationship to upper-echelons theory (Hambrick and Mason, 1984) labels and labels in the current study.

The integrated framework developed, separates several important concepts, to provide a more fine grained approach. Firstly, choice and discretion are separated and this allows for the introduction of motivation to the framework, a concept which has been noticeably absent from previous upper-echelons explanations of choice and action. Secondly, discretion is separated into two facets, perceived discretion and actual discretion. Thus allowing the limits of the research to be clearly specified as excluding decisions which, it is argued, cannot be appropriately examined under experimental or survey conditions.

With the labelling of terms clearly addressed, and the limits of the research set, a focused conceptual model is presented. While developed from the theoretical stream in

upper-echelons research (Hambrick and Mason, 1984) the model is also clearly associated with the selective perception research stream (Dearborn and Simon, 1958). The conceptual model is therefore also described and located in terms of the latter research stream. Hypotheses are then derived in two strands. One, dealing with the more traditional demographic measures of experience and a second dealing with the much rarer and more direct measures of psychological predisposition.

The following chapter considers the philosophical perspective from which the ontological nature of knowledge, and the epistemological route to that knowledge is claimed. In that context the research design, method, and considerations of validity are addressed, together with the ethical consideration appropriate to this type of applied study.

CHAPTER 4 - METHODOLOGY AND RESEARCH DESIGN

4.1 INTRODUCTION

In previous chapters the challenges associated with the continued iterative development of upper-echelons and selective perception research were reviewed. The review identified a compelling need to develop an integrated framework that provides a basis for this study and future research. The integrated framework, and the focused conceptual model for this study, provide the opportunity to gain new insights into the relationship between key cognitive elements of content, style, and structure, and also provide the opportunity to test some of the fundamental assumptions of selective perception as applied in upper-echelons theory.

The central focus of this study is to develop an integrated theoretical framework that also enables further development of the field, and to empirically test focused elements of the model, namely the relationship between experience, psychological predisposition and perceived discretion. Any claim to develop and test theory puts an onerous responsibility on the researcher to carefully consider the ontological and epistemological issues involved. This chapter will deal with and describe both the nature of knowledge and the means of accessing that knowledge in the context of a research philosophy based in the realist perspective of Bhaskar (1975) and Layder (1990). Later in the chapter the research design will be carefully described in that context.

This chapter is organised and presented around four connected themes. These include a review of relevant philosophical perspectives, and a detailed description of the realist perspective adopted for this study. This is followed by the development of a methodology and research design consistent with the realist perspective, relevant previous research, and the specified aims of this study. This is followed by a description of the approach to data collection and analysis. The chapter then addresses

issues pertaining to the validity and reliability issues associated with this study before concluding with a consideration of the ethical issues involved.

4.2 SELECTING A PHILOSOPHICAL APPROACH

In answer to his own question "How can the best approach and strategy be selected? " Blaikie (1993:201) opens his discussion by acknowledging "that there is no neutral ground on which to stand to evaluate their relative merits" and consequently "a conclusion about the strengths or weaknesses of any approach or strategy will entail the adoption of a particular set of ontological and epistemological assumptions". Consequently, there is no universal *best approach*, and researchers make choices about the appropriate approach for a specific study in the context of a range of influences. Blaikie (1993:202) identifies five influences on a researchers choice of approach and these are outlined in Table 4-1.

Table 4-1: Influences on methodology selection

Influence	Mechanism
Pragmatism	Match the methodology to the nature of the research project
Worldview	Adopt a methodology compatible with ones own ideological views, religious beliefs or values.
Personality	A preference for linear or ambiguous approaches
Professional socialisation	Exposure and experience to particular methodologies
Social context	Adopting methodologies acceptable to the funders and consumers of the research

Source: Adapted from Blaikie (1993:202)

Pragmatic influences present the choice of approach as a means to an end, influencing a particular question to be addressed using an approach appropriate to the set of circumstances. A researchers worldview influences the choice of approach on the basis of deeply held principles about what knowledge is and how it might be accessed. A worldview may be a narrow perspective, limiting the range of approaches available, or it may be a more eclectic perspective that acknowledges different possibilities. The personality of the researcher may influence choices toward a more linear positivist

approach or toward a more complex and causally ambiguous interpretivist perspective. At a different level, social influences in the context of professional and broader communities of interest, may shape an approach. For example a researcher may adapt a particular approach because it is suitable for publication in a particular arena.

In practice these influences are not exclusive, and the choice of methodology is the result a combination of all the influences. Blaikie (1993:202) asserts his hopes that an understanding of alternative approaches would lead to an informed choice. At the same time he offers no guidelines as to how one might use the information to make this choice. Given the lack of such guidelines and the absence of a cogent foundation for assessing knowledge of knowledge (Johnson and Duberley, 2000) it is imperative that social researchers claiming to develop knowledge are explicit about their perspective on ontology (what constitutes social reality) and epistemology (how they came to know or access that reality) and where possible to recognise the biases and influences that shape that perspective. Rather than an attempt to identify the *best* choice, the consideration of a research approach should help researchers recognise in the first instance that there are choices to be made, and secondly by considering the influences to recognise the biases and forces at play, and so present the best opportunity to make the most *appropriate* choice in the circumstances; in doing so creating the conditions for recognising the strengths, weaknesses, and limitations of the approach.

4.3 ONTOLOGY AND EPISTEMOLOGY

There are a multiplicity of perspectives available to the researcher which is evidenced by Halfpenny's (1982) identification of no less than twelve varieties of positivism. Nevertheless, consideration of different philosophical perspectives can be simplified without undue loss of clarity by considering positions on an ontological continuum from positivism at one extreme to constructivism on the other. Historically, positivism has been the dominant perspective in scientific study. Positivism stems from principles of exact, precise, and objective science, the basis of which was originally developed by Comte (1970). Positivism found a basis in research in the natural sciences with an ontological position that there is a single objective reality, which can be accessed by an independent researcher. That is, reality is a thing that can be sensed (even if the

technology is not currently available to sense it). The objective of positive forms of enquiry in the natural sciences is to understand observable causal relationships that explain and predict events. Positivists argue that methods in the fields of natural and social sciences "are fundamentally the same" (Popper, 1961:130,131). In the context of social research in organisations, it is said that positivism seeks to understand fundamental laws that shape the operation of organisations (Johnson and Duberley, 2000).

The extent of acceptance of the positivist position over centuries should not be confused with any argument proposing the superiority of that perspective. Positivism is a founding philosophical position, it has survived several centuries of application and it still has relevance; it does not however have an exclusive claim as a perspective for understanding, explanation, and prediction of social phenomena. There are a range of classical and contemporary philosophical perspectives all of which present a legitimate claim to a have knowledge about knowledge.

At the opposite end of positivism, on the ontological continuum, is constructivism or its closely related position interpretivism. Constructivists argue that truth is relative to some meaning, context or perspective and interpretivists argue that knowledge exists in shared meaning (Schwandt, 1994:125). What they have in common is a rejection of the notion of a single objective reality as proposed by positivism. Interpretivists identify multiple realities constructed in context. Interpretivism puts the researcher in a fundamentally different position to positivism. In positivism the researcher is detached from the reality. In interpretivism the researcher is one of the relative parts of the reality being uncovered, producing in a nested sense a theory of the theory of others (Schutz, 1972). The key ontological differences between the positivist and interpretivist polarities are shown in Table 4-2.

In addition to the ontological continuum of positivism and interpretivism, there are differences between the epistemological perspectives of both positions. At the positivist extreme, knowledge is accessed through the observation or sensing of events from which generalised theory providing causal explanation and prediction is induced.

In this position the observer is objective, independent and theoretically neutral in their observation (Blaikie, 1993:205). In contrast, from an interpretivist position, access to knowledge is gained through a hermeneutic task of "penetrating the frames of meaning of social actors" (Blaikie, 1993:205) from which ideal types or abstract theories are generated. This epistemological divide can be characterised on a continuum of the observer relationship to reality. Thus positivist observers are objective or outside of the reality where as social constructivist or interpretivist researchers are part of the knowledge generating process and inside the reality.

Lying between the two extremes of the positivism-interpretivism ontological divide are a range of perspectives that, on the one hand challenge the single objective reality of positivism and at the same time challenge the interpretivist position of only a shared reality (Johnson and Duberley, 2000). Realism, lying between the two extremes, but much closer to positivism, shares the positivist belief in an objective independent reality, thus allowing for systematic and *scientific* analysis in the same way a positivist approaches the investigation of natural phenomena. Where realism differs from the positivist approach is that it proposes there are different levels of reality that can be analysed through the application of rigorous methods. Where positivism accepts generalisations only if they can be supported by observed facts, realists seek to explain the unobservable generative mechanisms that explain observable effects; and in doing so accepts a dualist separation of theories about reality and the reality itself. The fact that something cannot be observed does not lead to its rejection, or to the conclusion that it is a socially constructed reality, thus by promoting rationalism over empiricism, realism is in fundamental opposition to the interpretivist perspective (Chia, 2002:11).

Table 4-2: Ontological divide of positivism and interpretivism

	Positivism	Interpretivism (Constructivism)
Ontology	External reality Single reality Causal laws Generalisable Predictive Reductionist Observer independence	Socially constructed reality Multiple contexts Multiple (changing) realities Relative Without independence Interpreted by observer

Source: Compiled by the author

To identify the appropriate approach for the current study, the five dimensions of influence (described in Table 4-1 above) are considered. A pragmatic influence on the research is appropriate because this study, in part replicates and builds, on previous research in the strategic leadership stream with a leaning towards strategic choice (Child, 1972). In this context the research stream advances a realist ontology that takes account of both social structure and human agency (Bhaskar, 1975) and this specific philosophical position has been explicitly called for in previous work (Whittington, 1988). The worldview of this researcher is one that presents a belief in both objective and observable reality in the physical world and a constructed reality in the social dimension; consequently the realism perspective of stratified epistemological domains of actual, empirical and real (Bhaskar, 1975:56) is an attractive one. While personality factors do provide an influence, perhaps they are not the simple influences that Blaikie (1993:201) suggests. While the researcher has a personal preference for complex, flexible and ambiguous interactions as a general trait, in the context of learning skills and completing, largely on ones own, an extensive body of work for the first time (this study), his preference is for the clear linear logic of reasoning that realism supports. Although it should be acknowledged that this preference has more to do with prior professional socialization and an engineering background than personality. Finally, the social context of the research plays a part. A clear objective for the study is to disseminate the findings of this research both to practitioners but also importantly to researchers in the field so that the iterative process of development may continue. As this research sits clearly in a research stream with a realist perspective, views of the consumers of the research require due consideration, and in this case a realist approach is congruent with consumer requirements.

Ultimately the selection of a research philosophy is an interaction of the influences described above. With no neutral ground from which to assess the best choice the researcher must decide on the most appropriate philosophy for the study at hand. In the case of the current study a realist philosophy has been selected.

4.4 REALISM

Within realism, two alternate views of social reality can be identified. The first is a reductionist view that sees any macro structure as non-existential (Harré, 1979; Harré, 1981). Macro structures in this view only exist in the accounts of the observed. Social reality is therefore socially constructed by the cognition of individuals or, in other words, social reality is the aggregate of individual realities. This view clearly shares much with the interpretivist perspective.

The more social psychology oriented view of Bhaskar (1979) recognises an ontological difference between individuals and social structures or micro and macro. Bhaskar (1982) clearly separates knowledge (a socially constructed macro concept) from motives (an individual micro concept).

Layder (1990:23) argues that “macro structures have properties that enable them to constrain as well as facilitate human actions from ‘outside’ *as well* as from within”. In his view one comes to *know* social reality through the development of models that represent (real but unobservable) generative mechanisms. In other words one comes to know social reality through the development of a mental map of the territory (which then constrains human action from within) rather than through actual experience of the territory. This philosophy is particularly appropriate to the current research, given the focus on mental maps of perceived discretion. These are perceptions that managers develop to guide action in the world, but have not necessarily been tested or experienced, but nevertheless provide a constraint to managerial action.

A central feature of scientific realism is the search for a *true* description of unobservable processes that explain observable ones. Van Fraassen (1980:3) argues against this view and suggests that theories need not represent unobservables that

actually exist, “except in what they say about what is actual and empirically testable”. Thus a theory may suggest a framework or causal model that explains observable events, but that framework or model may not actually exist.

Realism takes from the positivist perspective the desire to produce causal laws and from an interpretivist perspective, its view of the nature of social reality (that is social reality is pre-interpreted). Therefore, in the perspective of realism, social reality is both “produced and reproduced by its members” (Blaikie, 1993:59). This interrelatedness of the individual and society is a defining aspect of realism.

Society is both the ever-present condition (material cause) and the continually reproduced outcome of human agency. And praxis is both work, that is, conscious production, and (normal unconscious) reproduction of the conditions of production, that is society (Bhaskar, 1979:128).

Therefore realism ontologically separates the individual and society and at the same time recognises their interdependence. In this context, societal structures may influence individual outcomes that can be observed by the researcher, at the same time those societal structures cannot be reduced to the aggregate of individual actions.

Focusing on the stratified ontological schema in the realist philosophy, Bhaskar’s (1975:56) domains of reality – empirical, actual and real – present a stratified ontology, with epistemological consequences.

Within realism the researcher can come to know reality through direct experience (in the domain of the empirical) or through experience of events (in the domain of the actual) or through experience that explains mechanisms (in the domain of the real). According to Layder (1990:127) and Bhaskar (see Manicas and Secord, 1983:408-409) the realities being explained by a similar epistemology (experience) are ontologically different – although this view is not shared by the reductionist view of Harré (1979). This separation of ontology and epistemology is a central feature of the realist

perspective and it identifies that ontology cannot be reduced to epistemology, and thus avoids what Bhaskar (1975) describes as an epistemic fallacy. Thus from a realist perspective the researcher can seek explanation of a causal mechanism (proposed to generate effects) through experiences of the consequences.

Where the realist perspective seeks to explain *generative mechanisms*, the classical view of positivism holds within its remit a belief in the importance of *general laws*.

Positivism pivots on the Humean theory of causal laws, viz. that laws are or depend upon constant conjunctions of atomistic events or states of affairs, interpreted as the objects of actual or possible experience. This theory itself follows ineluctably from the requirements that knowledge be certain and given-in-experience (Bhaskar, 1979:158).

These constant conjunctions are treated as being as real as the chair on which the subject sits. They are also wholly independent of the observer and the observed. From a positivist perspective, knowledge of reality is claimed by experiencing that reality, whereas from a realist perspective reality in one domain can be inferred (for example generative mechanisms in the domain of the real) through experience in another domain (for example experiences in the domain of the empirical). In the realist perspective the fact that a reality cannot be experienced directly (epistemology) does not preclude knowing something about that reality (ontology).

While realism looks for reasons to explain actions, Bhaskar (1975) argues that there is a distinction to be made between causal laws that predict, and reasons that explain patterns of events. Constant conjunctions or patterns of events are backed up by theories that explain the link between the two events. These explanatory theories are not causal laws (as described by positivism) but generative mechanisms that influence outcomes under appropriate conditions. Thus the events and the generative mechanisms have separate existences. Described differently, the retroductive approach

characteristic of realism “culminates in finding *a* solution to the research problem” (Blaikie, 1993:165).

For realists the Humean notion of causality derived from the observable is not adequate. Consider the following description of causality:

The surprising fact, C, is observed:

But if A were true, C would be a matter of course,

Hence, there is reason to suspect that A is true” (Peirce, 1931a:117).

While this causality is descriptive, it does not *explain* the relationship. The realist goes beyond the description to find the generative mechanism that lies beneath the observed regularities. “A real causal explanation must answer the question of why these regularities exist in terms of the underlying mechanisms which generate them” (Layder, 1990:13). It is a Humean notion of causality on which upper-echelons research has rested, describing the relationship between demographics and firm performance. Through an exploration of the *black box*, the current research addresses the realist requirement to explain the underlying mechanism.

In the realist tradition causal laws are causal properties of structures rather than events.

The deductive nomological model of explanation presupposes an ontology of events and closed systems produced by a high degree of control over the number of real mechanisms at work... Therefore the D-N model is inappropriate to the real world outside the laboratory since the latter is an open system” (Layder, 1990:14).

This breaks with the positivist idea that explanation and prediction go hand in hand. It may therefore be able to retrospectively explain some event but not predict it. Realism therefore “does not concern itself with prediction, since this is only applicable under conditions of closure...” (Layder, 1990:15).

The overall aim of the research is therefore, not to identify general laws, but to uncover generative mechanisms that explain the phenomena under study. These explanations are not predictive in the positivist sense.

In the perspective of realism the role of theory is to develop the field and provide some maps the researcher can use to understand the phenomena being studied. In the positivist stance one induces relationships from pure observation.

... the object of sociology is to construct theories about human conduct inductively on the basis of prior observations about that conduct: these observations which are made about externally 'visible' characteristics of conduct are necessarily 'pre-theoretical', since it is out of them that theories are born (Durkheim referred to in Giddens, 1976:132).

This is an inductive form of enquiry often called empiricism because of its basic assumption that observation is the foundation of knowledge (phenomenology). Induction is a process whereby one “infers from one set of facts another set of facts” (Peirce, 1931b:386). That is, from a set of observable facts, one induces observable and testable explanations about those facts.

Peirce (1931b:386) suggests that retrodution “infers from facts of one kind to facts of another”. Thus one can infer from observable events a generative mechanism or mechanisms that cannot be observed. The critical difference between inductive and retroductive processes is the role of theory in observation. In the inductive stance of positivism, the researcher starts with a blank slate “ridding yourself of all preconceptions about what you are going to study” (quoted in Blaikie, 1993:134). In the retroductive stance of realism as developed by Peirce (1931a; 1931b) no such blank slate is assumed.

Hanson (1965) identified the role of theory dependence on observation, and Achinstein (1971) further refined the issue by questioning the role of theory-dependence on

retroduction. Retroduction is concluded to occur in the context of ontological, conceptual and theoretical assumptions. Realism is a cyclical form of enquiry developed in the context of previous understanding. It is a process of description, explanation and redescription that meets with the call for an iterative process of theory building within the strategic leadership research stream (Lawrence, 1997).

This is a theory building process, although not theory building from a blank slate. Neither does it rule out the possibility of testing theories relating to generative mechanisms in the domain of the real, by reference to events in the domain of the empirical. In this research there is a clear goal to build theory, but built on the foundations of existing knowledge. Not just to describe, but to redescribe the generative mechanisms at work, and to test these in the empirical domain.

In contrast with classical positivism which searches for general laws, this research aims to describe the generative mechanisms that explain part of the link between the experience and psychological predisposition of senior managers and their perceived discretion in the context of organisational success (a retroduced hypothesis); to test this causality empirically; and consequently to redescribe the generative mechanism where appropriate.

4.5 METHODOLOGY

The choice of methodology for this study is a direct consequence of the philosophical position (realism) outlined in the previous section. The philosophical position adopted is not superior to any other, but is legitimised through the explicit identification of influences on the researchers choice – to the extent that they can be consciously identified (Blaikie, 1993:202).

Developing a research methodology requires an understanding of the role that theories and models play in the generation of knowledge. From a perspective of realism theories can be expected to provide answers to questions about why patterns of outcomes are the way they are (Harré, 1972; Harré, 1976). In this view the theory provides an understanding of how elements, which behave in a particular way, produce

a pattern of outcomes. The objective is to describe those elements, in the form of generative mechanisms, that explain the observed patterns.

Following the terminology of Blaikie (1993:168) and Bhaskar (1979:15) the research strategy, the logic used for this study, is described as one of retroduction followed by deduction and induction (Peirce, 1934). The first phase of the enquiry is retroduction or model formulation (Peirce, 1934). The second stage, deduction, involves deducing the consequences through hypotheses. The final stage, induction, involves testing the consequences.

Retroductive reasoning, unlike deductive or inductive reasoning, does not follow logically from any given premise, rather the researcher imagines new ideas (Blaikie, 1993:165 discussing the views of Peirce) that arise from consideration of observed phenomena. A perspective of realism acknowledges that every "advance is first laid by Retroduction alone, that is to say, by the spontaneous conjectures of instinctive reason" (Peirce, 1934:324).

In this study the research model developed in previous chapters presents the retroduced hypotheses of underlying generative mechanisms at work; retroduced from the consideration of observed phenomena of previous studies. Then deduced from that model are the specific hypotheses or consequences that are to be tested. The final stage involves the method of testing the induced consequences in order to help ascertain whether the hypothesised generative mechanism or research model does indeed explain the observed phenomena.

Retroductive reasoning provides an approach which has been largely absent from the strategic leadership and upper-echelons research streams. The investigations undertaken in the stream have largely been used to identify relationships between variables. With the notable exception of Finkelstein and Hambrick's (1990) work on managerial discretion, the original theoretical framework of upper-echelons theory (Hambrick and Mason, 1984) has had little modification derived from reflection based on these investigations. Yet only through a process of modification and development

can the research stream produce good theory (Whetten, 1989; Whetten , 2002). In this study a retroductive reasoning approach was used to reflect on the previous investigations undertaken in the research stream. Based on reflections of the results from these investigations a general hypothesis, in the form of the research model was formed (and is described in Chapter 3).

Following on from retroductive reasoning, deduction is a mechanical role which followed by induction, links ideas or concepts to the social world. According to Blaikie (1993:168) "Retroductive research strategy involves the construction of hypothetical models as a way of uncovering the real structures and mechanisms which are assumed to produce empirical phenomena".

Similarly Keat and Urry (1975:126) provide a realist research strategy explaining that as

- a) generative mechanisms are often unobservable, a model is developed
- b) the model is tested by working out phenomena that would be a consequence of the model and are observable in the empirical domain
- c) and if the tests are successful it lends support to the model.

Following a similar process of thought Bhaskar (1979:15) notes that:

*Typically, then, the construction of an explanation for... some identified phenomenon will involve the building of a model, utilizing such cognitive materials and operating under the control of something like the logic of analogy and metaphor, of a mechanism, which **if** it were to exist and act in the postulated way would account for the phenomenon in question (a movement of thought that may be styled 'retroduction'). The reality of the postulated explanation must then, of course, be subjected to empirical scrutiny... Once this has been done, the explanation must then in principle itself be explained.*

Relating these concepts to this study; in the inductive phase a hypothesised theoretical model was developed; this induced model provides guidance for the deductive development of hypotheses specific to the context of this research. This is followed in the inductive phase by the empirical investigation, which if successful provides support for the model.

In the inductive phase of the research, the empirical scrutiny involves the investigation of several cognitive concepts. These concepts are not tangible and are not readily accessible by the researcher. To facilitate the empirical investigation they must be operationalised in a way that permits researcher access. The process of operationalising the variables is described below in the research design.

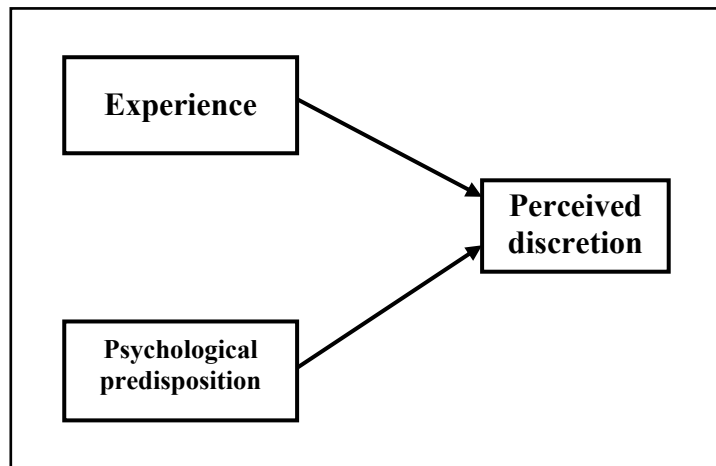
4.6 METHOD

Research design provides the operational expression of a scientific methodology. The research design must be appropriate to the question (Johnson and Harris, 2002:100) as it defines the operations necessary to achieve the research objectives (Mayer and Greenwood, 1980:67). A stated objective of this research, defined in an earlier chapter, is the continued development of the strategic leadership research theme by building on previous research. The research design echoes this objective and the methods used are a reflection and a development of previous research in the field. The methods used in the strategic leadership research stream are predominantly built on a quantitative approach. Quantitative research design is appropriate in this field as there is a reasonable amount of existing knowledge and specific constructs and relationships can be identified (Johnson and Harris, 2002:100). A quantitative technique is also an appropriate method within the realist philosophy that this study is set (Pratschke, 2003).

The conceptual model developed in earlier Chapter 3 and reproduced in Figure 4-1 below, identifies the key constructs in this study and the proposed causal relationships. These conceptual definitions need to be developed as operational definitions to allow for measurement and each concept presents a different challenge. The remainder of

this chapter deals with the operational development of the concepts and concludes by considering the reliability and validity of the measures identified.

Figure 4-1: Conceptual model



Source: Compiled by the author

4.6.1 Experience

This is the first of the two groups of independent variables.

Upper-echelons theory presents observable characteristics as indicators of “the givens that managers bring to a situation” (1984:196). The particular characteristics presented are however, largely representative of experience. Experience is used in this study more specifically as the personal and professional experiences from which an executive's "cognitive content" stems (Finkelstein and Hambrick, 1996:57). It is the experience through which the executive has come to know something about their world.

Experience is operationalised in this study through the use of demographic variables that measure as directly as possible the nature, breadth and amount of experience that managers bring to a situation. Hambrick and Mason (1984) note that demographic indicators may contain more noise than purer psychological measures. This is not an issue in this study as demographics measures are proposed only as a means of

operationalising experience, whereas Hambrick and Mason (1984) used demographic measures to operationalise the concept of psychological predisposition. This study deals with that concept much more directly, as described in the next section.

Table 4-3: Independent variables 1

Concept	Indicator	Type of data
Experience	Industry sector	Category
	Size of the organisation	Scale
	Level in the organisation	Category
	Number of direct reports	Scale
	Total management experience	Scale
	Heterogeneity of experience	Scale
	Functional area of most experience	Category
	Functional area most associated with	Category
	Level of education	Category
	Nature of 3 rd level education	Category
	Gender	Category
	Age	Scale

For the concept of experience, the measures in Table 4-3 have been included on the basis that they influence either the nature, breadth or amount of an executive's experience, and are representative of measures previously applied in the field (Eisenhardt and Schoonhoven, 1990; Finkelstein and Boyd, 1998; Finkelstein and Hambrick, 1990; Hitt et al., 1997; Norburn and Birley, 1988; Wiersema and Bantel, 1992) thus facilitating comparison of the results with prior work.

With the exception of 'Heterogeneity of experience' all of the operational measures are the direct answers to questions in the survey form. Heterogeneity of experience is calculated from the number of years spent in each function using Blau's (1977:78) index. Blau's index, presented in Equation 4-1 provides a measure of similarity/dissimilarity of heterogeneity of experience.

For the remaining operational measures a questionnaire was used as shown in Appendix A. The questionnaire captures information on the context of the person's

work experience, the functional nature of their experience, the amount of their experience and their educational experience as per Table 4-3 above.

Equation 4-1: Blau's index for heterogeneity of experience

A homogeneity index is given by:

$$\alpha = \sum p^2$$

where α = Index of homogeneity
 p = The proportion in each category

to convert this to a measure of heterogeneity the index is subtracted from 1.

$$\beta = 1 - \sum p^2$$

where β = Blau's index of heterogeneity

Source: Blau (1977)

4.6.2 Psychological predisposition

Psychological predisposition is an extremely broad concept and it is not possible to provide a complete operational measure. The goal is to operationalise the concept with some of the significant and well understood aspects of psychological predisposition that are available. Finkelstein and Hambrick (1996) discuss psychological predisposition (cognitive style) in terms of logical and non-logical groupings, differences between the two hemispheres of the brain (Mintzberg, 1976), Jungian theory (Jung, 1923; Jung, 1971; Nutt, 1986; Nutt, 1993) and cognitive complexity (Hitt and Tyler, 1991). For the purpose of this research the Jungian approach would seem the most appropriate from the group suggested by Finkelstein and Hambrick (1996). This Jungian model (Jung, 1923; Jung, 1971) provides a direct relationship between the Sensing-Intuition (SN) dichotomy and the concept of gathering of information, and the Thinking-Feeling (TF) dichotomy is a representation of decision-making or information-processing style. With the inclusion of the Extraversion-Introversion (EI) categories it forms the basis of a comprehensive approach.

The Myers-Briggs Type Indicator (MBTI) (Myers, 1975; Myers and McCaulley, 1985; Myers et al., 1998) is the most popular approach to operationalising Jungian theory

(Thompson and Ackerman, 1994), particularly in the fields of organisational psychology and vocational counselling (Saggino and Kline, 1996b). In addition to the Jungian concepts the MBTI also measures on the Judging-Perceiving (JP) categories. The purpose of the MBTI instrument is to sort people into groups that accord with the theory, although the instrument has been criticised for its assumptions about categorical sorting (Garden, 1991; Girelli and Stake, 1993). Researchers (Janowsky, Morter and Hong, 2002; Lacorte and Risucci, 1993; Silberman, Freeman and Lester, 1992; Spirrisson and Gordy, 1994) have overcome this criticism by using continuous scores and this approach is supported empirically by McCrae and Costa (1989) and others (Carlson, 1985; Carlyn, 1977) who found higher reliability using continuous scores and claim this approach is therefore “better suited to research” (Gardner and Martinko, 1996:50). Cohen (1983) expresses a different concern by observing that the artificial dichotomisation of a continuous variable at the mean reduces the amount of variance accounted for, significantly reducing the power of the analysis in question.

The use of continuous scores converts the otherwise dichotomous categories as single dimensions and so moves away from the instrument’s conception as a type theory. Garden (1991:4) observes that current research “may validate no more than a trait interpretation of the scales”. Saggino and Kline (1996a) factor analysed 166 items from the MBTI Form F⁸. They conclude that the main dimensions seem to correspond to four out of the five dimensions of the Five-Factor or Big-Five model (Norman, 1963; Tupes and Christal, 1961). On the basis of their findings they observe that “the meaning of MBTI scales can only be clearly established by placing the MBTI in personality factor space” (Saggino and Kline, 1996b:591-592). In their later research Saggino and Kline (1996b:595) found that “the MBTI could seem redundant, because its scales and factors load on the three main personality factors”.

McCrae and Costa (1989:37) were highly critical of the psychometric properties associated with MBTI, concluding that “If the MBTI is used, evidence to date suggests that it may be better to abandon its Jungian framework and reinterpret the MBTI in

⁸ The MBTI is available in a number of versions and most are referred to by a letter designation which in this case is “F”.

terms of the Five-Factor model". McCrae and Costa (1989) find significant correlation between the Five-Factor and MBTI instruments. At a significance level of $p < .001$ they find correlation between the MBTI and Five-Factor dimensions of E-I correlated with Extroversion, S-N correlated with Openness, T-F correlated with Agreeableness and J-P correlated with Conscientiousness.

Regardless of the criticisms of MBTI, one recognises that in excess of three million people undertake an analysis each year (Centre for Applications of Psychological Type, 1992). Haley and Stumpf (1989) observed that the widespread use of the MBTI in management circles affords researchers tremendous opportunities for data collection. However, since the release of Form M⁹ in the United States and Step 1¹⁰ in Europe, data collection has become more difficult. Previous versions allowed researchers to take manually scored reports and convert them to continuous scores. Form M and Step 1 employ a different scoring method and continuous scores can now only be obtained from computer scored answer sheets (Myers et al., 1998:149). This change severely limits the potential for opportunistic data collection, as much of the large-scale application of the MBTI in executive education is based on paper scoring in classrooms.

Given:

- a) the criticisms that have been levelled at MBTI as a type theory,
- b) the significant correlation between MBTI continuous scores and the Five-Factor dimensions and
- c) the need for computer scoring with current MBTI forms to obtain continuous scores,

⁹ See footnote 10

¹⁰ Form M refers to a specific version of the MBTI instrument. Step 1 is an alternative form of identification for a similar version of the Form M instrument released by its European publishers.

a decision was made to use the now almost universally accepted Five-Factor framework as operationalised in the NEO-FFI¹¹ instrument (Costa and McCrae, 1992), and described as the “gold standard of Big Five personality inventories” (Hough, 2003:300).

Table 4-4 identifies the measures used to operationally define the concept of Psychological Predisposition. The five scales, Extraversion, Openness, Agreeableness, Conscientiousness and Neuroticism, deal effectively with hypotheses H9 through H13 respectively, which were developed in a previous chapter. The data collection uses the NEO-FFI instrument in accordance with the NEO PI-R Professional Manual (Costa and McCrae, 1992). An extract from the manual providing a rich description of the operational measures is provided in Appendix B.

Table 4-4: Independent variables 2

Concept	Indicator	Type of data
Psychological predisposition	NEO-FFI: Extraversion scale	Scale
	NEO-FFI: Openness scale	Scale
	NEO-FFI: Agreeableness scale	Scale
	NEO-FFI: Conscientiousness scale	Scale
	NEO-FFI: Neuroticism scale	Scale

4.6.3 Perceived discretion

Perceived discretion is conceptually defined for the purpose of this research as the belief a manager holds about the limit of managerial actions available in furtherance of a specified outcome. For the purpose of this study the specified outcome is long-term organisational success. There are three factors influencing the choice of organisational success as the focal organisational outcome. Firstly, success is a complex strategic issue of concern to senior managers and it is unlikely that their mental models of the concept would be represented by simple linear cause and effect logic. In other words

¹¹ The NEO-FFI is a psychometric instrument developed specifically to operationalise the big five personality variables of neuroticism, extraversion, openness, agreeableness, and conscientiousness. The name of the instrument, NEO-FFI corresponds to the original three factors of the tool in development, neuroticism, extraversion, and openness, and the FFI designates it as a five factor inventory. The instrument is extensively cited and used in leading academic research adopting the big-five model.

the answer is not obvious and includes enough interdependencies to warrant a complex mapping approach. Secondly, the issues important to organisational success arise from a wide range of different domains creating the potential to differentiate managers representations of the concept. Thirdly, the use of organisational success provides the potential for comparison of the results of this study with previous studies that used similar concepts (Markóczy, 2001b; Walsh, 1988).

For clarity it should be noted that the purpose of the research is not to understand what managers perceived discretion is, but instead to capture a measure of their perceived discretion that can be compared across the sample. As a result of this focus the study need not be concerned about how complete the representation of their belief system is and recognises that the discretion map is only a small subset of an extensive belief system. The approach is therefore to ensure that the operationalised measure is a valid representation of *a* specific aspect of perceived discretion and that there is consistency across the sample.

As the study will deal with managers perceptions of discretion, its interest lies only in what the manager *believes*. The study is not concerned with how accurately this reflects their actual discretion, as actual discretion is accounted for post choice. The task in this study is to capture a portion of the manager's beliefs about the causal relationships that relate to the choices available in furtherance of a goal, in other words their perception of managerial discretion to influence outcomes.

Before progressing it will be helpful to clarify some of the terms used and for the sake of clarity to decide on a single term. Markóczy (1989) uses the terms belief system and causal map. The causal map is captured in the form of a matrix. In the context of this study the term causal map (Axelrod, 1976; Huff, 1990; Huff and Jenkins, 2002) can be taken as interchangeable with the notion of cognitive structure as described by Finkelstein and Hambrick (1996:59). Later it is shown how the concept of cognitive structure is operationalised and results in a matrix with similarities to the approach of Markóczy and Goldberg (1989). For clarity this will be called a 'discretion map' to

indicate that it describes a representation of a manager's perceived discretion and not a broader concept of causal map or belief system, although they are all closely related. Conceptually one might be better described as an overarching concept that captures the full range of a manager's beliefs. One subset of this belief system is the cognitive structure of a manager's beliefs, that is, the beliefs they hold about causal relationships in the world. These causal beliefs or cognitive structures can be represented in the form of a causal map that captures the relationship between elements and the strength of the causal relationship. A further specification of this concept is to consider not only if managers believe a causal relationship exists between the elements, but also if they believe they can influence the relationship between the elements. In other words do they perceive that managers have the discretion to act in the context of that causal relationship. It is this latter specification that the study attempts to capture and the concept is labelled a 'discretion map'.

To elaborate on the concept of perceived discretion, consider that the development of a causal map (which is representative of a belief system) is a precondition of discretion. That is, if a manager does not believe that a causal relationship exists, then he/she cannot perceive to have the discretion to influence a non-existent relationship. However, if a manager does believe that a causal relationship exists, that does not infer that he/she has the perceived discretion to influence the relationship. For example a person may believe that the orbit of the moon influences the tide, but at the same time not believe they can influence the relationship. So in that context they may not perceive the discretion to act in an influential manner. It is a manager's belief in the ability to influence a relationship that the study intends to capture, as it is a perception of an ability to act in an influential manner that is to be explored.

4.6.3.1 Methods from the literature

Managers beliefs and cognitive structures have been the subject of a broad range of studies (Andersen and Strandskov, 1998; Barnes, 1984; Barr, Stimpert and Huff, 1992; Chattopadhyay et al., 1999; Jenkins and Johnson, 1997). A wide variety of methods have been proposed and used to elicit and map these belief systems. The Self Q interview technique proposed by Bougon (1983) has been used to develop constructs

(Chattopadhyay et al., 1999). The cognitive interviewing techniques have been used to develop mental models (Calveri and Sterman, 1997). Verbal protocol analysis has been used to explore problem solving and decision-making processes (Isenberg, 1986). Content analysis has been used to understand conceptual relationships (Wrightson, 1976). Repertory grid technique has been used to provide a cognitive perspective on strategic groups (Reger and Huff, 1993). Visual card sorting technique has been used to assess managers models of competitive structures (Daniels, de Chernatony and Johnson, 1995). Pairwise rating has been used to compare team mental models (Langan-Fox, Code and Langfield-Smith, 2000). A structured approach to causal mapping has been used to explore consensus formation in management groups (Markóczy, 2001b).

Selecting a method to assess managerial discretion in this study requires a number of considerations. The method must be consistent with the methodology and philosophical perspective and objectives of the study. The method must be pragmatic and appropriate for the amount of time senior managers will be willing to allocate to the research. The method must also provide a satisfactory representation of the cognitive structure concept of perceived discretion. That is, its operational definition should be as close to the conceptual definition as possible. Finally, as this study is quantitative, the method must provide a measure that allows for statistical analysis of all the variables.

Taking the above into consideration, the Self Q interview technique (Bougon, 1983) and the repertory grid technique are eliminated as they are more appropriate to developing constructs, which is not a requirement of this study. Cognitive interviewing techniques (Calveri and Sterman, 1997) and verbal protocol analysis (Isenberg, 1986) are qualitative approaches and therefore inappropriate. Visual card sorting (Daniels et al., 1995) has potential for this study as it allows participants to build a cognitive map from a list of constructs. However translating the spatial relationship of cards into a measure suitable for statistical measurement is not a trivial matter. Pairwise rating (Langan-Fox et al., 2000) has potential for this study as it is time efficient and produces a cognitive map. An adaptation of the pairwise rating technique developed by

Markóczy and Goldberg (1995) and applied in Markóczy (1997; 2000; 2001b) allows for the indirect development of a cognitive map and its subsequent statistical analysis. While the approach does not precisely meet the needs for this study, it forms the basis on which an appropriate method can be developed.

Markóczy and Goldberg's (1995) method is a development of Langfield-Smith and Wirth's (1992) method and captures the causal map in an $n \times n$ matrix. This method has been supported as being capable of overcoming difficulties associated with cognitive mapping approaches by providing an objective measure of dissimilarity between the maps (Hodgkinson, 2002). Once the belief systems of managers (in the case of this study the managers perceived discretion) are represented in the prescribed matrix form, they can be analysed to provide a measure of similarity or dissimilarity between individual maps. It is this measure of relative similarity in causal beliefs, specifically perceived discretion, that is the focal point of this research.

4.6.3.2 A revision of the technique for preparing the dependent variable

In this section the process of preparing the perceived discretion variable is considered. This is considered in two parts; one, a review of the Markóczy and Goldberg (1995) technique identified in the previous section and two, development of the appropriate mathematical treatment for the amended process.

Markóczy and Goldberg (1995:309) propose a four stage process for the preparation of the dependent variable.

1. Develop a pool of constructs
2. Have each subject select a fixed number of constructs
3. Construct the map
4. Calculate distance ratios

Each of the stages is considered in turn below and adapted as necessary

Stage 1 - Develop a pool of constructs

Stage one of the process requires the development of a pool of constructs (from which the participants will select in stage two). A range of constructs are developed “to ensure that the pool covers a broad domain” (1995:309). Before adopting this approach Markoczy and Goldberg (1995) consider the relative merits and demerits of a broad versus a narrow list of constructs being offered to participants. Reasons to support a narrow list included difficulty in selection of constructs, lack of map overlap for comparison where broad lists are used, clarity of coding and presentation of common stimuli. They offer two reasons to support the use of a broad list. One, there is "more scope for differences between subjects to be expressed" (1995:310). This point needs to be balanced with the risk of lack of map overlap previously mentioned. Two, the disadvantage of precluding the elicitation of novel constructs. Since this research is not interested in understanding the nature of managers discretion, the failure to elicit novel constructs is not an issue and so it takes a nomothetic rather than an ideographic approach. This is a different method to that of many cognitive mapping studies (Huff, 1990; Huff and Jenkins, 2002), because the objective of this research differs from these mapping studies. Rather than using an ideographic approach to generate novel maps, this study uses a nomothetic approach to capture an aspect of managers beliefs in a specified domain. Consequently, in this study, the pool of constructs is limited to a fixed list, as are previous studies (Bougon, Weick and Binkhorst, 1977; Ford and Hegarty, 1984).

There are two further reasons to support a decision to work with a fixed list. The first issue is the nature of the construct under investigation. Perceived discretion was described earlier as a subset of the concept of cognitive structure as described by Finkelstein and Hambrick (1996:59). That is the nature of where things are relative to each other (Isenberg in Finkelstein and Hambrick, 1996:59). However, if researchers start with a pool of constructs they must first have respondents assess the importance of items before identifying their relationship to each other. This study is not concerned with the relative importance of items. The focus of this study is on their perceived causal relationships with each other. The importance of an element, while clearly having an influential effect on a persons beliefs, would contaminate the dependent

variable in the context of this study. This contamination may in part explain Markoczy's (1997) non findings.

The second reason to support the decision to work with a fixed list is of a more practical nature. In the data analysis section of this thesis the development of formulae to work with both fixed item and selected item lists are shown. From a review of the formulae it is apparent that the use of selected lists adds greatly to the complexity of the analysis. This is to account for the presence or not of concepts rather than the relationship between them.

In the revised method for this study the first stage of the process is to define a fixed list of constructs. The goal in developing the fixed list is to produce a manageable, but empirically defensible set of constructs. The first stage is to develop a potential pool of constructs and several different approaches have been taken in previous research. One approach is to develop the pool of constructs from relevant literature (Beyer et al., 1997; Chattopadhyay et al., 1999; Glick, Miller and Huber, 1993; Walsh, 1988). Markóczy and Goldberg (1995) take a more eclectic approach, developing the initial list from interviews with managers, then adding items suggested by the literature and finally adding items suggested during pilot studies. The interest of this study is in causal beliefs, and therefore a starting a pool of items was selected from the literature and then adapted by an expert and practitioner group.

Stage 2 - Select a fixed number of constructs

As stage one has been adapted from the original technique and in its current form produces a fixed list, stage two of the process, selecting from the pool of constructs, is now redundant.

Stage 3 - Construct the map

The original method (Markóczy and Goldberg, 1995) presents three stages of elicitation in constructing the map. Firstly, the participant is asked if one construct influences the other (causal relationship). Secondly, if one construct does influence the other, does it do so positively or negatively (direction of causality)? Thirdly, is the

influence weak, moderate or strong (strength of relationship)? This technique captures a belief system that represents a manager's view of their operating environment. However, what is missing is how they interact with that environment. This interaction is an important aspect of the research given the theoretical foundation of the conceptual research model which explains discretion (Hambrick and Finkelstein, 1987) as a function of the interaction of the individual, organisation and environment.

The development of the conceptual framework for this research is also predicated on the strategic choice paradigm (Child, 1972) and as such is interested in the manager's influential relationship with the environment. To capture the concept of perceived discretion to influence, the method will be adapted and participants asked two questions. One, does Concept A influence Concept B and two, do you believe managers can influence the effect that Concept A has on Concept B?

Capturing managers beliefs about their ability to influence relationships is a more appropriate representation of their perceived discretion. That is, managers beliefs that they can influence relationships describes their perceived ability to take action, which is representative of the choices they perceive to be available to them. Developing the map in this way produces a discretion map that includes the managers perceived options for interaction with their environment.

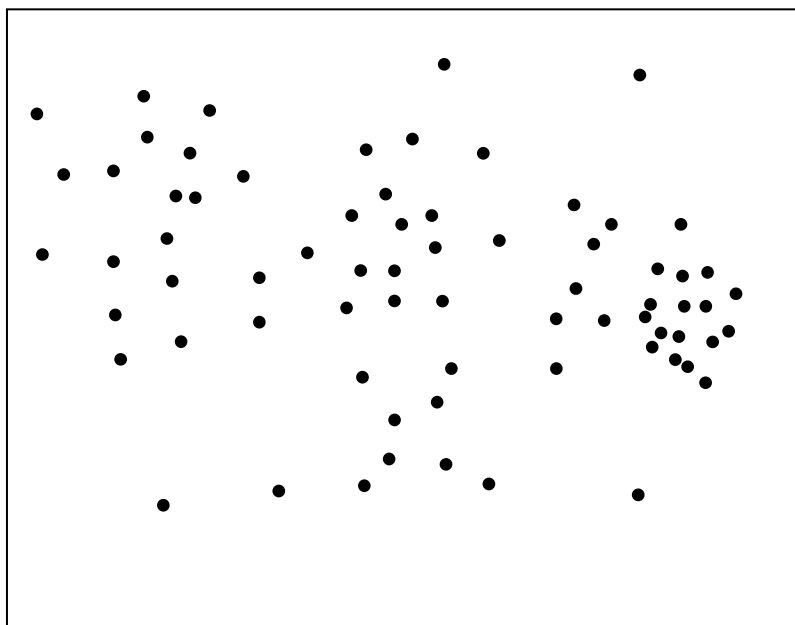
Stage 4 - Calculate the distance ratios

After the discretion map for each person is elicited and captured in the form of an $n \times n$ matrix, the dependent variable needs to be prepared for use in statistical analysis. The objective of preparing the dependent variable is to provide a measure of how similar each participant's perceived discretion is to each other. The discretion map in the form of an $n \times n$ matrix is a representative measure of a participant's perception of managerial discretion.

The measure is complicated by the fact that it is captured in n dimensional space (with n representing the rows in the matrix). For a moment, for the purpose of explanation, suspend that complication and consider a measure in two dimensional space that can

be represented visually. In Figure 4-2 below the black dots represent the location of a participant's perceived discretion in two dimensional space. Visually it can be identified who is close together and who is far away. This type of measure is however, of little use for the intended statistical analysis. As currently described it can only identify how similar a participants discretion map is to every other participant on an individual basis. What is needed is a measure of similarity that allows for comparison across the sample.

Figure 4-2: Similarity in discretion maps



Source: compiled by the author

To resolve this issue the technique proposed by Markóczy and Goldberg (1995), who use the analogy of fuzzy clusters to describe the approach, is adopted. But, cluster analysis is just one of the possible approaches that could be taken and an approach using multi-dimensional scaling would work just as effectively and there "is no principled reason why one technique should be preferred" (Markóczy and Goldberg, 1995). The final decision to use cluster analysis to identify central maps is based on the pragmatic reason that the central maps developed also have other uses.

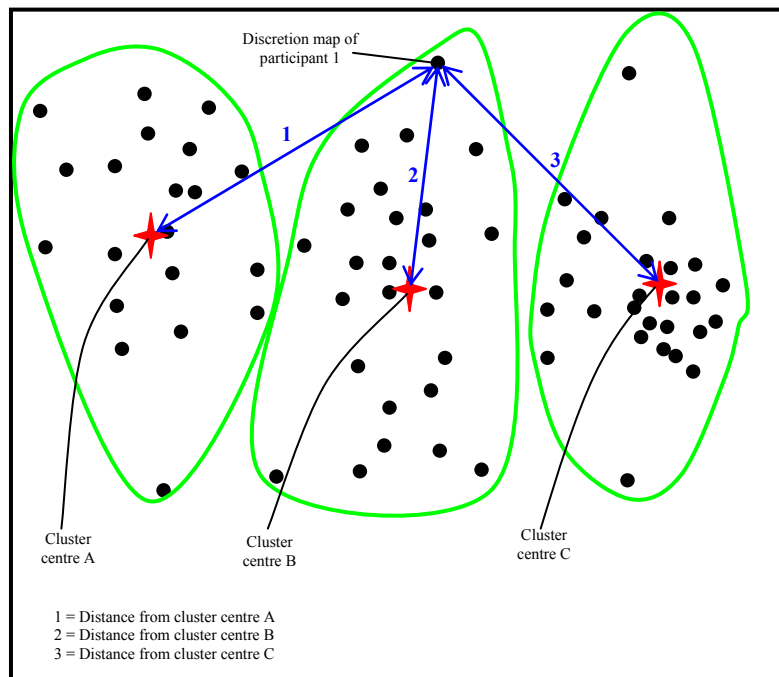
Cluster analysis is extremely sensitive to the method used and different techniques may put a participant in a different cluster. This absolute nature of *in* or *out*, may therefore not be suitable where completely clear cluster groups do not exist. Markóczy and Goldberg (1995:320) resolve this issue by preparing a measure of "the degree to which a particular entity is a member of that cluster", therefore removing the binary notion of in or out and replacing it with a scale of *outness*. This approach makes the measure extremely robust as the cluster technique does "not have to be very good" and results will not be affected if slightly different clusters are identified (Markóczy and Goldberg, 1995:321). Also, "the central map of the cluster does not have to be very close to the centre of each cluster", as the technique will work as long as they are not very close to each other (Markóczy and Goldberg, 1995:321).

The mathematical and statistical aspects of this approach are described in the following section, but the overall concept is to calculate the distance ratios for every participants map to every other participants map. Following this to:

- a) run the cluster analysis and select the clusters,
- b) calculate the central or average discretion map position for a cluster and
- c) calculate the distance from each participant's discretion map to the average discretion map for each cluster.

As can be seen from Figure 4-3 the result of this process is a measurement of the distance of each participant from each of the cluster centres, thus creating a number of dependent variables equal to the number of selected clusters (in the case of the example above, three). Using this concept removes the difficulty associated with the binary approach to cluster membership as every participant is to a greater or lesser extent (as measured by the distance from the cluster centre) a member of every cluster. When the calculations are completed the assessment can be made that those participants who are closer to a cluster centre (that is have a shorter distance measured to the centre) are more similar in their perceived discretion than those who are further away.

Figure 4-3: Discretion map clusters



Source: Compiled by the author

It is worth re-emphasising that the level of explanation sought in the study is limited to explaining the extent to which cognitive content and cognitive style explain perceived discretion. The study questions *if*, and not *what*, similarity in perceived discretion is explained by the independent variables. For this reason it is not necessary to analyse the nature of the clusters.

Following from the discussion above, the adapted process for developing the dependent variable in this study is to:

1. Develop a fixed list of constructs
2. Construct the map
3. Calculate the distance ratios

4.6.3.3 *Mathematics for calculating the distance ratio*

Following the process outlined in stage two above, the perceived discretion map is captured in the form of an $n \times n$ asymmetric matrix. This type of data provides rich

information about the participants cognitive structure but does not easily lend itself to analysis.

This section deals with the mathematical requirements of stage four above (stage three in the adapted process). For clarity the matrix that holds the Perceived Discretion data (the output from stage 2) will be referred to as the discretion map or DM. The aim is to provide a mathematical means of calculating the similarity or dissimilarity of participant's DMs to the cluster centres.

Step 1 - Calculate the distance between every pair of maps

The first step in the process is to identify how dissimilar the DMs of the participants are. This is achieved by comparing every combination of pairs of maps with each other. The number of pairs is given by Formula 4-1, which is the number of cells in an $n \times n$ matrix, minus the diagonal, because the distance between Cell A and Cell A is zero in this context, and divide by two because the distance between Cell A and Cell B is the same as the distance between Cell B and Cell A thus producing a symmetric matrix. The output is a distance ratio, DR, that is a measure of the dissimilarity of each pair of DMs presented in a symmetric matrix.

Formula 4-1: Number of paired comparisons in a given matrix

$$\text{Pairs} = \frac{(n \times n) - n}{2}$$

Langfield-Smith and Wirth (1992) provide an extensive discussion on quantitative techniques for measuring maps and provide a formula for calculating the difference between maps. This measure is denoted as the distance ratio or DR. See Formula 4-2 below.

In Formula 4-2 the numerator in the equation is the sum of the absolute difference between the equivalent cells in the matrices being compared. The denominator is a means of relativising the numerator taking account of the maximum size of the matrix,

that is all of the items that could have been included, and the presence or absence of these items.

Formula 4-2: Langfield-Smith and Wirth's (1992) Formula 12

$$DR = \frac{\sum_{i=1}^p \sum_{j=1}^p |a_{ij}^* - b_{ij}^*|}{6pc^2 + 2pc(\rho u_1 + \rho u_2) + \rho u_1^2 + \rho u_2^2 - (6pc + \rho u_1 + \rho u_2)}$$

where ρ = the number of elements in the distance matrix
 pc = the number of elements common to the two matrices
 ρu_1 = the number of unique elements in matrix a
 ρu_2 = the number of unique elements in matrix b

$$a_{ij}^* = \begin{cases} 1 & \text{if } a_{ij} > 0 \text{ and } i \text{ or } j \notin pc \\ -1 & \text{if } a_{ij} < 0 \text{ and } i \text{ or } j \notin pc \\ a_{ij} & \text{otherwise} \end{cases}$$

The Langfield-Smith and Wirth (1992) Formula 12 (Formula 4-2) was developed with specific parameters built in. For example it presumes the pairwise ratings are in the range of -3 to +3. Markóczy and Goldberg (1995) further developed this formula to take into account the potential for more varied applications and provided a more generalised format shown in Formula 4-3 below.

As can be seen from Formula 4-3, most of the complexity is caused by the denominator. The complexity of the denominator is a derivative of the need to compare maps that use a subset of elements selected from a wider list. In the current study the choice was made to work from a fixed list of elements. This choice was primarily driven by a desire to protect the validity of the measure, that is to measure a single construct, but has the added benefit of removing much of the complexity associated with the measure. With a fixed item list the factors affecting the denominator remain constant.

Formula 4-3: Markóczy and Goldberg's (1995) Generalised Distance Ratio Formula

$$DR(A,B) = \frac{\sum_{i=1}^p \sum_{j=1}^p diff(i, j)}{(\varepsilon\beta + \delta)p_c^2 + \gamma^1(2p_c(p_{uA} + p_{uB}) + p_{uA}^2 + p_{uB}^2) - \alpha((\varepsilon\beta + \delta)p_c + \gamma^1(p_{uA} + p_{uB}))}$$

where

$\alpha = 0$ to compare values of nodes directly influencing themselves; 1 not to compare

$\beta =$ maximum strength of the arc

$\delta =$ the additional weight given to a polarity change

$\gamma =$ how to deal with a mismatch of nodes, i.e. no arc possible; range 0 - 2

$\varepsilon =$ number of polarities

$$diff(i, j) = \begin{cases} 0 & \text{(i) if } i = j \text{ and } \alpha = 1; \\ \Gamma(a_{ij}, b_{ij}) & \text{(ii) if either } i \text{ or } j \notin pc \text{ and } i, j \in N_A \text{ or } i, j \in N_B; \\ |a_{ij} - b_{ij}| + \delta & \text{(iii) if } a_{ij}b_{ij} < 0; \\ |a_{ij}| & \text{(iv) otherwise} \end{cases}$$

$$\Gamma(a_{ij}, b_{ij}) = \begin{cases} 0 & \text{(a) if } \gamma = 0; \\ 0 & \text{(b) if } \gamma = 1 \text{ and } a_{ij} = b_{ij} = 0; \\ 1 & \text{(c) otherwise} \end{cases} \quad \gamma^1 = \begin{cases} 0 & \text{if } \gamma = 0; \\ 1 & \text{otherwise} \end{cases}$$

The generalised formula allows for a range of ways in which the discretion maps may differ. However, with the exception of clause (ii) in Formula 4-3 above, all aspects of the formula, except the numerator, deal with possible differences due to the presence or absence of items in the map. As this study deals with only a fixed list, this complexity can be eliminated. Clause (ii) is included to allow the researcher modify the distance measure between maps where arcs of different polarity are presented. For example, if, on the same pair of items participant A records +1, participant B records -1 and participant C records +3.

Calculating the absolute differences shows two pairs to be equidistant. That is:

$$\text{diff AB} = \text{diff} (+1, -1) = 2$$

$$\text{diff AC} = \text{diff} (+1, +3) = 2$$

$$\text{diff BC} = \text{diff} (-1, +3) = 4$$

It may in some cases be conceptually more accurate for the inference to be drawn that A and C are in fact more similar than A and B because A and C are in the same direction (polarity).

The elicitation techniques used in this study eliminate the complexity associated with polarity. The discretion map is elicited to capture perceived discretion in both directions, producing an asymmetric matrix, and so eliminating the need for clause (ii).

This leaves the numerator in Formula 4-2 and Formula 4-3 above. Although both use slightly different notation they produce identical results. It is conceptually best described by the creation of a distance matrix which is constructed by subtracting the contents of identically positioned cells and placing the absolute value of the result in the corresponding cell of the distance matrix. The distance measure is then the sum of the cells in that distance matrix.

The distance formula is then succinctly described in Formula 4-4 below.

Formula 4-4: Basic distance formula

$$\text{distance (A,B)} = \sum_{i=1}^p \sum_{j=1}^p d_{ij}$$

For practical reasons, namely availability of suitable software, the generalised formula in Formula 4-3 was used in the pilot study. As all of the factors affecting the denominator remain constant (because the size and item list in the discretion map is fixed) this has the effect of changing the absolute value of the distance ratio in

comparison to the distance that would be derived using Formula 4-4. The relative values are however not changed and as it is the relative difference in distance between discretion maps that is of interest, the use of the generalised formula in Formula 4-3 therefore fulfils the requirements of this study.

To demonstrate this point empirically, take the discretion maps shown in Appendix C and calculate the distance matrices shown in Appendix D. The application of Formula 4-2 gives the following distance measures:

$$\text{distance (A,B)} = 63$$

$$\text{distance (A,C)} = 83$$

$$\text{distance (B,C)} = 64$$

The application of the full Formula 4-3 gives the following distance ratios:

$$\text{DR (A,B)} = 0.2917$$

$$\text{DR (A,C)} = 0.3843$$

$$\text{DR (B,C)} = 0.2963$$

While the absolute differences between the distance measure is obvious, a quick calculation shows that the ratios are the same.

Taking (A,B) as the base line the following ratios are calculated:

$$\text{DR (A,C)/DR (A,B)} = 0.3843/0.2917 = 1.317$$

$$\text{DR (B,C)/DR (A,B)} = 0.2963/0.2917 = 1.016$$

and it can be shown that similar ratios are derived from:

$$\text{distance (A,C)/distance (A,B)} = 83/63 = 1.317$$

$$\text{distance (B,C)/distance (A,B)} = 64/63 = 1.016$$

While this measure of distance will suffice, there is a more appropriate measure available. One of the weaknesses associated with the generalised Formula 4-3 above is that it does not meet the requirements of a measure in metrical space. Three conditions must be met before the measure may be considered a metric. One, symmetry is maintained, that is the distance between A and B is the same as the distance between B and A. Two, under the minimality condition distances cannot be negative and the distance can only be zero when both points occupy the same point in space. Three, triangle inequality is maintained, that is the distance between A and B cannot be greater than the distance between A and C plus C and B; in other words the shortest distance between two point is always a straight line. Formula 4-3 does not preserve triangle inequality and is a semi-metrical measure.

By using a Euclidean vector norm measure metrical space can be induced, ensuring the result is a metric, thus providing additional stability to the dependent variable measure. Following the notation in Formula 4-4 above the matrix norm is identified for the distance between matrix A and matrix B in Formula 4-5.

Formula 4-5: Matrix norm in n dimensional Euclidean metric space

$$\text{distance (A,B)} = \sqrt{\sum_{i=1}^p \sum_{j=1}^p d_{ij}^2} = \|A - B\|$$

Step 2 - Identify the clusters and calculate the central or average DM

Step two of the analysis is a cluster analysis of the matrix of DRs produced in step one. The objective is to identify similar sized clusters for further analysis. Suitable cluster methods are Ward's method (1963) (also known as the Minimum Sum of Squares method) or the Complete Linkage method (Sorensen, 1948) (also known as the Furthest Neighbour method). Ward's method is selected as it has the advantage of taking cluster structure into account (Everitt, Landau, and Leese, 2001:62) and tends to produce more equal sized clusters.

The identification of clusters is extremely sensitive to the method used. Any conclusions drawn on the basis of cluster membership alone must therefore be carefully examined. The approach used in this study alleviates this problem and makes it extremely robust, because cluster membership is not used as a variable in any further analysis.

Using the cluster groups approach, clusters are identified, the DMs for each cluster are taken and an average DM for the cluster is calculated. This is a simple mathematical process of taking the entry from the same cell from each DM in the cluster, summing them and dividing the result by the number of DMs in the cluster. This is completed for each cell in the matrix to provide the average DM and then repeated for each cluster. The output from this stage is an average or central DM for each identified cluster.

Step 3 - Calculate the distance ratio to each cluster centre

Step three of the analysis takes the average or central DM of the clusters identified and calculates the DR from the average DM to all of the participant's DMs. This produces a measure of distance from each participant's DM to each of the cluster average DMs. Those participants whose DMs are closer to an average DM, that is have smaller DRs, can be said to have more similar DMs than those with larger DRs. It is this Distance Ratio to the cluster average that becomes the dependent variable and the number of dependent variables is equal to the number of clusters identified.

4.7 RELIABILITY AND VALIDITY

The process of translating a conceptual definition to an operational definition requires careful attention to ensure that the resultant operational measure is both a reliable and a valid representation of the concept.

4.7.1 Reliability

Reliability refers to "the ability of an instrument to produce the same answer in the same circumstances, time after time" (Johnson and Harris, 2002). Dealing with the three research concepts separately:

Experience

The operation measures for experience in this study are captured using a survey form. While all of the questions relate to the concept of Experience, they are nevertheless single-issue measures. This does not create an issue of reliability in this case, as the items being measured can broadly be described as objective criteria. There are no time pressures placed on participants to complete the survey and so they have time to reflect and calculate answers.

Psychological Predisposition

The psychological predisposition concept is operationalised using the standard form NEO-FFI (Costa and McCrae, 1992) instrument. Test-retest reliability for this instrument has been assessed with a sample (N=208) of college students over a period of three months providing coefficients of 0.79, 0.79, 0.80, 0.75 and 0.83 for N,E,O,A,C with $p < 0.001$ (Costa and McCrae, 1992:45). Longer term stability of the instrument has not been directly assessed, although the results for long-term stability on the NEO-PI, the long-form version of the NEO-FFI, show coefficients of 0.51 to 0.82 over a seven year period (McCrae, Costa. P. T. and Busch, 1986:45). The NEO-FFI uses a subset of the NEO-PI questions.

Perceived Discretion

The concept of perceived discretion is measured by an instrument that produces a cognitive map in the form of an $n \times n$ matrix. This matrix is a representation of the participant's perceived discretion to influence key relationships. The test-retest reliability of the instrument has not been assessed. The basic tenet of this study is that Perceived Discretion changes across time and experience. As test-retest reliability is a measure of stability across two measurements (Isaac and Michael, 1995:134) spaced in time, it is inappropriate for the perceived discretion instrument used in this study. Perceived discretion is expected to change over time and the measure is therefore unstable by design. In this study perceived discretion is captured as it exists for a moment in time.

4.7.2 External validity

External validity is concerned with whether the instrument actually measures what it purports to measure (Johnson and Harris, 2002). There are several types of external validity, namely content validity, construct validity, concurrent validity and predictive validity. Not all are appropriate to all variables in this study. While construct validity and content validity have application, concurrent and predictive validity do not. Dealing with each of the concepts individually:

Experience

The operationalised measures of the experience concept were developed following an extensive review of the literature. The variables are also relatively objective measures of the context, nature and amount of the participants experience. Content validity is therefore addressed by the extensive literature review undertaken to ensure that the pertinent domain measures of experience, in the context of upper-echelons theory, have been included.

The concept of experience is operationalised through a range of objective measures. The individual measures represent different facets of experience. While they are grouped under the concept of 'experience', the measures do not purport to provide an aggregate measure of 'experience'. Each of the individual measures is taken in its own right to represent a unique dimension of experience and they are analysed separately. As the measures are objective measures of 'experience' (in its various forms) and because no attempt is made to present the individual measures as an aggregate measure of the concept, construct validity need not be considered.

Psychological Predisposition variables

The potential range of operational measures for this concept is enormously varied. Based on issues identified in the literature a subset of personality variables was selected. The variables are operationalised in the form of the NEO-FFI (Costa and McCrae, 1992) inventory. The NEO PI-R Professional Manual (Costa and McCrae, 1992:45-46) provides extensive support for the instruments content validity and construct validity.

Perceived Discretion variables

The extensive use of cognitive maps to represent managers belief systems (Huff, 1990; Huff and Jenkins, 2002) provides empirical support for the use of a mapping approach in this study, and the work of Markóczy (1997; 2000; 2001b; 1995) provides support for the particular quantitative approach. Content validity is not a significant issue for consideration as the instrument does not purport to provide a measure of a complete domain. Neither is the actual portion of the domain being studied of concern. The study is concerned with the perceived discretion of managers in a more general sense, not solely their perceived discretion in relation to the item list being considered. While significant care was taken to provide an empirically defensible item list, it could be argued that a random list of identifiable items may also have been acceptable. Care has been taken to ensure that the instrument measure is as close to the theoretical construct as possible. The approach of using a fixed list of constructs removes some of the potentially contaminating elements. In this study only the relative position of elements in a discretion map is measured. The removal of the relative importance aspect of the measure, commonly used in previous studies (Markóczy, 1997; Markóczy, 2000; Markóczy, 2001b) leaves a measure that is conceptually very close to the theoretical construct of "cognitive structure" (Finkelstein and Hambrick, 1996:59) on which the broad theoretical model for this study is based .

Within the frame of the study (and based on a more general literature review) construct validity for the Perceived Discretion measurement has not been established. The most obvious conceptually similar construct is Rotter's (1966) locus-of-control or I-E scale. However Hambrick and Finkelstein (1987:387-388) identify locus-of-control as a predictor rather than a proxy of perceived discretion and this view is repeated by Carpenter and Golden (1997) who provide empirical support.

4.7.3 Internal validity

Internal validity asks "can it reasonably be assumed that A causes B" (Johnson and Harris, 2002). This is a fundamental design issue and has been addressed extensively in the development of the conceptual model described in Chapter 2 and Chapter 3.

4.8 ETHICAL CONSIDERATIONS

For this study two specific dimensions of ethically sound research are considered, namely responsibility to the academic community and responsibilities to participants.

4.8.1 Responsibility to the academic community

Excellent research does not occur in a vacuum. Research students build on the great accomplishments of others that have gone before, and on the intellect of those that work so generously with them. It is therefore a clear ethical responsibility to ensure that the work of others is clearly cited and recognised, and no effort has been spared in the presentation of this thesis to do so.

Research output should "fairly represent" the literature and represent both the strengths and weaknesses of the findings (The Academy of Management Code of ethical conduct, 2002:292). Every attempt has been made to ensure that the context within which the findings are reported are both a fair and accurate representation of the field.

4.8.2 Responsibility to participants

It is an important ethical consideration to recognise that participants are not merely used for the researchers own ends, but that their involvement in the research either benefits them personally or benefits their community. The research project is designed to contribute to the academic community and the practitioner community. Participant's communities may therefore benefit through improved practice or through improvements in management education.

In accordance with good research practice (The Academy of Management code of ethical conduct, 2002:292) the purpose of the research was explained to the participants and their informed positive consent was gained prior to collection of the data (The British Psychological Society , 2000:8-11).

Where possible, feedback on the personality instrument was provided directly to participants. In many cases it was possible to weave the collection of data and

subsequent feedback into the fabric of a development programme. In all cases participants were informed whether they would or would not receive feedback.

The process of feedback was designed to maintain the confidentiality of individual data and to provide the participants with a safe environment for them to explore any issues it raised. After all group feedback sessions participants were encouraged to take the time to contact me individually if they were concerned with any aspect of the data. All group and individual feedback was conducted by a qualified assessor on the British Psychological Society Register of Competence in Occupational Testing.

4.9 SUMMARY

Through an exploration of the ontological and epistemological dimension of research philosophies, realism was identified as the appropriate perspective for this study. While there is no neutral method to evaluate this choice and no way of identifying a superior perspective, care was taken to identify the conscious influences behind the choice. Following from the choice of philosophical perspective the methodological considerations of the study, in particular the role of theory, were discussed. A process of retroduction, deduction and induction was identified as most appropriate and this in turn influenced the shape of the research design.

The method of operationalising the conceptual design was developed in the context of the chosen methodology. Operationalising is a process of carefully translating each of the conceptual variables of experience, psychological predisposition and perceived discretion into operationally defined variables that provide acceptable reliability and validity in the study. Particular emphasis was given to the process and mathematical fundamentals of the perceived discretion concept, as this approach is relatively new and has not had the benefit of extensive application in the literature.

As this study accesses psychometric characteristics of participants directly, consideration was given to the ethical requirements of the approach. This included receiving the informed positive consent of participants and providing appropriate feedback by appropriately qualified assessors.

This chapter has described the philosophical perspective of the study and how within this perspective, the methodology and method of the study were developed. The following chapter describes the initial empirical work of the study in the application of the operationalised design through the pilot and extended pilot study.

CHAPTER 5 - EMPIRICAL TESTING OF THE RESEARCH DESIGN

5.1 INTRODUCTION

This chapter deals with the pilot empirical phase of the study which was implemented to ensure the research design was sufficiently robust before collecting the full-study data. This initial stage was implemented over two phases, a pilot-study – from which disappointing results were achieved and issues with the method were identified – and an extended pilot – which allowed for changes to the method to be made and assessed.

The complete operational model was tested in the pilot-study and a summary analysis performed to check for any issues that might arise. The results of the pilot revealed extensive non-findings. Recognising that non-findings may result because no relationships actually existed, and acknowledging the limitation of the small sample size used in the pilot, the results were nevertheless disappointing. On further investigation concerns about the data collection process, and the strain it placed on participants arose, and these concerns were addressed and consequent changes made, before conducting an extended pilot-study.

With several changes in the data collection process implemented, the extended pilot-study proved the process to be extremely robust, and provided interesting tentative findings.

This chapter commences with the development of the fixed item list that forms the contextual basis within which the analysis of the discretion variable is conducted.

5.2 THE FIXED ITEM LIST

As discussed in the previous chapter, a decision was made to use a fixed item list, rather than a list from which participants selected, because the fixed list forms the basis of an operational measure that is a more accurate representation of the concept

being investigated. As the objective of the study is the examination of the perceived discretion concept, the actual items in the list are only a secondary consideration of the study. The items provide the applied context, which the study uses as a vehicle to access the managers cognition of the discretion concept. However, while the items are not the object of the study, neither is their selection arbitrary. The study is interested in the perceived discretion of managers as it applies to strategic, as opposed to operational issues, hence, the items must provide an adequate representation of strategic concepts.

If the constructs required in the research are not well developed in the literature, an appropriate route might be to elicit the constructs from an experienced population by adopting an ideographic approach. There are elicitation techniques such as the self-Q interview (Bougon, 1983) to deal with this approach. However, having reviewed the literature, it was clear that the constructs required for this study were well developed. It was concluded that Walsh's (1988) study, in which a fixed list was used, provided a suitable starting point. The availability of well developed and discussed arguments in the literature is evidenced by the fact that Walsh (1988) developed his list from a review of the strategy literature at the time. The use of Walsh's (1988) list provides an additional benefit as his study occupies a pivotal role, both as a replication study of Dearborne and Simon's (1958) study of selective perception, and precursor to the subsequent replication and extension study of Beyer et al. (1997). This approach to selecting items for the list from the literature is a valid approach in this study as

- a) the objective is to select only constructs with potential causal relationships, and
- b) the causal constructs – set in the context of long-term organisational success – are extensively discussed in the literature.

Having identified the list of constructs from the literature (Walsh, 1988), the list was presented to an expert panel from the fields of Human Resource Management, Economics, Strategy, Operations and Leadership. The panel was asked to review the presented list, shown in Appendix E, with the objective of selecting approximately 10 items. The criteria given to the panel were:

-
- a) All items should be distinctly different.
 - b) The items selected must be broadly based across functional categories.
 - c) The items selected should represent what the panel believes are the most important – in the context of long term organisational success.

The requirement for distinctly different items was to avoid the participants in the study becoming confused over definitions. For example, sophistication of technology and patents advantage, could be seen by participants as a more generic technological advantage which would avoid them (or the subsequent measures) being able to distinguish any difference along those dimensions. The requirement to spread the items across functional categories was to enable any functional biases that existed to be expressed in the dependent variable. The final requirement, to select items important to long-term organisational success, was put in place to ensure the items retained a strategic and non-trivial significance to managers.

The panel were told that in the event of a conflict between a, b and c above they should treat the criteria as a hierarchy. While it was important to try and accommodate all criteria the most important was a, followed by b and then c.

To help get the process started it was suggested to the panel that they might first try to categorise the items and then work onwards in whichever way they found useful. As well as presenting the list on one A4 sheet of paper, they were also provided with a stack of cards with one item on each and several pin-boards to work with. The panel took about one hour to complete the task and presented the list highlighted in bold in Appendix E. Although initially asked to reduce the list to about 10 items, the panel returned 13.

Using a 13 item fixed list requires participants in the study to consider 156 (13x13-13) elicitation pairs (and as pairs have to be compared in both directions this presents 312 required ratings). To assess the feasibility of this, a pilot elicitation was set up with three volunteers (full-time experienced managers studying part-time at the Irish Management Institute). The volunteers were presented with a questionnaire booklet.

The cover sheet included instructions for completion, and each page presented one pair of items to be considered. The candidates took 1 hour and 10 minutes, 1 hour and 18 minutes and 1 hour and 40 minutes respectively to complete the questionnaire. When debriefed they said they found the presentation of the questions clear, but the bulk of the document (157 pages) overpowering. All agreed that by about the 50 minute mark they were frustrated by the process, and found it difficult to pay sufficient care and attention to the remaining questions.

Given that this was only one of three sets of data that would have to be collected for the full-study, it was clear that the number of items needed to be reduced. Another concern was that the item list in Walsh (1988) was drawn from texts over 20 years old (Buzzell, Gale and Sultan, 1975; Hambrick, 1981; Miles, 1980). It was necessary to ensure that the terms, as presented, were clearly recognisable in today's context, and also to consider if managers felt that there were any obvious omissions.

To further develop the list the 13 items were presented to a group of 26 experienced managers in their final semester of the final year of a three year part-time management degree conducted at the Irish Management Institute. They were given very brief information on the nature of the study and were presented with the list of 13 items from the expert panel.

In the first phase they were split randomly into five groups and asked to review the list for omissions, and to reduce it to nine items. It was explained to the group that they were not looking to list the nine most important items, but rather the most important items from the broadest range of issues. In other words a balanced list of important issues. They were instructed that

- a) all items must be distinctly different
- b) the items should be as broadly based as possible and they should add any missing items
- c) the items should be important to long-term organisational success
- d) the wording of the items should be clear and unambiguous to experienced managers

The groups were also told that the list must be no longer than nine items including any that they added. They were told that they would be brought back to a plenary session in forty minutes to discuss the final list.

In the plenary session that followed the groups were asked for details of any changes to the wording of items. Where groups came back with different suggestions for the same term they were discussed and agreed. In general the changes were minor with the exception of CEO Leadership which was changed to Organisational Leadership. They were then asked for any additional items to the list. The only additional item added was Information Technology. The complete list is shown in Appendix F. The groups were then asked if there were any items they felt should be combined. This resulted in only one change with Product Research and Process Research being merged, and then changed to the more general term of Research and Development. This left a list of thirteen items. The groups were then asked to confer and agree their final list. The results of the final lists were combined and based on simple mathematics of votes per item, a list of nine items was selected. The final list is shown in Appendix G.

The final list was then included in a data capture document where all 72 possible pairs (9x9-9) were presented with both questions, giving a total of 142 ratings for participants to make. Considerably less arduous than the 312 ratings that resulted from the first attempt.

5.2.1 Item order

A simple instrument was then developed to elicit the pairwise ratings. While the sequencing of the items to be presented has no content based logic, the sequence should be preset to avoid, regular repetitions of pairs, and also maintain the greatest possible space between the pairs (Ross, 1934). Ross (1934) presents a comprehensive discussion of the issues involved and presents a method for ordering item pairs. This mathematical approach to sequencing was implemented, and the paired items were presented in the survey form using this Ross ordering technique.

5.3 PILOT-STUDY

Before moving onto the full-study data collection and analysis, a pilot-study was carried out to

- a) identify any procedural issues with the research design
- b) monitor participants reaction to the data collection process
- c) identify any issues in the data collection and capture process
- d) test the analysis process and software for completeness
- e) identify initial tentative findings

5.3.1 Sample

Data was collected from two groups of managers for the pilot-study. Both groups were practising managers taking part in extended executive education programmes at the Irish Management Institute. Although this is a non-random approach, the use of part time-students (Brady and Palmer, 2003; Coviello, Brodie, Danaher and Johnston, 2002; Neelankavil, 2000) and more specifically participants on executive development programmes (Chakravarthy, 1987) has empirical support and is considered to fall within the definition of a field-study (Snow and Thomas, 1994).

5.3.2 Data collection

All the data was collected in group settings. In the case of the first group, all three instruments were presented in one sitting at an evening session. Participants reported that they found it difficult to maintain interest in the process, firstly, because of the time of day, and secondly, because of the extensive nature of the questionnaires. The first participant finished at 1 hour 19 minutes, with the final participant completing the set at 1 hour and 46 minutes.

Taking the feedback of the first group on board, the second group were presented with the Experience Variables questionnaire and the NEO-FFI instrument at the initial part of the morning session. The Perceived Discretion instrument was presented immediately after lunch. Generally participants found this less onerous although there was still some minor dissatisfaction recorded in relation to the volume of work

associated with the Perceived Discretion instrument. In total 36 complete sets of data were collected for the pilot phase.

A sample of the Experience data collection questionnaire is shown in Appendix A. The NEO-FFI instrument is a controlled instrument, available only to qualified assessors, and as such cannot be reproduced in this thesis. A sample of the Perceived Discretion questionnaire is shown in Appendix H.

5.3.3 Data analysis

While a sample of 36 respondents is too small to produce statistically meaningful results it is sufficient a number to test the procedures involved in data collection and analysis.

5.3.4 Preparation of the dependent variable.

For the pilot-study, two maps were elicited from each participant. Both maps used the same fixed 13 item list, but with different elicitation questions. The two maps were collected to ascertain if the difference between the perception of causal relationships and the perception of discretion to influence those relationships contained enough difference to warrant separate investigation.

The two maps collected are identified as the influence map (IM) and the discretion map (DM). The IM capturing managers beliefs about the causal relationship between items, and the DM capturing managers beliefs in relation to discretion to influence the relationship between the items.

The first step was to calculate the set of distance ratios for all of the IMs and separately for all of the DMs. The results were then prepared in two matrices, one containing all the distance ratios for the IMs and the other all the distance ratios for the DMs.

The goal is to identify whether there is a substantial and significant level of correlation between the two sets of distance ratios. A simple bivariate correlation could be used to check for this association. However, because of the nature of the data this may give a

misleading result, as the data represented in the two matrices containing the distance ratios is obtained from the *same set of participants* in the study. This is an issue because the data has one common participant's view in any column or row, and consequently the cell values do not vary independently along rows or columns.

The rows and columns in each case refer to the participant in question and their relationship to the other participants. In this context, using a simple bivariate correlation may overestimate the significance of a relationship. The solution to this issue is the application of the quadratic assignment procedure (QAP) (Krakhardt, 1988) developed explicitly to deal with this issue (Krakhardt, 1987). The QAP compares the observed correlation between the matrices with a distribution of random correlations generated according to the null hypothesis of no relationship between the matrices. The *p*-value is given by the proportion of random correlations that are as large or larger than the observed correlation.

The QAP works by permuting the rows and columns (together) of one of the input matrices (and so maintaining their internal dependence), and then correlating the permuted matrix with the other data matrix. This process is repeated hundreds of times to build up a distribution of correlations under the null hypothesis. The result is a more accurate measure of correlation.

The QAP procedure was implemented using the Ucinet¹² (Borgatti, Everett, and Freeman, 2003) software package. When the distance ratios of the IMs and the DMs were compared using the QAP correlation, a Pearson's correlation of 0.577 with a significance <0.001 was identified, indicating that there is a strong and significant correlation between the two sets of distance ratios. On the basis that

- a) the focus of the study is the discretion to influence causal relationships rather than the relationship in itself,
- b) participants found the completion of the instrument tiring and so efforts to reduce the data collection for the full-study are required, and
- c) the strong and significant correlation between the two sets,

¹² Ucinet® is a registered trademark of Analytic Technologies

it was deemed unnecessary to include the influence map (IM) in the full-study and to use only the discretion map (DM) in the dependent variable calculations for this pilot.

5.3.5 Calculating the dependent variable

The DM data was prepared for use in the dependent variable, using the procedure defined in Chapter 4.

5.3.5.1 Step 1

The DRs for the thirty-six DMs were calculated using the generalised distance ratio formula (described in Formula 4-3 in the previous chapter). The resultant matrix of DRs is shown in Appendix I.

5.3.5.2 Step 2

A cluster analysis using Ward's method (1963) was run on the data in Appendix I to produce between two and four clusters. The resulting dendrogram and cluster groups are shown in Appendix J and Appendix K respectively. Based on observation of the dendrogram it was decided that three clusters was a suitable split for this study. While observation of the dendrogram was deemed appropriate for the pilot-study, a more extensive analysis of the cluster groups is performed when considering the full-study data.

The average DM for each of the three selected clusters was then calculated.

5.3.5.3 Step 3

The DRs from each of the 36 pilot-study DMs to each of the three average cluster DMs were calculated using the distance ratio (described in Formula 4-3 in the previous chapter). The result provides three dependent variables for each participant in the study.

5.3.6 Pilot-study results

The relationship between the independent and dependent variables was investigated. The dependent variable is, in all cases, a scale variable (distance from cluster centre).

Where the independent variable under investigation was a scale variable a correlation analysis was applied. Where the independent variable was a categorical variable it was dummy coded (Hardy, 1993) and regressed on the independent variable.

5.3.6.1 Hypothesis 1

H1 *Managers similarity in heterogeneity of functional experience will coincide with similarity in their perception of managerial discretion.*

Variables

One independent variable and three dependent variables, as presented in Table 5-1 are used to test this hypothesis.

Table 5-1: Variables used in H1

Variable	Description	Type
Independent	Heterogeneity of experience	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

A correlation analysis was computed between heterogeneity of experience and the DRs from each of the cluster centres. A summary of the results is shown in Table 5-2.

Table 5-2: Heterogeneity of experience correlations

		4
1	Distance from Cluster 1	-.004
2	Distance from Cluster 2	.180
3	Distance from Cluster 3	.249
4	Heterogeneity of experience	

n = 36

No correlations are identified with a significance level of 0.05 or better.

H1 conclusion

In conclusion the results do not provide support for H1.

5.3.6.2 Hypothesis 2

H2 *Managers similarity in age will coincide with similarity in their perception of managerial discretion.*

Variables

One independent variable and two dependent variables, as presented in Table 5-3, are used to test this hypothesis.

Table 5-3: Variables used in H2

Variable	Description	Type
Independent	Age	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

A correlation analysis was computed between the age of the respondent and the DRs from each of the cluster centres. A summary of the results is shown in Table 5-4.

Table 5-4: Age correlations

		4
1	Distance from Cluster 1	-.026
2	Distance from Cluster 2	-.150
3	Distance from Cluster 3	.037
4	Age of respondent	

n = 36

No correlations are identified with a significance of 0.05 or better.

H2 conclusion

In conclusion the results do not provide support for H2.

5.3.6.3 Hypothesis 3

H3 *Managers similarity in length of management experience will coincide with similarity in their perception of managerial discretion.*

Variables

One independent variable and three dependent variables, as presented in Table 5-5 are used to test this hypothesis.

Table 5-5: Variables used in H3

Variable	Description	Type
Independent	Total management experience	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

A correlation analysis was computed between the total management experience of the respondent and the DRs from each of the cluster centres. A summary of the results is shown in Table 5-6.

Table 5-6: Total management experience correlations

	4
1 Distance from Cluster 1	-.117
2 Distance from Cluster 2	-.224
3 Distance from Cluster 3	-.256
4 Total management experience	

n = 36

No correlations were identified with a significance of 0.05 or better.

H3 conclusion

In conclusion the results do not provide support for H3.

5.3.6.4 Hypothesis 4

H4 *Managers with similar functional backgrounds will show more similarity in their perception of managerial discretion than will managers with different functional backgrounds.*

Variables

Two independent variables and three dependent variables, as presented in Table 5-7 are used to test this hypothesis.

Table 5-7: Variables used in H4

Variable	Description	Type
Independent	Functional area of most experience	Category
Independent	Functional area most associated with	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Functional area of most experience

As the independent variables are categorical it is necessary to code them into j-1 bivariate dummy variables (Hardy, 1993:7). Table 5-8 presents the Pearson correlation of the coded dummy variables associated with the functional area of most experience and the distance of participants DMs from the cluster centres.

Table 5-8: Functional experience dummy variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.071		
3 Distance from Cluster 3	-.494**	.527**	
4 Operations/Logistics	.032	.191	-.057
5 Technical/IT	.084	.201	.028
6 Human resources	.250	-.027	-.287
7 Finance	.023	.163	.053
8 Quality	-.230	-.450**	.130
9 Sales and marketing	-.334*	-.177	.128

n = 36

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

There are two correlations of note, Quality which has a negative correlation of 0.450 ($p < 0.01$) with distance from cluster centre 3 and Sales and Marketing which has a negative correlation of 0.334 ($p < 0.05$) with cluster centre 1. This provides partial support for H4.

In order to assess whether it is possible to estimate similarity of perceived discretion on the basis of most functional experience, the DR to each cluster centre was regressed in turn on the six dummy variables representing the seven functional categories. The results are shown in Table 5-9.

Table 5-9: Regression results for functional area of most experience

Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.015	6	.003	1.412	.244
	Residual	.052	29	.002		
	Total	.068	35			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.026	6	.004	2.086	.086
	Residual	.061	29	.002		
	Total	.087	35			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.018	6	.003	.623	.710
	Residual	.136	29	.005		
	Total	.153	35			

a Predictors: General management (Constant), Sales and Marketing, Human resources, Quality, Finance, Operations/Logistics, Technical/IT
b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

As none of the models produced a significance at the 0.05 level or better, no further analysis was carried out. These results provide no support for Hypothesis 4.

Functional area most associated with

Following the same process as above, the statistics were rerun using the functional area most associated with as the variable. Table 5-10 presents the Pearson correlation of the coded dummy variables associated with the functional area most associated with and the distance of participants DMs from the cluster centres.

Table 5-10: Functional association dummy variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.071		
3 Distance from Cluster 3	-.494**	.527**	
4 None	.048	-.157	-.243
5 Technical/IT	-.086	.040	-.059
6 Human Resources	.080	-.153	-.227
7 Operations/logistics	.151	.131	.015
8 Finance	-.110	.198	.153
9 Quality	-.134	-.382*	.137
10 Sales and Marketing	-.334*	-.177	.128

n = 36

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

There are two correlations of note, Quality which has a negative correlation of 0.382 ($p < 0.05$) with distance from cluster centre 3, and Sales and Marketing which has a negative correlation of 0.334 ($p < 0.05$) with cluster centre 1. This provides partial support for H4.

Table 5-11: Regression results for functional area most associated with

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.013	7	.002	.995	.455
	Residual	.054	28	.002		
	Total	.068	35			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.025	7	.004	1.604	.175
	Residual	.062	28	.002		
	Total	.087	35			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.025	7	.004	.766	.620
	Residual	.129	28	.005		
	Total	.153	35			

a Predictors: General management (constant), Sales and Marketing, None, Quality, Human Resources, Finance, Operations/logistics, Technical/IT
b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

In order to assess whether it is possible to estimate similarity of perceived discretion on the basis of functional area most associated with, the DR to each cluster centre was

regressed in turn on the seven dummy variables representing the eight functional categories. The results are shown in Table 5-11.

As none of the models produced a significance at the 0.05 level no further analysis was carried out. These results provide no support for H4.

H4 conclusion

As two functional groups from each of the independent variables showed significant correlation with distance from a cluster centre, this provides partial support for H4.

5.3.6.5 Hypothesis 5

H5 *Managers in similar hierarchical positions will show more similarity in their perception of managerial discretion than will managers with different hierarchical positions.*

Variables

Two independent variables and three dependent variables, as presented in Table 5-12 are used to test this hypothesis.

Table 5-12: Variables used in H5

Variable	Description	Type
Independent	Level in the organisation	Category
Independent	Number of direct reports	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Level in the organisation

Level in the organisation was coded into two dummy variables to represent the three categories of Board, General Management and Operations/Functional. The DR to each cluster centre was regressed in turn on the two dummy variables representing the three functional categories. The regression results are shown in Table 5-13.

As none of the models produced a significance at the 0.05 level, no further analysis was carried out. These results provide no support for H5.

Table 5-13: Regression results for level in the organisation

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.000	2	.000	.045	.956
	Residual	.068	33	.002		
	Total	.068	35			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.006	2	.003	1.253	.299
	Residual	.081	33	.002		
	Total	.087	35			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.006	2	.003	.686	.511
	Residual	.147	33	.004		
	Total	.153	35			

a Predictors: General management (constant), Operations/Technical, Board
 b Dependent Variable: Distance from Cluster 1, 2, and 3 respective!

Number of direct reports

The correlation of number of direct reports and DRs from each of the cluster centres is shown in Table 5-14.

Table 5-14: Number of direct reports correlations

	4	
1	Distance from Cluster 1	-.117
2	Distance from Cluster 2	-.224
3	Distance from Cluster 3	-.256
4	Number of direct reports	

n = 36

No correlations were identified with a significance of 0.05 or better and no further analysis was carried out.

H5 conclusion

In conclusion the results do not provide support for H5.

5.3.6.6 Hypothesis 6

H6 *Managers working in similar industries will show more similarity in their perception of managerial discretion than will managers working in different industries.*

Variables

One independent variable and three dependent variables, as presented in Table 5-15, are used to test this hypothesis.

Table 5-15: Variables used in H6

Variable	Description	Type
Independent	Industry sector	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Table 5-16 presents the Pearson correlation of the coded dummy variables associated with the industry group and the distance of participants DMs from the cluster centres.

Table 5-16: Industry group dummy variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.071		
3 Distance from Cluster 3	-.494	.527	
4 Distribution	-.409*	-.067	.022
5 Manufacturing	-.064	-.277	.101
6 Public	.253	-.120	-.295

n = 36

* Correlation is significant at the 0.05 level (2-tailed).

There is one correlation of note, Distribution, which has a negative correlation of 0.409 ($p < 0.05$) with distance from cluster centre 1. This provides partial support for H6.

The DR to each cluster centre was then regressed in turn on the three dummy variables representing the four categories. The regression results are shown in Table 5-17.

The results of the regression on cluster 2 and cluster 3 provide no significance at the 0.05 level. The result of the regression on cluster 1 is significant at the 0.05 level. The variation in the similarity to cluster centre 1 explained by difference in industry sector is 21.6% ($R^2 = 0.216$, adjusted $R^2 = 0.146$).

H6 conclusion

In conclusion, the results provide partial support for H6.

Table 5-17: Regression results for industry sector

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.015	3	.005	2.993	.045
	Residual	.053	32	.002		
	Total	.068	35			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.012	3	.004	1.733	.180
	Residual	.075	32	.002		
	Total	.087	35			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.014	3	.005	1.048	.385
	Residual	.140	32	.004		
	Total	.153	35			

a Predictors: Service (constant), Public, Distribution, Manufacturing
b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

5.3.6.7 Hypothesis 7

H7 *Managers working in larger organisations will show more similarity in their perception of managerial discretion than will managers working in smaller organisations.*

Variables

One independent variable and three dependent variables are used to test this hypothesis.

Table 5-18: Variables used in H7

Variable	Description	Type
Independent	Size of the organisation	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The correlation of size of the organisation and DRs from each of the cluster centres is shown in Table 5-19. There are two correlations of note, a positive correlation of 0.403 ($p < 0.05$) with distance from cluster centre 1 and a negative correlation of 0.399 ($P < 0.05$) with cluster centre 3. Subjects working in smaller organisations can therefore be said to have more similar perceived discretion (closer to cluster centre 1), as do participants working in larger organisations (closer to cluster centre 3).

Table 5-19: Size of organisation correlations

	4
1 Distance from Cluster 1	.403*
2 Distance from Cluster 2	-.059
3 Distance from Cluster 3	-.399*
4 Size of organisation	

n = 36
* correlation is significant at the 0.05 level (2-tailed)

The R^2 for the correlation to cluster centre 1 and cluster centre 3 is 0.163 and 0.159, indicating that size of organisation explains 16.3% and 15.9% of the variation respectively. Because the R^2 tends to be overoptimistic with a small sample size (Tabachnick and Fidell, 1996) an Adjusted R^2 was calculated for reference and returned values of 0.138 and 0.135.

H7 conclusion

In conclusion the results provide support for H7.

5.3.6.8 Hypothesis 8

H8 *Managers with similar education will show more similarity in their perception of managerial discretion than will managers with different educational backgrounds.*

Variables

Two independent variable and three dependent variables, as presented in Table 5-20, are used to test this hypothesis.

Table 5-20: Variables used in H8

Variable	Description	Type
Independent	Level of education	Category
Independent	Nature of 3 rd level education	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Level of education

The DR to each cluster centre was regressed in turn on the three dummy variables representing the four categories, none, certificate/diploma, degree and higher degree. The regression results are shown in Table 5-21.

Table 5-21: Regression results for level of education

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.008	3	.003	1.366	.271
	Residual	.060	32	.002		
	Total	.068	35			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.021	3	.007	3.303	.033
	Residual	.067	32	.002		
	Total	.087	35			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.023	3	.008	1.906	.148
	Residual	.130	32	.004		
	Total	.153	35			

a Predictors: Higher degree (Constant), Degree, None, Certificate/Diploma
 b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

The results of the regression on cluster 1 and cluster 3 provide no significance at the 0.05 level. The result of the regression on cluster 2 is significant at the 0.05 level. The variance in the dissimilarity to cluster centre 2 explained by difference in industry sector is 23.6% ($R^2 = 0.236$, adjusted $R^2 0.165$).

Nature of 3rd level education

Table 5-22: Regression results for nature of 3rd level education

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.005	3	.002	.780	.514
	Residual	.063	31	.002		
	Total	.067	34			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.000	3	.000	.036	.991
	Residual	.077	31	.002		
	Total	.077	34			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.005	3	.002	.415	.744
	Residual	.133	31	.004		
	Total	.138	34			

a Predictors: Business (Constant), Mixed, Arts, Science/Engineering
 b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

The DR to each cluster centre was regressed in turn on the three dummy variables representing the four categories of arts, business/finance, science/engineering and other. The regression results are shown in Table 5-22.

The results provide no significance at the 0.05 level.

H8 conclusion

The results provide partial support for H8. While managers with similar education do have more similar perceived discretion, it is the level of education rather than the type of education that accounts for the difference.

5.3.6.9 Hypothesis 9 - Hypothesis 13

Hypotheses 9 through 13 deal with the psychological disposition variables.

H9 *Managers introvert/extravert preferences will coincide with similarity in their perception of managerial discretion.*

H10 *Managers with similar levels of open styles of information gathering will show more similarity in their perception of managerial discretion than will managers with different levels of openness.*

H11 *Managers with similar levels of concern for people will show larger similarities in their perception of managerial discretion than will managers with different levels of concern.*

H12 *Managers with similar levels of conscientiousness will show larger similarities in their perception of managerial discretion than will managers with different levels of conscientiousness.*

H13 *Managers with similar levels of emotional stability will show larger similarities in their perception of managerial discretion than will managers with different levels of emotional stability.*

Variables

The independent variables used to test H9 to H13 are operationalised by the NEO-FFI instrument (Costa and McCrae, 1992). The scales used to test each hypothesis are presented in Table 5-23.

Table 5-23: Variables used in H9 through H13

	Variable	NEO-FFI Scale	Description	Type
H9	Independent	Extraversion	Extraverted tendencies	Scale
H10	Independent	Openness	Open information gathering style	Scale
H11	Independent	Agreeableness	Concern for people	Scale
H12	Independent	Conscientiousness	Conscientiousness, planful and organised	Scale
H13	Independent	Neuroticism	Susceptibility to psychological distress	Scale
ALL	Dependent	N/A	Distance from cluster centre A	Scale
ALL	Dependent	N/A	Distance from cluster centre B	Scale
ALL	Dependent	N/A	Distance from cluster centre C	Scale

The correlation analysis was carried out for all of the variables and the results are shown in Table 5-24.

Table 5-24: Personality variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.071		
3 Distance from Cluster 3	-.494**	.527**	
4 Extraversion	.026	-.073	-.218
5 Openness	.211	.085	-.169
6 Agreeableness	-.185	.070	.005
7 Conscientiousness	.167	.319	-.002
8 Neuroticism	.067	-.044	.118

n = 36

** correlation is significant at the 0.01 level (2-tailed)

No significant correlations are noted between the independent and dependent variables, and so no further analysis was carried out.

H9 - H13 conclusion

In conclusion the results provide no support for H9 through H13.

5.3.7 Summary of pilot-study results

A summary of the pilot-study results is shown in Table 5-25. While there is support for some hypotheses the overall results are not promising. There are two fundamental

reasons why this may be the case. Firstly the sample size at $n=36$ is quite small for the number of variables involved in some of the analysis.

Table 5-25: Summary of pilot results

Hypothesis	Support
H1	Partial
H2	None
H3	None
H4	None
H5	None
H6	Partial
H7	Supported
H8	Partial
H9	None
H10	None
H11	None
H12	None
H13	None

Secondly, and of more concern is the quality of the data, in particular the dependent variable. During the data collection phase there were some minor complaints about the process of pairwise comparison. After the pilot data collection, the opportunity arose to reflect on the process with nine of the participants in the pilot-study. While initially in the conversation, participants said they were happy to have been involved and found the process interesting, after an extended conversation, three of the nine shared that they had found the latter part of the data collection process extremely tiring and said they may have become careless in their responses during the last part of the final data collection exercise. It is this latter part of the data collection phase that the critical data for the discretion map was collected.

Taking into consideration the disappointing results from the pilot-study and the concerns over the quality of the data it was decided to complete an extended pilot-study before progressing. The revised approach, and more promising results, are described in the following section.

5.4 EXTENDED PILOT-STUDY

Taking on board the analysis to date and the feedback from participants, several changes were made for the extended pilot-study. Firstly, the data collection requirement for the dependent variable was halved. This was possible following the analysis in section 5.3.4 above which eliminated the requirement for the inclusion of an influence map. The number of items in the fixed list was reduced from 13 to 9 with the consequence of more than halving the number of pairs to be elicited from 156 (13x13-13) to 72 (9x9-9). The process used to reduce the item list is described in the next section. Secondly, participants completed the data collection in three separate sittings, limiting the maximum time spent on any part at one time to approximately 30 minutes for those at the slower end of the scale.

All of the first thirty participants in the extended pilot were debriefed after the data was collected. While they still mentioned that the data collection for the dependent variable was tedious and required a lot of concentration, they believed that because they were given notice of these potential difficulties in advance, and a quiet time was available without interruption, they were able to maintain their concentration. For the remaining data collection a briefing document was drawn up and read to the participants before data collection commenced. In the majority of cases specific time was allotted to the data collection, and controlled by the researcher to ensure there were no pressures to finish.

Several lessons were also learned from the pilot-study in relation to the presentation of the demographic data questionnaire. Several adjustments were made to the format of the questions, in particular offering forced choice options which made coding and data input simpler and more reliable. The amended questionnaire is shown in Appendix L.

5.4.1 Calculating the dependent variable

Repeating the process adopted in the pilot-study the following stages of calculation were applied to the collected data.

5.4.1.1 Step 1

The DRs for the 72 DMs were calculated using Formula 4-5 (described in Chapter 4).

5.4.1.2 Step 2

A cluster analysis using Ward's method (1963) was run on the data from Step 1. Based on observation of the dendrogram it was decided that three cluster groups was a suitable split for this study.

The average DM for each of the three clusters was then calculated.

5.4.1.3 Stage 3

The DRs from each of the 72 extended pilot-study DMs to each of the three average cluster DMs were calculated using the distance ratio described in Formula 4-5. The results provide three dependent variables for each participant in the study.

5.4.2 Extended pilot-study results

5.4.2.1 Hypothesis 1

H1 *Managers similarity in heterogeneity of functional experience will coincide with similarity in their perception of managerial discretion.*

Variables

One independent variable and three dependent variables, presented in Table 5-26, are used to test this hypothesis.

Table 5-26: Variables used in H1

Variable	Description	Type
Independent	Heterogeneity of experience	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

A correlation analysis between heterogeneity of experience and the DRs from each of the cluster centres was run, and the results are shown in Table 5-27.

Table 5-27: Heterogeneity of experience correlations

	4
1 Distance from Cluster 1	.007
2 Distance from Cluster 2	-.165
3 Distance from Cluster 3	-.154
4 Heterogeneity of experience	

n = 71

No correlations with a significance of 0.05 or better were identified.

H1 conclusion

In conclusion the results do not provide support for H1.

5.4.2.2 Hypothesis 2

H2 *Managers similarity in age will coincide with similarity in their perception of managerial discretion.*

Variables

One independent variable and two dependent variables, as presented in Table 5-28, are used to test this hypothesis.

Table 5-28: Variables used in H2

Variable	Description	Type
Independent	Age	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

A correlation analysis between age of respondent and the DRs from each of the cluster centres was run, and is presented in Table 5-29.

Table 5-29: Age correlations

	4
1 Distance from Cluster 1	-.209*
2 Distance from Cluster 2	.060
3 Distance from Cluster 3	.134
4 Age of respondent	

n = 71

* Correlation is significant at the 0.05 level (2-tailed)

Age of respondent has a negative correlation of 0.209 ($P < 0.05$). This indicates that older managers DMs are more similar to each other.

H2 conclusion

The result provides support for H2, although the amount of explanation attributable to a difference in age is small at 4.57% ($R^2 = 0.04572$)

5.4.2.3 Hypothesis 3

H3 *Managers similarity in length of management experience will coincide with similarity in their perception of managerial discretion.*

Variables

One independent variable and three dependent variables, as presented in Table 5-30, are used to test this hypothesis.

Table 5-30: Variables used in H3

Variable	Description	Type
Independent	Total management experience	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

A correlation analysis between total management experience and the DRs from each of the cluster centres was run, and is shown in Table 5-31.

Table 5-31: Total management experience correlations

	4
1 Distance from Cluster 1	-.080
2 Distance from Cluster 2	-.104
3 Distance from Cluster 3	-.071
4 Total management experience	

n = 71

No correlations were identified with a significance of 0.05 or better.

H3 conclusion

In conclusion the results do not provide support for H3.

5.4.2.4 Hypothesis 4

H4 *Managers with similar functional backgrounds will show more similarity in their perception of managerial discretion than will managers with different functional backgrounds.*

Variables

Two independent variables and three dependent variables, as presented in Table 5-32, are used to test this hypothesis.

Table 5-32: Variables used in H4

Variable	Description	Type
Independent	Functional area of most experience	Category
Independent	Functional area most associated with	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Functional area of most experience

As the independent variables are categorical it is necessary to code them into j-1 bivariate dummy variables (Hardy, 1993:7). Table 5-33 presents the Pearson correlation of the coded dummy variables associated with the functional area of most experience and the distance of participants DMs from the cluster centres.

Table 5-33: Functional experience dummy variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.138		
3 Distance from Cluster 3	-.318**	.828**	
4 Operations	-.040	-.040	-.036
5 Human resources	.132	-.081	-.069
6 Technical	-.057	-.001	-.026
7 Sales and Marketing	.127	.015	-.039
9 Finance	-.072	-.209*	-.168

n = 71

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

There is one correlation of note, Finance, which has a negative correlation of -0.209 ($p < 0.05$) with distance from cluster centre 2. This provides marginal support for H4.

In order to assess whether it is possible to estimate similarity of perceived discretion on the basis of most functional experience, the DR to each cluster centre was regressed in turn on the five dummy variables representing the six functional categories. The regression results are shown in Table 5-34.

Table 5-34: Regression results for functional area of most experience

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	57.347	5	11.469	.571	.722
	Residual	1305.375	65	20.083		
	Total	1362.722	70			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	211.454	5	42.291	1.741	.138
	Residual	1578.829	65	24.290		
	Total	1790.284	70			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	486.163	5	97.233	1.801	.125
	Residual	3510.128	65	54.002		
	Total	3996.291	70			

a Predictors: General management (constant), Finance, Human Resources, Technical, Operations, Marketing/Sales

b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

As none of the models produced a significance at the 0.05 level, no further analysis was carried out. These results provide no support for H4.

Functional area most associated with

Following the same process as above, the statistics were rerun using functional area most associated with as the dependent variable.

Table 5-35: Functional area association dummy variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.138		
3 Distance from Cluster 3	-.318**	.828**	
4 Operations	-.325**	-.171	-.018
5 Human resources	.074	.070	.090
6 Technical	-.094	.077	.041
7 Sales and Marketing	.141	.102	.081
8 Finance	-.019	-.112	-.093
9 Other	-.039	-.199*	-.126

n = 71

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 5-35 presents the Pearson correlation of the coded dummy variables associated with functional association, and the distance of participants DMs from the cluster centres.

There are two correlations of note, Operations which has a negative correlation of 0.325 ($p < 0.01$) with distance from cluster centre 1, and Other which has a negative correlation of 0.199 ($P < 0.05$) with distance from cluster centre 2. This provides partial support for H4.

In order to assess whether it is possible to estimate similarity of perceived discretion on the basis of functional area most associated with, the DR to each cluster centre was regressed in turn on the six dummy variables representing the seven functional categories. The regression results are shown in Table 5-36.

None of the models produced a significance at the 0.05 level, and no further analysis was carried out. These results provide no support for H4.

Table 5-36: Regression results for functional area association

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	189.980	6	31.663	1.728	.129
	Residual	1172.742	64	18.324		
	Total	1362.722	70			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	184.328	6	30.721	1.224	.306
	Residual	1605.956	64	25.093		
	Total	1790.284	70			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	151.787	6	25.298	.421	.862
	Residual	3844.503	64	60.070		
	Total	3996.291	70			

a Predictors: General management (constant), Sales and Marketing, None, Quality, Human Resources, Finance, Operations/logistics, Technical/IT, Other
 b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

H4 conclusion

In conclusion the three correlations identified in the analysis provide partial support for H4.

5.4.2.5 Hypothesis 5

H5 *Managers in similar hierarchical positions will show more similarity in their perception of managerial discretion than will managers with different hierarchical positions.*

Variables

Two independent variables and three dependent variables, as presented in Table 5-37 are used to test this hypothesis.

Table 5-37: Variables used in H5

Variable	Description	Type
Independent	Level in the organisation	Category
Independent	Number of direct reports	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Level in the organisation

Level in the organisation was coded into seven dummy variables to represent the eight categories. The DR to each cluster centre was regressed in turn on the seven dummy variables representing the eight levels. The regression results are shown in Table 5-38.

Table 5-38: Regression results for level in the organisation

Model – Cluster 1		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	323.589	7	46.227	2.821	.013
	Residual	999.731	61	16.389		
	Total	1323.320	68			
Model – Cluster 2		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	163.201	7	23.314	.941	.482
	Residual	1512.102	61	24.789		
	Total	1675.303	68			
Model – Cluster 3		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	359.085	7	51.298	.873	.533
	Residual	3583.797	61	58.751		
	Total	3942.882	68			

a Predictors: General Management (Constant), First level management, CEO/MD, Specialist, Board, Function Director, Middle management, Head of function

b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

The regression on cluster centre 1 is significant at the 0.05 level.

To ensure that the results are not confounded by the influence of age, because there may be a correlation of age and level, a hierarchical regression was run controlling for age. The results are presented in Table 5-39 and Table 5-40.

Table 5-39: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.196	.038	.024	4.358324606	.038	2.667	1	67	.107
2	.523	.274	.177	4.001855381	.236	2.781	7	60	.014

a Predictors: (Constant), Age of respondent

b Predictors: (Constant), Age of respondent, Specialist, Board, CEO/MD, Function Director, First level management, Middle management, Head of function

The effect of age is neither significant nor substantial, with an explanatory effect of just 3.8% ($R^2 = 0.038$, adjusted $R^2 = 0.024$) and a significance greater than 0.05.

Table 5-40: Regression results for level, controlling for age

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	50.655	1	50.655	2.667	.107
	Residual	1272.665	67	18.995		
	Total	1323.320	68			
2	Regression	362.429	8	45.304	2.829	.010
	Residual	960.891	60	16.015		
	Total	1323.320	68			

a Predictors: (Constant), Age of respondent

b Predictors: (Constant), Age of respondent, Specialist, Board, CEO/MD, Function Director, First level management, Middle management, Head of function

b Dependent Variable: Distance from Cluster 1

Controlling for the effect of age, level in the organisation explains 23.6% (change in $R^2 = 0.236$) of the variation in distance from cluster 1.

Number of direct reports

The correlation of number of direct reports and DRs from each of the cluster centres is shown in Table 5-41.

Table 5-41: Number of direct reports correlations

	4
1 Distance from Cluster 1	-.158
2 Distance from Cluster 2	-.040
3 Distance from Cluster 3	.030
4 Number of direct reports	

n = 71

No correlations are identified with a significance of 0.05 or better and no further analysis is performed.

H5 conclusion

The results provide support for H5. They also indicate that the nature of managerial responsibility rather than the scale of that responsibility, influences the perception of managerial discretion.

5.4.2.6 Hypothesis 6

H6 *Managers working in similar industries will show more similarity in their perception of managerial discretion than will managers working in different industries.*

Variables

One independent variable and three dependent variables, as presented in Table 5-42, are used to test this hypothesis.

Table 5-42: Variables used in H6

Variable	Description	Type
Independent	Industry sector	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Table 5-43 presents the Pearson correlation of the coded dummy variables associated with the industry group and the distance of participants DMs from the cluster centres.

There are four correlations of note, Distribution, which has a positive correlation of 0.203 (p<0.05) with distance from cluster centre 1, Public, which has a negative correlation of 0.202 (p<0.05) with distance from cluster centre 1, Other which has a positive correlation of 0.246 (P<0.05) with distance from cluster centre 1, and

Distribution, which has a positive correlation of 0.203 with distance from cluster centre 2 .

Table 5-43: Industry group dummy variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.138		
3 Distance from Cluster 3	-.318	.828**	
4 Distribution	.203*	.203*	.167
5 Manufacturing	-.163	-.066	-.007
6 Public	-.202*	.032	.114
7 Other	.246*	-.037	-.109

n = 71

* Correlation is significant at the 0.05 level (2-tailed).

This provides partial support for H6. The DR to each cluster centre was then regressed in turn on the three dummy variables representing the four categories. The regression results are shown in Table 5-44.

Table 5-44: Regression results for industry sector

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	199.794	4	49.949	2.835	.031
	Residual	1162.928	66	17.620		
	Total	1362.722	70			
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	84.207	4	21.052	.814	.521
	Residual	1706.076	66	25.850		
	Total	1790.284	70			
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	246.364	4	61.591	1.084	.372
	Residual	3749.926	66	56.817		
	Total	3996.291	70			

a Predictors: Service (constant), Public, Distribution, Manufacturing, Other

b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

The results of the regression on cluster 2 and cluster 3 provide no significance at the 0.05 level. The result of the regression on cluster 1 is significant at the 0.05 level. The

variation in the similarity to cluster centre 1 explained by difference in industry sector is 14.7% ($R^2 = 0.147$, adjusted $R^2 = 0.095$).

H6 conclusion

The results provide support for H6.

5.4.2.7 Hypothesis 7

H7 *Managers working in larger organisations will show more similarity in their perception of managerial discretion than will managers working in smaller organisations.*

Variables

One independent variable and three dependent variables, as presented in Table 5-45, are used to test this hypothesis.

Table 5-45: Variables used in H7

Variable	Description	Type
Independent	Size of the organisation	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The correlation of size of the organisation and DRs from each of the cluster centres is shown in Table 5-46.

Table 5-46: Size of organisation correlations

	4
1 Distance from Cluster 1	-.158
2 Distance from Cluster 2	-.040
3 Distance from Cluster 3	.030
4 Size of organisation	

n = 71

No correlations were identified with a significant at the $P < 0.05$ level of significance, and as a result no further analysis was undertaken.

H7 conclusion

The results do not provide support for H7.

5.4.2.8 Hypothesis 8

H8 *Managers with similar education will show more similarity in their perception of managerial discretion than will managers with different educational backgrounds.*

Variables

Two independent variable and three dependent variables, as presented in Table 5-47, are used to test this hypothesis.

Table 5-47: Variables used in H8

Variable	Description	Type
Independent	Level of education	Category
Independent	Nature of 3 rd level education	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Level of education

The DR to each cluster centre was regressed in turn on the four dummy variables representing the five categories of none, certificate, diploma, degree or professional, and higher degree. The regression results are shown in Table 5-48. No significant results were identified at the 0.05 level and consequently no further analysis was conducted.

H8 conclusion

In conclusion the results do not provide support for H8

Table 5-48: Regression results for level of organisation

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	105.130	4	26.283	1.379	.251
	Residual	1257.592	66	19.054		
	Total	1362.722	70			
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	140.578	4	35.145	1.406	.242
	Residual	1649.705	66	24.996		
	Total	1790.284	70			
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	351.130	4	87.783	1.589	.187
	Residual	3645.160	66	55.230		
	Total	3996.291	70			

a Predictors: (Constant), Degree or Professional, None, Diploma, Certificate
b Dependent Variable: Distance from Cluster 1, 2, and 3 respectively

5.4.2.9 Hypothesis 9 – Hypothesis 13

Hypotheses 9 through 13 deal with the psychological disposition variables.

H9 *Managers introvert/extravert preferences will coincide with similarity in their perception of managerial discretion.*

H10 *Managers with similar levels of open styles of information gathering will show more similarity in their perception of managerial discretion than will managers with different levels of openness.*

H11 *Managers with similar levels of concern for people will show larger similarities in their perception of managerial discretion than will managers with different levels of concern.*

H12 *Managers with similar levels of conscientiousness will show larger similarities in their perception of managerial discretion than will managers with different levels of conscientiousness.*

H13 *Managers with similar levels of emotional stability will show larger similarities in their perception of managerial discretion than will managers with different levels of emotional stability.*

Variables

The independent variables used to test H9 to H13 are operationalised by the NEO-FFI instrument (Costa and McCrae, 1992). The scales used to test each hypothesis are presented in Table 5-49.

Table 5-49: Variables used in H9 through H13

	Variable	NEO-FFI Scale	Description	Type
H9	Independent	Extraversion	Extraverted tendencies	Scale
H10	Independent	Openness	Open information gathering style	Scale
H11	Independent	Agreeableness	Concern for people	Scale
H12	Independent	Conscientiousness	Conscientiousness, planful and organised	Scale
H13	Independent	Neuroticism	Susceptibility to psychological distress	Scale
ALL	Dependent	N/A	Distance from cluster centre A	Scale
ALL	Dependent	N/A	Distance from cluster centre B	Scale
ALL	Dependent	N/A	Distance from cluster centre C	Scale

A correlation analysis between extraversion, openness, agreeableness, conscientiousness, neuroticism, and the dependent variable of DRs from each cluster was run, and the results are presented in Table 5-50.

Table 5-50: Personality variables correlations

	1	2	3
1 Distance from Cluster 1			
2 Distance from Cluster 2	.138		
3 Distance from Cluster 3	-.318**	.828**	
4 Neuroticism	-.238*	.296**	.445**
5 Extraversion	.291**	-.323**	-.459**
6 Openness	.414**	-.038	-.184
7 Agreeableness	-.030	.103	.154
8 Conscientiousness	.169	-.081	-.201*

n = 71

** correlation is significant at the 0.01 level (2-tailed)

* correlation is significant at the 0.05 level (2-tailed)

Correlations significant at the 0.05 level or better were identified between neuroticism and extraversion, and cluster centre 1. Additionally a correlation significant at the 0.05 level was identified between openness and cluster centre 1, and between conscientiousness and cluster centre 3.

H9 - H13 conclusion

The results provide support for H9, H10, H12 and H13. The results do not provide support H11. The results provide substantial support for H9 and H13 with significant correlations reported for all three cluster centres.

5.4.3 Summary of extend pilot-study results

A summary of the pilot and extended pilot results are shown in Table 5-51. As is evident the results from the extended pilot-study the results are more promising than those in the pilot-study.

Table 5-51: Summary of pilot and extended pilot results

Hypothesis	Support - pilot	Support - extended pilot
H1	Partial support	Partial
H2	Not supported	Supported
H3	Not supported	Supported
H4	Not supported	Not supported
H5	Not supported	Not supported
H6	Partial support	Supported
H7	Supported	Not supported
H8	Partial support	Not supported
H9	Not supported	Supported
H10	Not supported	Supported
H11	Not supported	Not supported
H12	Not supported	Supported
H13	Not supported	Supported

5.5 CONCLUSION

The extended pilot-study with an n=71 provides support for eight out of the thirteen hypotheses. While the sample size is still too small to make generalisable conclusions, the results nevertheless point toward some interesting findings.

Following the extended pilot-study, no new issues relating to the data collection process emerged and it was concluded that the questionnaire design, and data collection process was satisfactory to progress to the full-study.

5.6 IMPLICATIONS FOR THE FULL-STUDY

With the success of the extended pilot data collection process and the strong indicative findings, no changes to the data collection process were necessary for the full-study. It is therefore acceptable to include the data from the extended pilot-study (but not the pilot-study) in the full-study data set.

Previous similar studies are often a useful indicator of sample size (Sudman, 1976), and studies in this research stream have had sample sizes of 22 (Markóczy and Goldberg, 1995), 91 (Markóczy, 1997), 111 (Markóczy, 2000), 64 (Markóczy, 2001b), 114 (in the complete study by Hodgkinson, 1997), 32 (Daniels et al., 2002), 121

(Walsh, 1988), 120 (Beyer et al., 1997). On that basis the target for the full-study was set at a threshold of 120 complete data sets.

5.7 SUMMARY

The pilot-study identified a number of issues, particularly in relation to the data collection process. The analysis of the pilot-study data, while providing disappointing results, provided confidence that the analytic techniques were sufficiently specified.

Having built on the experience of the first pilot-study, the process for the extended pilot-study proved to be robust and resulted in promising findings. This provided confidence that the methods used for data collection were sufficiently robust for the full-study, the results of which are presented in the following chapter.

CHAPTER 6 - RESULTS

6.1 INTRODUCTION

In previous chapters the conceptual model for this study was developed, and the methods for conducting the research were identified and evaluated through a pilot-study. The process of analysis in this chapter follows the guidance of the previous chapters and incorporates the lessons learned during the pilot and extend pilot phases. The objective of this chapter is to describe the data analysis process followed in the full-study, and to demonstrate the rigorous approach to the statistical analysis that was applied.

This chapter begins with the preparation of the dependent variable. The dependent variable is by far the most complex variable in the analysis requiring significant mathematical and statistical preparation before it can be used. This complexity arises mainly because of the richness associated with the n dimensional space in which the data is captured. While the methods utilised are not new to this study they are however, not commonly utilised in the literature. This chapter therefore deals with the development of the dependent variable in substantial detail. Attention is also paid to the exploration of the underlying structure of the data (although this is explicitly not a defined outcome of the study) in order to validate that the clusters identified in the data are more than an artefact of the mathematical processes. Checks are also made to ensure that the complex distance to cluster centre measurements actually capture more than a simple one dimensional measure of map intensity.

With the dependent variable prepared and validated, attention turns to each of the hypotheses. Where the independent variables are continuous, correlation analysis is applied. Before the correlation is applied assumptions of normality are investigated and Pearson's R or Spearman's Rho are applied as appropriate. Where the independent variables are categorical they are coded in bivariate dummy variables and regressed on

the dependent variables. Where significant relationships are identified consideration is given to confounders and reanalysis is applied as appropriate.

6.2 SAMPLE

Data was collected from experienced managers on executive development programmes at the Irish Management Institute. As already expressed in Chapter 5, this approach, although non-random, is acceptable (Brady and Palmer, 2003; Chakravarthy, 1987; Coviello et al., 2002; Neelankavil, 2000), has empirical support and is considered to fall within the definition of a field-study (Snow and Thomas, 1994).

The full study data set includes the data from the extended pilot-study, but not the pilot-study. Data was collected from 141 managers over a twelve-month period. As the data collection was not all conducted in the same session, in some cases the data sets were incomplete. In some cases participants partially or incorrectly completed the forms. Data sets which did not have a complete DM and NEO-FFI, and substantially complete demographic data were eliminated, leaving 126 useable data sets.

6.3 NONEXPERIMENTAL RESEARCH, VARIABLES AND CAUSALITY

The distinction between experimental and nonexperimental research is principally whether the researcher manipulates the independent variable or not (Tabachnick and Fidell, 1996:2). In nonexperimental research the researcher does not influence, control or manipulate the independent variable. It is therefore, not strictly speaking an *independent* variable. Because of this some researchers prefer to label independent variables as *predictor variables*, and dependent variables as *criterion variables* (Tabachnick and Fidell, 1996:3). This is a matter for the researcher to decide and the decision in this study is to use the terms *independent* and *dependent*, while recognising the experimental implications of the terms in this nonexperimental study.

The differences in experimental and nonexperimental research also extends beyond the descriptive terms for variables, as is captured by the following quote.

The well-known virtue of the experimental method is that it brings situational variables under tight control. It thus permits rigorous tests of hypotheses and confident statements about causation. The correlational method, for its part, can study what man has not learned to control or can never hope to control. Nature has been experimenting since the beginning of time, with a boldness and complexity far beyond the resources of science. The correlator's mission is to observe and organize the data from Nature's experiments. As a minimum outcome, such correlations improve immediate decisions and guide experimentation. At the best, a Newton, a Lyell, or a Darwin can align the correlations into a substantial theory (Cronbach, 1957:684).

In experimental research, under controlled conditions, changes in the dependent variable can be said to have been caused by a change in the independent variable. In nonexperimental research, such as this study, it is much more difficult to attribute differences in a dependent variable on the basis of causality from the independent variable (Tabachnick and Fidell, 1996:3). What can be said is, a statistically significant correlation is identified that infers support for a hypothesised causal relationship. However, all other confounding variables cannot be controlled for, it cannot be argued with a high degree of confidence that the independent variable *caused* the change in the dependent variable. This is not unique to this study, but a general characteristic of nonexperimental research. Taking Cronbach's (1957) words, the research can at best hope to align the correlations into the theoretical research model developed for the study.

Differences between experimental and nonexperimental research also arise in the techniques applied for analysis. While two-group t tests and ANOVA are conceptually the same procedure as correlation and regression analysis respectively, they form two distinct branches of social science methods (Field, 2000:245). This is generally a historical division, which lead to a t-test and ANOVA being associated with experimental research, while correlation and regression is associated with nonexperimental research. In this study correlation and regression analysis are used,

but their use presents no principled difference to the t-test and ANOVA option, and has no different effect on the interpretation of causality or correlation.

Related to the use of independent and dependent variable terminology, is the terminology applied to the hypotheses. The hypotheses presented are the *research hypotheses*, sometimes referred to as the *alternative hypotheses*. That is, the hypotheses propose that *a relationship exists* between two variables. If a significant correlation is identified, the research hypothesis is accepted. This approach is adopted to present the results in a more accessible manner; however, behind this approach lies the statistical analysis. In the statistical analysis of the variables, the null hypothesis, which states that *no relationship exists* between the variables, is the one actually being tested (Isaac and Michael, 1995:192). Therefore, from a statistical perspective, when in this study it is reported that the findings provide support for the (research) hypothesis, the implication is the statistical rejection of the null hypothesis (Tabachnick and Fidell, 1996:33-34). When findings are reported as failing to support the (research) hypothesis, the implication is a statistical failure to reject the null hypothesis. That is, it could not be disproved that no relationship exists.

6.4 PREPARING THE DEPENDENT VARIABLE

The dependent variable is developed from the captured discretion matrices of all 126 participant data sets. The procedure follows the process described in Chapter 4 and empirically validated in Chapter 5.

6.4.1 Calculate the distance ratios

Adopting the procedure defined in previous chapters the following steps are applied.

6.4.1.1 Step 1

The distance ratios (DRs) were calculated for all 126 discretion matrices (DMs) using Formula 4-5 (described in Chapter 4). This produced a 126 column by 126 row symmetric dissimilarity matrix.

6.4.1.2 Step 2

A cluster analysis was performed on the 126 x 126 dissimilarity matrix using Ward's (1963) method and applied through the use of a well known statistical software package, originally called the Statistical Package for the Social Sciences but now officially referred to as simply SPSS¹³ (2001). As SPSS cannot handle matrix input data through the normal graphical user interface, a syntax input, using the workaround recommended in Resolution 26381 (SPSS, 2002) was implemented. The resulting cluster groups and dendrogram are shown in Appendix M and Appendix N respectively.

There are a variety of approaches adopted by researchers to select the appropriate number of clusters, and most are "relatively informal" (Everitt et al., 2001:102). Despite attempts to provide rules for selecting the number of cluster groups (Milligan and Cooper, 1985), no clearly defined approach has been identified, and informal subjective approaches based on researcher expertise remain the most common (Baxter, 1984). While the informality of selecting numbers of clusters is a significant cause for concern in many studies, the approach of using fuzzy clusters in this study, as described in a previous chapter, means that the method of clustering and selecting "does not have to be very good" (Markóczy and Goldberg, 1995:321).

Two of the most widely used procedures (Everitt et al., 2001:102-103) were applied to identify the optimal number of clusters. The first approach presents the number of cluster groups plotted against changes in the clustering criterion. In the case of Ward's method, the clustering criterion is the within clusters sum of the squares. The clustering criterion values are obtained from the agglomeration coefficient output from the SPSS cluster procedure. For all hierarchical cluster procedures in SPSS, with the exception of Ward's method, the agglomeration coefficient represents the joining distance between the clusters being agglomerated. In Ward's method only, the agglomeration coefficient represents the sum of squares of distances from all cases to their cluster centres (see SPSS, 1988). A change in the coefficient therefore represents

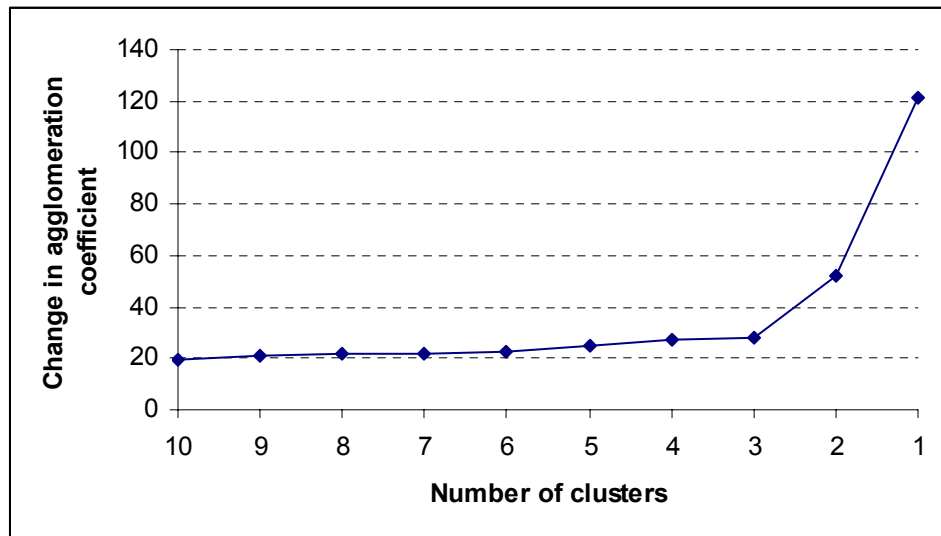
¹³ SPSS® is a registered trademark of SPSS Inc.

the increased total sum of squares resulting from the fusion of clusters at that stage. A sharp increase in the rate of change of the coefficient signifies that disparate clusters have been merged, resulting in a non-linear increase in the sum of the squares distance error, and so indicating that the number of cluster before the fusion that caused the sharp increase, is likely to be the optimal number of clusters. The optimal number of clusters is visually indicated by a sharp change or kick point in the plot.

As can be seen from Figure 6-1 there is a change in the rate of increase at six clusters, and then a more significant increase in the rate of change as three clusters are merged to form two clusters. If a very fine grained approach to cluster membership was required then six clusters might be chosen as optimal and then further refined using a non-hierarchical method such as k-means clustering. As the reason for clustering in this study is to identify cluster centres, as opposed to cluster membership, three clusters can be safely accepted. The small absolute values of the change in the sum of squares distance measures, indicates that accepting more than three clusters, would result in clusters with centres that had small absolute distances from each other. As it is the cluster centres that are used for the analysis that follows, and not cluster membership, three clusters with substantial absolute Euclidean distance between centres is the optimal solution in the context of this study.

Because of the approach that Ward's method utilises it is possible that an individual data point is closer to one cluster centre while the data point actually belongs to another cluster. This is a significant issue if cluster membership is the output used for analysis. In this study the problem is overcome by applying a fuzzy cluster approach. Once the cluster centre is identified, group membership is ignored for further analysis, and every individual data point (not just those in the cluster) is analysed based on its distance to the cluster centre. Consequently, if a data point belonging to one cluster (as an artefact of the clustering procedure) is actually closer to another cluster centre, this will be accounted for fully in the analysis that follows, as it is the Euclidean distance of all data points to the cluster centre that are analysed. A rough grained approach, rather than a fine grained approach to cluster number selection is therefore preferred in this context.

Figure 6-1: Agglomeration coefficient plot



The second approach applied to identify the optimal number of clusters is a visual inspection of the dendrogram. The dendrogram is a visual representation of the clusters identifying the level at which they cluster based on the rescaled combining distance. For all cluster techniques in SPSS, except Ward's method, the rescaled combining distance is the agglomeration coefficient rescaled from 0 to 25. In such cases reviewing the dendrogram is the same as reviewing the agglomeration coefficient plot, just with a different graphical representation. In the case of Ward's method, the agglomeration coefficient is the sum of the squares of distances from all cases to their cluster centres, whereas the rescaled combining distance is the rescaled joining distance (the squared Euclidean distance in this case) between the cluster centres being joined at that stage. As such, the review of the dendrogram provides a second distinct method to judge the optimal number of clusters.

Based on a review of the dendrogram (shown in Appendix N) it can be seen that there are three clear clusters. At a finer level of detail there are six identifiable groups, but the short horizontal lines produced as these groups fuse are relatively short, indicating that the cluster centres are close to each other. Applying the same logic applied to the review of the agglomeration schedule, the review of the dendrogram also indicates that three clusters is optimal.

With the cluster groups identified, the central or average DM was then calculated for each cluster. The procedure was implemented using the software originally developed in the Markóczy and Goldberg study (1995) (provided by Goldberg through private correspondence) and recompiled for use in a Windows environment. The resulting average DMs are reproduced in Appendix O.

6.4.1.3 Step 3

The dependent variables, in this case three (because there are three clusters), are prepared by calculating the DR for each DM to the cluster average map. The DR is calculated using Formula 4-5. The result is a single measure of dissimilarity between each participants DM and the average map for the cluster, as calculated in nine (the number of concepts in the matrix) dimensional Euclidean vector space. The three dependent variables were labelled CLUS1, CLUS2 and CLUS3.

6.4.2 Validate the groups

While a study of the nature of the clusters is beyond the scope of this study, the clusters were investigated to see if it was possible to identify any themes. This was done to satisfy concerns that the clustering and the resulting dependent variable might simply be an artefact of the mathematics used in the calculations and to ensure that some construct validity was evident.

6.4.2.1 Discretion Map intensity

The intensity of a DM (the sum of the cells in the DM) indicates the aggregate level of discretion a manager perceives to be available. Table 6-1 shows the intensity of the average map for each of the clusters.

Table 6-1: Average map intensity

Average map	Intensity
Cluster 1	381.7450
Cluster 2	276.3000
Cluster 3	481.0000

There is a significant difference in intensity between each of the clusters, indicating that Cluster 3 participants perceive that, at an aggregate level, managers have greater perceived discretion than either Cluster 1 or Cluster 2 participants. It is clear that at least at an aggregate level, the level or intensity of perceived discretion is captured by the clusters.

6.4.2.2 Cluster group data within the Discretion Map

To further explore the data behind the cluster intensity, the row and column sums of the average maps were analysed. The column of an average map is conceptually the perceived discretion that managers' have to influence the effect that a particular item has on the other eight elements. For example, the perceived discretion managers have to influence or mitigate the effect that net margin has on the eight other items in the matrix. The row sum captures the perceived discretion managers have to influence or mitigate the effect of the eight items on, for example, net margin. In other words the column sum is the perceived discretion to influence effect **of** net margin on other items, the row sum is the perceived discretion to influence the effect of other items **on** net margin. The results are plotted in Figure 6-2 and Figure 6-3.

A visual inspection of the graphs indicates a similar pattern across each of the item column sums (Figure 6-2) and item row sums (Figure 6-3). It would appear from this visual inspection that while the clusters are distinctly different, the differences have a lot to do with aggregate intensity. In other words cluster 3 does not appear to be different from the others because of a difference in beliefs about, for example, staff morale as opposed to any of the other items. Rather the difference is accounted for on the basis of perceived discretion across the range of items.

To further examine the apparent covariance of the items a bivariate correlation was run on the column sums and row sums for each of the 126 participants. The results are shown in Table 6-2 and

Table 6-3. As expected both the column and row sum correlations are positive, strong and significant, indicating a high level of covariance. It is apparent that while participants have discriminated in their perceived discretion to influence the effect of

different items, that is believing they can influence the effect of some items more or less than others, these differences are common across participants.

Figure 6-2: Perceived discretion to influence the effect OF items

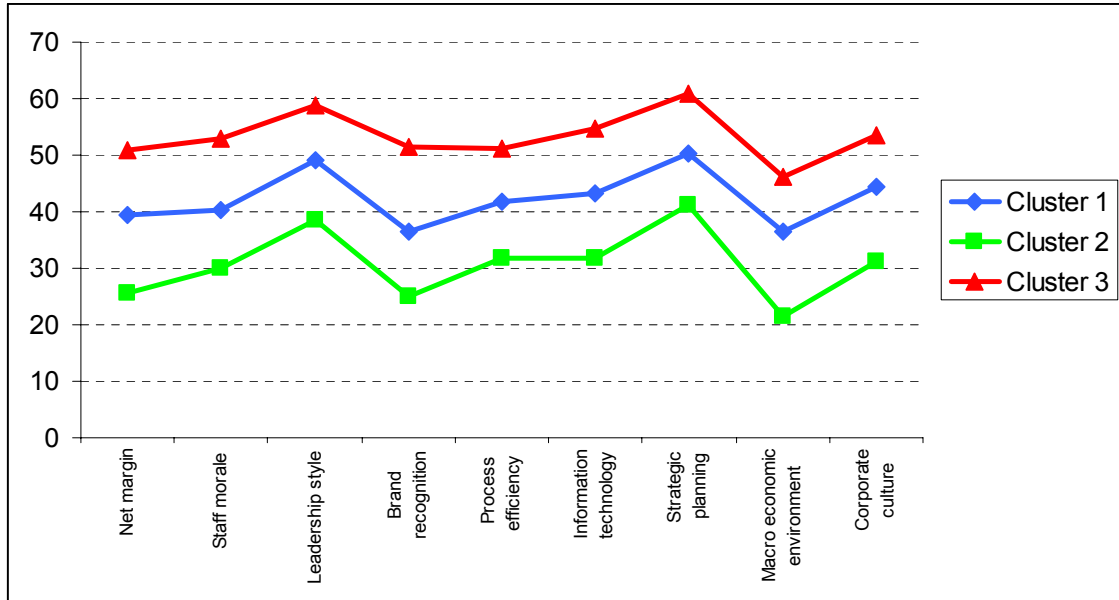


Figure 6-3: Perceived discretion to influence the effect ON items

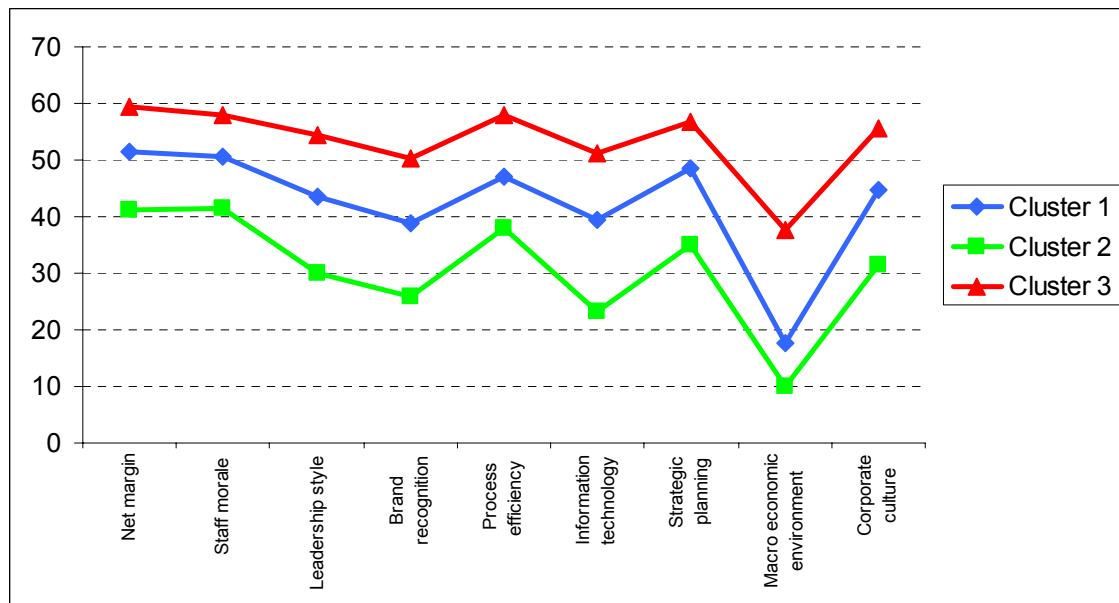


Table 6-2: Correlation of column sums

		Mediate influence of Net Margin	Mediate influence of Staff Morale	Mediate influence of Leadership Style	Mediate influence of Brand Recognition	Mediate influence of Process Efficiency	Mediate influence of Information Technology	Mediate influence of Strategic Planning	Mediate influence of Macro Economic Environment	Mediate influence of Corporate Culture
Mediate influence of Net Margin	Pearson Correlation	1	.560**	.471**	.581**	.563**	.471**	.518**	.488**	.562**
	Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Staff Morale	Pearson Correlation	.560**	1	.625**	.626**	.674**	.630**	.573**	.506**	.657**
	Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.000	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Leadership Style	Pearson Correlation	.471**	.625**	1	.633**	.497**	.604**	.669**	.512**	.628**
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.000	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Brand Recognition	Pearson Correlation	.581**	.626**	.633**	1	.617**	.663**	.636**	.601**	.641**
	Sig. (2-tailed)	.000	.000	.000	.	.000	.000	.000	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Process Efficiency	Pearson Correlation	.563**	.674**	.497**	.617**	1	.651**	.520**	.495**	.543**
	Sig. (2-tailed)	.000	.000	.000	.000	.	.000	.000	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Information Technology	Pearson Correlation	.471**	.630**	.604**	.663**	.651**	1	.668**	.484**	.614**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.	.000	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Strategic Planning	Pearson Correlation	.518**	.573**	.669**	.636**	.520**	.668**	1	.546**	.670**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.	.000	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Macro Economic Environment	Pearson Correlation	.488**	.506**	.512**	.601**	.495**	.484**	.546**	1	.497**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.	.000
	N	126	126	126	126	126	126	126	126	126
Mediate influence of Corporate Culture	Pearson Correlation	.562**	.657**	.628**	.641**	.543**	.614**	.670**	.497**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.
	N	126	126	126	126	126	126	126	126	126

** . Correlation is significant at the 0.01 level (2-tailed).

Table 6-3: Correlation of row sums

		Mediate influences on Net Margin	Mediate influences on Staff Morale	Mediate influences on Leadership Style	Mediate influences on Brand Recognition	Mediate influences on Process Efficiency	Mediate influences on Information Technology	Mediate influences on Strategic Planning	Mediate influences on Macro Economic Environment	Mediate influences on Corporate Culture
Mediate influences on Net Margin	Pearson Correlation Sig. (2-tailed) N	1 .000 126	.603** .000 126	.545** .000 126	.454** .000 126	.601** .000 126	.491** .000 126	.660** .000 126	.233** .009 126	.650** .000 126
Mediate influences on Staff Morale	Pearson Correlation Sig. (2-tailed) N	.603** .000 126	1 .000 126	.603** .000 126	.550** .000 126	.654** .000 126	.575** .000 126	.663** .000 126	.266** .003 126	.679** .000 126
Mediate influences on Leadership Style	Pearson Correlation Sig. (2-tailed) N	.545** .000 126	.603** .000 126	1 .000 126	.520** .000 126	.559** .000 126	.567** .000 126	.640** .000 126	.372** .000 126	.641** .000 126
Mediate influences on Brand Recognition	Pearson Correlation Sig. (2-tailed) N	.454** .000 126	.550** .000 126	.520** .000 126	1 .000 126	.603** .000 126	.658** .000 126	.517** .000 126	.474** .000 126	.619** .000 126
Mediate influences on Process Efficiency	Pearson Correlation Sig. (2-tailed) N	.601** .000 126	.654** .000 126	.559** .000 126	.603** .000 126	1 .000 126	.672** .000 126	.583** .000 126	.322** .000 126	.609** .000 126
Mediate influences on Information Technology	Pearson Correlation Sig. (2-tailed) N	.491** .000 126	.575** .000 126	.567** .000 126	.658** .000 126	.672** .000 126	1 .000 126	.599** .000 126	.445** .000 126	.563** .000 126
Mediate influences on Strategic Planning	Pearson Correlation Sig. (2-tailed) N	.660** .000 126	.663** .000 126	.640** .000 126	.517** .000 126	.583** .000 126	.599** .000 126	1 .000 126	.320** .000 126	.698** .000 126
Mediate influences on Macro Economic Environment	Pearson Correlation Sig. (2-tailed) N	.233** .009 126	.266** .003 126	.372** .000 126	.474** .000 126	.322** .000 126	.445** .000 126	.320** .000 126	1 .000 126	.380** .000 126
Mediate influences on Corporate Culture	Pearson Correlation Sig. (2-tailed) N	.650** .000 126	.679** .000 126	.641** .000 126	.619** .000 126	.609** .000 126	.563** .000 126	.698** .000 126	.380** .000 126	1 .000 126

** Correlation is significant at the 0.01 level (2-tailed).

So while some participants believe they have significantly higher perceived discretion to influence the effect of staff morale than do other participants, the participants who have a higher perceived discretion to influence staff morale are also likely, to varying degrees, to have a higher level of perceived discretion to influence the effect of the other items as well.

6.4.2.3 *Assessing structure within the Discretion Maps*

Reverting back to the full data set (that is merging the data from all three clusters) a factor analysis using principal component extraction was run on the column and row sums to check for any other underlying structural facets of the data within the DMs, although from a visual inspection of Figure 6-2 and Figure 6-3 there appeared to be none. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.933 and 0.924 for the row and column sums respectively, and both had a significance for Bartlett's Test of Sphericity $p=0.000$ indicating that factor analysis is appropriate for this data set (Pallant, 2001:161). Using Kaiser's criterion (cited in Pallant, 2001:154) only components with an eigenvalue of 1.0 or more should be retained for investigation and as can be seen from Table 6-4 and Table 6-5 below only one factor for either the column sums or the row sums has an eigenvalue of 1.0 or more and so no further investigation is appropriate.

Table 6-4: Total variance explained for column sums

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.658	62.869	62.869	5.658	62.869	62.869
2	.639	7.105	69.975			
3	.593	6.585	76.560			
4	.513	5.695	82.255			
5	.408	4.529	86.783			
6	.352	3.916	90.699			
7	.329	3.657	94.356			
8	.261	2.900	97.255			
9	.247	2.745	100.000			

Extraction Method: Principal Component Analysis.

From this investigation of the data it can be concluded that there is at least one significant factor construct within the data and that the clusters identified are not

simply an artefact of the mathematical process. Although it may be that the clusters are heavily biased by a single factor.

Table 6-5: Total variance explained for row sums

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.423	60.255	60.255	5.423	60.255	60.255
2	.945	10.504	70.759			
3	.578	6.419	77.177			
4	.442	4.906	82.084			
5	.407	4.519	86.603			
6	.356	3.960	90.563			
7	.345	3.835	94.398			
8	.264	2.933	97.331			
9	.240	2.669	100.000			

Extraction Method: Principal Component Analysis.

Even though a strong single component, explaining over 60% of the variance, is evident in the data, it is clear that that participants are adequately differentiating between the items. The similarity arises because participants are differentiating between the items in a similar way.

Table 6-6: Column sum statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Mediate influence of Net Margin	126	3	61	37.63	12.002
Mediate influence of Staff Morale	126	5	61	39.48	10.297
Mediate influence of Leadership Style	126	19	68	47.89	9.332
Mediate influence of Brand Recognition	126	6	65	35.50	11.279
Mediate influence of Process Efficiency	126	12	62	40.59	10.054
Mediate influence of Information Technology	126	14	72	41.95	11.330
Mediate influence of Strategic Planning	126	26	71	49.84	9.019
Mediate influence of Macro Economic Environment	126	0	67	33.66	12.939
Mediate influence of Corporate Culture	126	15	65	42.17	10.404
Valid N (listwise)	126				

The differentiation of the items is evidenced by the differences in mean, minimum and maximum values shown in Table 6-6 and Table 6-7.

It would appear that there is evidence of differences in the overall perceived discretion of participants and the most obvious differences are in level or amount of perceived discretion rather than in the nature of that discretion.

Table 6-7: Row sum statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Mediate influences on Net Margin	126	13	69	50.10	9.849
Mediate influences on Staff Morale	126	27	70	49.76	7.889
Mediate influences on Leadership Style	126	8	66	41.45	12.088
Mediate influences on Brand Recognition	126	6	58	36.98	11.622
Mediate influences on Process Efficiency	126	22	72	46.60	9.756
Mediate influences on Information Technology	126	10	62	36.47	11.897
Mediate influences on Strategic Planning	126	7	72	46.32	10.812
Mediate influences on Macro Economic Environment	126	0	55	18.38	14.101
Mediate influences on Corporate Culture	126	9	67	42.64	11.752
Valid N (listwise)	126				

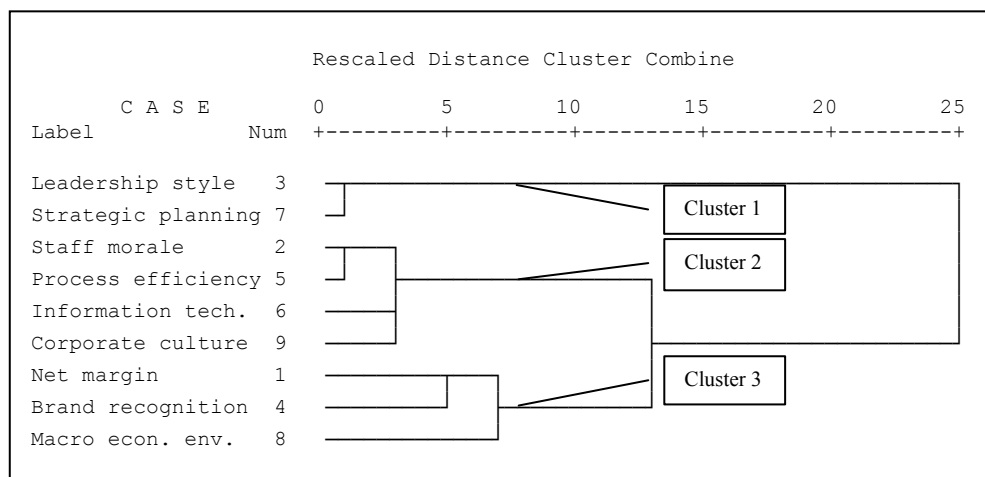
Taking a different approach, a cluster analysis was performed on the column sums using Ward's (1963) method. From a visual inspection of the dendrogram in Figure 6-4, there are three obvious clusters.

The clusters are:

- 1 Leadership Style
Strategic Planning

-
- 2 Staff morale
 - Process efficiency
 - Information technology
 - Corporate culture
 - 3 Net margin
 - Brand recognition
 - Macro economic environment

Figure 6-4: Column sum dendrogram using Ward's method



One of the challenges associated with any type of component analysis is making sense of the groupings identified. Conceptually these clusters could be identified in many different ways and it could equally be argued that there were as many differences as similarities. However “It should be remembered that in general a classification of a set of objects is not like a scientific theory and should be judged largely on its usefulness, rather than in terms of whether it is true or false” (Everitt et al., 2001:4). On this basis and given that only general indications of underlying structure are required (and their description does not influence the study outcomes) the following cluster labels are suggested:

- 1 Strategic leadership
- 2 Internal organisational factors
- 3 Competitive economic criteria

The approach to identifying cluster labels here is clearly subjective and only demonstrate facets that are indicative of an underlying structure in the data. While the cluster descriptions can make no claim to be correct or exclusive, they are indicative of *an* underlying structure, although clearly not *the* underlying structure. They do however provide support for the argument that the dependent variable is not an arbitrary construction nor the result of an unconnected mathematical phenomena.

6.4.2.4 *The relationship between map intensity and cluster average*

In a final assessment of the calculated dependent variables (CLUS1, CLUS2 and CLUS3) a correlation was run to check the relationship between the intensity of the DMs (a simple calculation of the sum of the cell in the matrix) and the distance from each of the cluster centres. This was undertaken to ensure that the dependent variables capture more than the intensity of the DM. The results in Table 6-8 show that map intensity could account for up to 25% of the difference in CLUS1, rising to 82% of the difference in CLUS3.

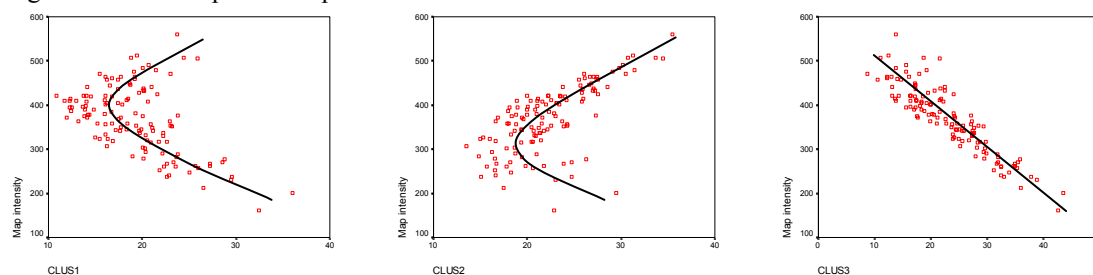
Table 6-8: Correlation of DM intensity with distance to cluster centres

		CLUS1	CLUS2	CLUS3
Map intensity	Pearson Correlation	-.502**	.666**	-.907**
	Sig. (2-tailed)	.000	.000	.000
	N	126	126	126

** . Correlation is significant at the 0.01 level (2-tailed).

Therefore while CLUS3 is a good approximation of DM intensity CLUS1 and CLUS 2 are capturing other dimensions. This is shown by the linear relationship with CLUS3 and the curvilinear relationship with CLUS1 and CLUS2 shown in Figure 6-5.

Figure 6-5: Scatter plot of map intensities and distance to cluster centres



Had all of the graphs returned a simple linear relationship, it would have indicated that the complex n dimensional structure of the DMs could be proxied by a single dimensional measure of intensity. The curvilinear relationship identified for CLUS1 and CLUS2 indicates that this is not the case and the use of the more complex cluster centre approach is justified.

6.4.2.5 Summary

The purpose of this section was to assess whether there were obvious underlying structures within the data which might indicate that the clustering of the data is supported by conceptual structures, rather than simply being an artefact of the mathematical processes applied. While the analysis in this section gives some insight into the nature of the DMs this insight is incidental to the objective of the study. The study is focused on identifying if experience and psychometric factors shape similarity in perceived discretion, without reference to the nature of the discretion. The exploration of the nature of the perceived discretion measures, while informative, is only intended to provide empirical support for the method of preparing the dependent variable.

On the basis of the insights gained, specifically in relation to:

- a) the intensity values of the cluster groups
- b) the visual inspection of the column and row sum data for the groups
- c) the high level of correlation between the item columns and the item rows
- d) the identification of a significant factor within the data
- e) the identification of clusters within the DM data and
- f) the differentiation of participants ratings across the items

it is concluded that there is sufficient evidence to accept that the differences found between cluster groups are not simply due to a mathematical artefact of the process, but rather, due to underlying structures in the data. It is also clear that while there is a correlation between a simple measure of map intensity and the distance to cluster centres in the calculated dependent variables, the calculated dependent variables also capture a more complex relationship between the DMs.

At this point the development of the dependent variables, CLUS1, CLUS2 and CLUS3, are considered to be validated as representing conceptually sound variances in perceived discretion across multidimensional criteria. Within the DMs, conceptual clusters have been identified indicating that participants discriminated across the nine items. The principal component analysis and visual inspection of the cluster row and column graphs indicate, that while the individual items cluster conceptually, they also form a single coherent dimension of perceived discretion as opposed to a set of individual disparate dimensions. Consequently the variables are deemed suitable to be applied in the full analysis and hypothesis testing.

6.5 DATA CHECKS

Before proceeding with the analysis it is necessary to screen the data set. Tabachnick and Fidell (1996:85) provide a checklist for screening data (reproduced in Table 6-9).

Table 6-9: Check list for screening data (Tabachnick and Fidell, 1996:85)

1. Inspect univariate descriptive statistics for accuracy of input
a. Out-of -range values
b. Plausible means and standard deviations
c. Univariate outliers
2. Evaluate amount and distribution of missing data; deal with the problem
3. Check pairwise plots for nonlinearity and hetroscedacity
4. Identify and deal with nonnormal variables
a. Check skewness an kurtosis probability plots
b. Transform variables (if desired)
c. Check results of transformations
5. Identify and deal with multivariate outliers
a. Variables causing multivariate outliers
b. Description of multivariate outliers
6. Evaluate variables for multicollinearity and singularity

The independent variables in this study are assessed in the sections that follow as they apply to the hypothesis being tested and the dependent variables are dealt with in this section. Steps 3, 5 and 6 are only relevant to multiple variables and are dealt with as appropriate during the statistical analyses in the sections that follow. Steps 1, 2 and 4 are considered here in the context of the dependent variables.

Following step 1 and step 2 of the check list, the dependent variables CLUS1, CLUS2 and CLUS3 were screened for out-of-range values, plausible means, standard deviations, and univariate outliers. Descriptive statistics were produced for each of the variables. A review of Table 6-10 and Table 6-11 identifies no cause for concern.

Table 6-10: Case listings for dependent variables

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
CLUS1	126	100.0%	0	.0%	126	100.0%
CLUS2	126	100.0%	0	.0%	126	100.0%
CLUS3	126	100.0%	0	.0%	126	100.0%

Table 6-11: Extreme values of dependent variables

			Case Number	Value
CLUS1	Highest	1	16	35.99218
		2	60	32.44243
		3	3	29.52747
		4	32	29.51771
		5	24	28.77748
	Lowest	1	114	10.88105
		2	126	11.75037
		3	95	11.95371
		4	57	12.24292
		5	73	12.28337
CLUS2	Highest	1	54	35.50070
		2	45	34.45432
		3	116	33.66972
		4	4	31.41019
		5	65	31.29137
	Lowest	1	79	13.50741
		2	108	14.85598
		3	110	14.95828
		4	5	15.04327
		5	28	15.31176
CLUS3	Highest	1	16	43.44312
		2	60	42.54359
		3	32	38.80210
		4	3	37.83845
		5	87	35.98698
	Lowest	1	83	8.696701
		2	17	10.50222
		3	100	11.04919
		4	109	12.20937
		5	113	12.21845

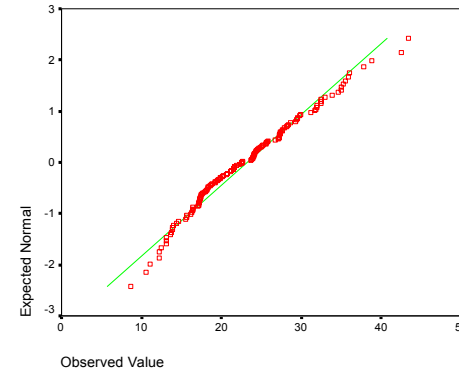
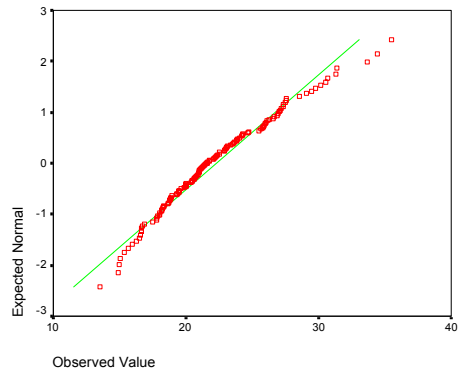
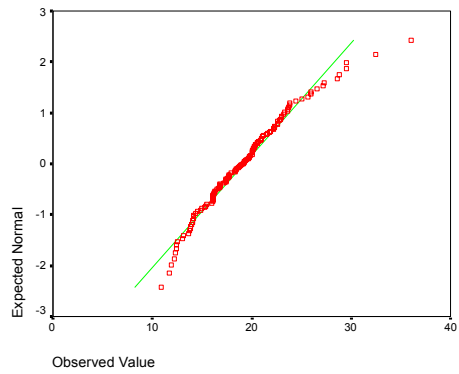
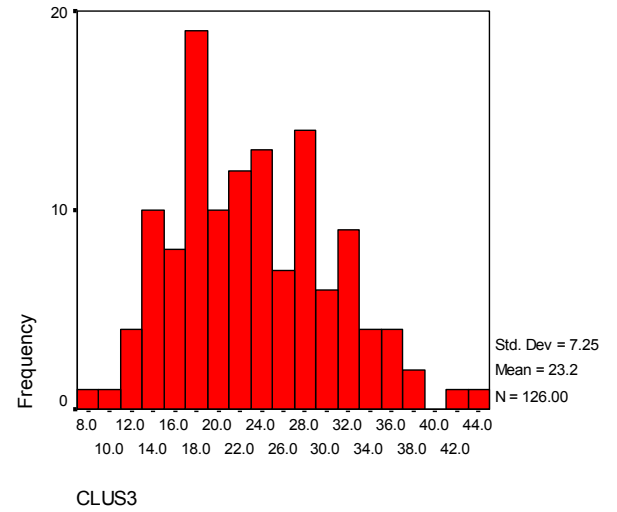
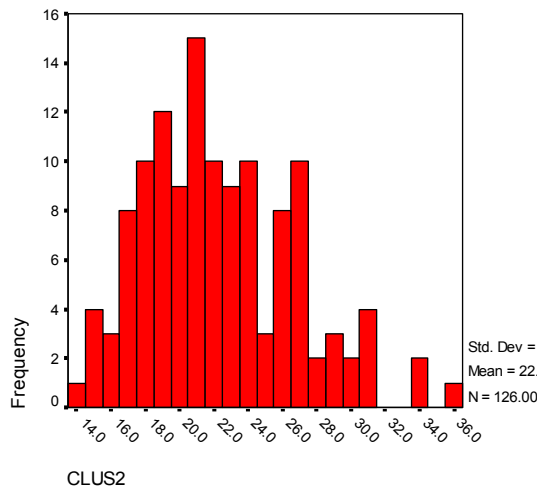
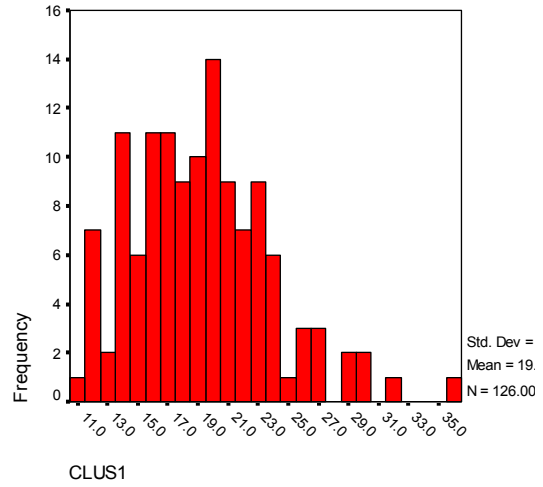
Following step four, to check for normality of the data, graphical tests were used. This is one of the most popular approaches and the Q-Q plot should resemble a straight line if normality is tenable (Stevens, 2002:264). While there are specific measures of skewness and kurtosis “in a large sample, a variable with statistically significant skewness often does not deviate enough from normality to make a substantive difference in the analysis” (Tabachnick and Fidell, 1996:74). Therefore the significance level of skewness is not as important as “the visual appearance of the distribution” (Tabachnick and Fidell, 1996:74). In large samples the impact of departure from zero kurtosis is also less substantive and underestimates of kurtosis can disappear with samples of 100 or more cases (Tabachnick and Fidell, 1996:74).

The histogram and Q-Q plots for the three dependent variables are shown in Figure 6-6. All three distributions are reasonably normal, although all have an obvious negative skew.

It could be argued that the distributions are near enough normal to be tenable and that improvements through transformation are often marginal where variables are skewed to the same moderate extent (Tabachnick and Fidell, 1996:81). However, Tabachnick and Fidell (1996:81) advise transformation of variables in all situations unless there is some reason not to. Reasons not to transform variables could include widely used or particularly meaningful scales. As the scale of DMs is neither widely used or meaningful in its own right there appears no reason to avoid transforming the data to provide a closer approximation to a normal distribution, if such a transformation will improve the analysis, although a philosophical argument for avoiding transformations is provided later.

In exploratory mode, square root and logarithm transformations were applied to the data sets of each of the distributions. The change in skewness and kurtosis is shown in Table 6-12.

Figure 6-6: Cluster DR histograms and Q-Q plots



Cluster 1 has seen a substantial improvement in both skewness and kurtosis. Cluster 2 has an improvement in skewness, but a disimprovement in kurtosis. Cluster 3 has an improvement in skewness with the square root transformation, but a disimprovement with the logarithmic transformation and a disimprovement in kurtosis with both transformations.

From this analysis it would appear that only cluster 1 benefits substantially from the transformation while the situation is much less clear for cluster 2 and cluster 3.

Table 6-12: Skewness and kurtosis measures of the dependent variables

	Skewness	Kurtosis
Cluster 1	0.726	0.923
Cluster 1 square root transformation	0.370	0.173
Cluster 1 logarithmic transformation	0.076	-0.176
Cluster 2	0.580	0.077
Cluster 2 square root transformation	0.338	-0.225
Cluster 2 logarithmic transformation	0.120	-0.358
Cluster 3	0.418	-0.312
Cluster 3 square root transformation	0.078	-0.538
Cluster 3 logarithmic transformation	-0.244	-0.411

It is not clear so far from the analysis that substantial benefits will accrue from the transformations. This is particularly so in light of the Central Limit Theorem which implies that 20 degrees of freedom is robust to violations of normality in univariate tests (Tabachnick and Fidell, 1996:72). In multivariate tests $N > 50+8m$ (where m = number of independent variables), which is 98 cases for 6 independent variables is sufficient (Tabachnick and Fidell, 1996:117). In cases of skewed distributions more cases are necessary although no specific guidelines are available to calculate this requirement (Tabachnick and Fidell, 1996:117).

To test the effect of the transformation empirically, separate linear regression analyses were run using the CLUS1 and CLUS1LOG (cluster 1 logarithmic transformation) as the dependent variables. CLUS1LOG was selected because it benefited most from the logarithmic transformation. The dependent variables were regressed on age while

controlling for gender. Table 6-13 and Table 6-14 show the model summary for both analyses.

Table 6-13: CLUS1 (raw data)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.026 ^a	.001	-.007	4.582907370
2	.027 ^b	.001	-.016	4.601396953

- a. Predictors: (Constant), Gender of respondent
- b. Predictors: (Constant), Gender of respondent, Age of respondent

Differences between the two are minimal, indicating that the analysis has not benefited substantially from the transformation. The difference in the standard error of the estimate is accounted for by the absolute change in scale caused by the transformation.

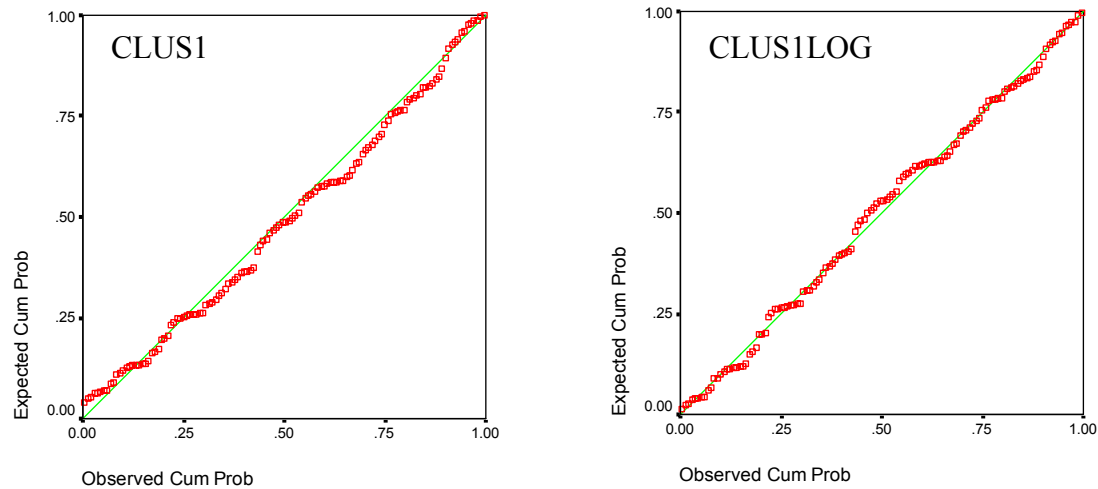
Table 6-14: CLUS1LOG (logarithmic transformation)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.027 ^a	.001	-.007	.09653
2	.027 ^b	.001	-.016	.09692

- a. Predictors: (Constant), Gender of respondent
- b. Predictors: (Constant), Gender of respondent, Age of respondent

The P-P plot or residuals for CLUS1 and CLUS1LOG, shown in Table 6-15, supports the view that little has been gained through the transformation of the variable. Both the plots are indicative of a relatively normal distribution. From this analysis it is evident that while transformation of the dependent variable improves normality, this does not add substantial benefit to further analysis. In other words the sample size is large enough to offset the skewness and kurtosis of the dependent variable indicating that a transformation is not necessary.

Table 6-15: P-P plot of regression standardised residual for CLUS1 and CLUS1LOG



In addition to the finding that a transformation is not *necessary*, it can be argued, based on the philosophical perspective of the research, that a transformation is not *appropriate*. The realist perspective in which this study is developed acknowledges perceived discretion as a concept that exists and can be measured. That is a person can have more or less perceived discretion than another person and that the relative amounts of perceived discretion may not simply be ordinal. While transformations retain the ordinal characteristics of the data they lose their relative values. So while before the transformation the data may indicate that a person has twice as much perceived discretion as another, after the transformation although the ordinal positions will be retained, the ratios will not.

There is considerable debate in the literature about the use of data transformation (Pallant, 2001:78) and the analysis presented here will not clarify a situation that statistical scholars have failed to resolve. What has been demonstrated is that in the particular case of the dependent variable in this study, there is little evidence of the benefits that would accrue from transforming the variables, while at the same time there is a philosophical reason for retaining the untransformed measure. The untransformed dependent variables will therefore be used throughout the analysis.

6.6 HYPOTHESIS 1

H1 *Managers similarity in heterogeneity of functional experience will coincide with similarity in their perception of managerial discretion.*

Variables

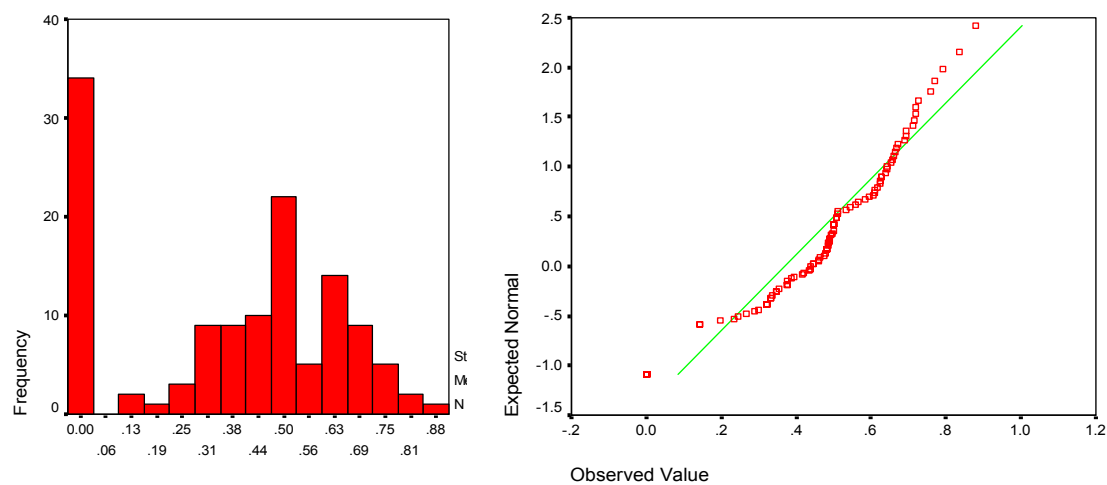
One independent variable and three dependent variables, presented in Table 6-16, are used to test this hypothesis.

Table 6-16: Variables used in H1

Variable	Description	Type
Independent	Heterogeneity of experience	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The distribution and Q-Q plots for heterogeneity of experience are shown in Figure 6-7. As is obvious from the visual inspection the number of cases recording a zero heterogeneity of experience, indicating a single function career, is skewing the distribution and makes it unsuitable for parametric analysis.

Figure 6-7: Histogram and Q-Q plot for heterogeneity of experience



Because of the skewed distribution of the data a Spearman rank correlation, which makes no assumptions about normality, was applied. As the conceptual research model hypothesises no direction of causality, that is a given independent variable may cause dependent variables to be either more or less similar, a 2-tailed test was applied. The results are shown in Table 6-17 and indicate no significant correlations between the variables.

Table 6-17: Heterogeneity of experience – non parametric correlations

			CLUS1	CLUS2	CLUS3
Spearman's rho	Heterogeneity of experience (Blau's index)	Correlation Coefficient	-.073	.075	-.108
		Sig. (2-tailed)	.418	.401	.229
		N	126	126	126

A further analysis was conducted by removing the cases with zero heterogeneity. This produces a reasonably normal distribution and a Pearson's correlation was applied. The results are shown in Table 6-18. No statistically significant correlations were identified.

Table 6-18: Heterogeneity of experience correlations

		CLUS1	CLUS2	CLUS3
Heterogeneity of experience (Blau's index)	Pearson Correlation	.049	.106	-.027
	Sig. (2-tailed)	.645	.316	.797
	N	91	91	91

The results show no support for hypothesis 1.

6.7 HYPOTHESIS 2

H2 *Managers similarity in age will coincide with similarity in their perception of managerial discretion.*

Variables

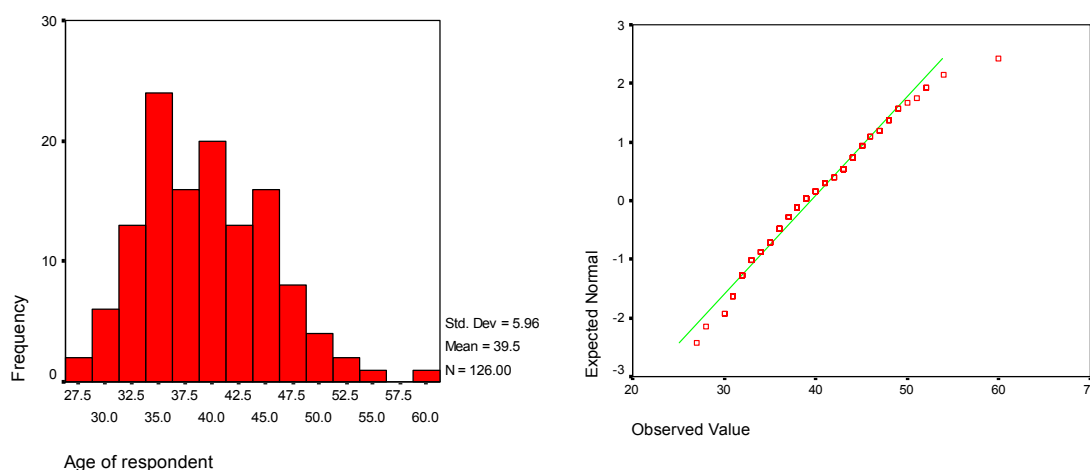
One independent variable and three dependent variables, as presented in Table 6-19, are used to test this hypothesis.

Table 6-19: Variables used in H2

Variable	Description	Type
Independent	Age	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The distribution and Q-Q plots for age are shown in Figure 6-8. A visual inspection reveals a relatively normal distribution.

Figure 6-8: Age distribution and Q-Q plot



A correlation analysis was conducted to test for significant relationships between the independent and dependent variables. The results, shown in Table 6-20, identify no significant correlations.

Table 6-20: Age correlations

	CLUS1	CLUS2	CLUS3
Age of respondent Pearson Correlation	.011	-.163	.093
Sig. (2-tailed)	.901	.067	.298
N	126	126	126

The results provide no support for hypothesis 2.

6.8 HYPOTHESIS 3

H3 *Managers similarity in length of management experience will coincide with similarity in their perception of managerial discretion.*

Variables

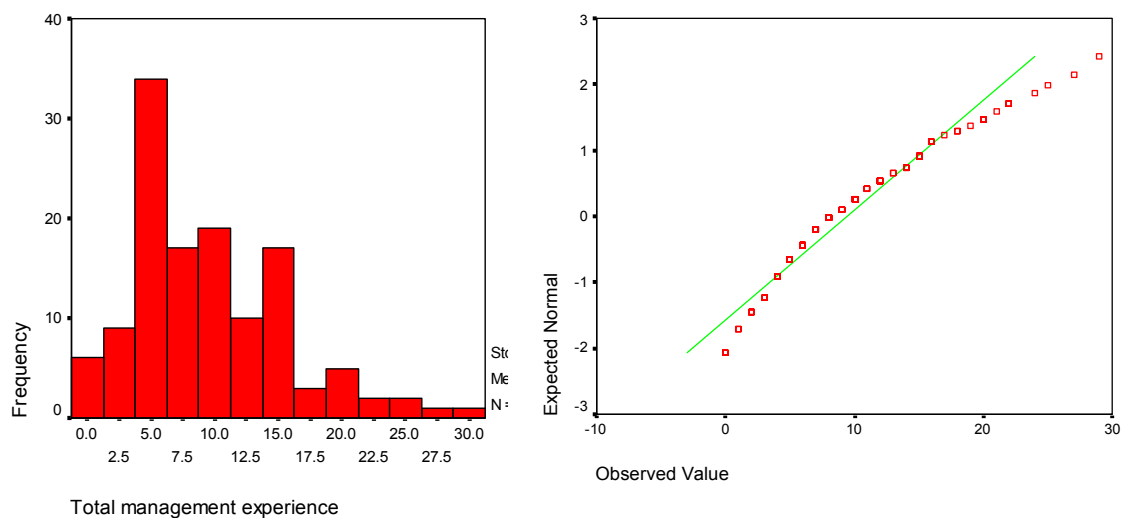
One independent variable and three dependent variables, as presented in Table 6-21 are used to test this hypothesis.

Table 6-21: Variables used in H3

Variable	Description	Type
Independent	Total management experience	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The distribution and Q-Q plot for total management experience are shown in Figure 6-9. a visual inspection reveals a significantly skewed distribution making it unsuitable for parametric analysis.

Figure 6-9: Total management experience distribution and Q-Q plot



A Spearman rank correlation was run and the results are shown in Table 6-22. No significant correlations were found.

Table 6-22: Total management experience correlations

			CLUS1	CLUS2	CLUS3
Spearman's rho	Full time work experience	Correlation Coefficient	.014	-.121	.041
		Sig. (2-tailed)	.877	.179	.645
		N	126	126	126

The results provide no support for hypothesis 3.

6.9 HYPOTHESIS 4

H4 *Managers with similar functional backgrounds will show more similarity in their perception of managerial discretion than will managers with different functional backgrounds.*

Variables

Two independent variables and three dependent variables, as presented in Table 6-23 are used to test this hypothesis.

Table 6-23: Variables used in H4

Variable	Description	Type
Independent	Functional area of most experience	Category
Independent	Functional area most associated with	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Functional area of most experience

The frequencies of the categories for functional area of most experience, are presented in Table 6-24. As the *Other* category has only two cases it was eliminated from the analysis.

Table 6-24: Functional area of most experience frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General management	27	21.4	21.4	21.4
	Operations	29	23.0	23.0	44.4
	Human resources	8	6.3	6.3	50.8
	Technical	12	9.5	9.5	60.3
	Marketing/Sales	28	22.2	22.2	82.5
	Finance	20	15.9	15.9	98.4
	Other	2	1.6	1.6	100.0
	Total	126	100.0	100.0	

The functional area of most experience variable is categorical and it is necessary to code it into j-1 bivariate dummy variables (Hardy, 1993:7) in preparation for the regression analysis. Although statistically the choice of reference group is arbitrary, the general management category was held as the reference category in this analysis, because it is a well defined group with a sufficient number of cases (Hardy, 1993:10).

Each of the dummy variables were correlated with CLUS1, CLUS2 and CLUS3 and the results are shown in Table 6-25. No significant relationships were identified.

Table 6-25: Functional area of most experience correlations

		General Management	Operations	Human Resources	Technical	Marketing /Sales	Finance
CLUS1	Pearson Correlation	.061	-.100	-.028	.077	.032	-.015
	Sig. (2-tailed)	.497	.267	.758	.392	.725	.870
	N	126	125	125	125	125	125
CLUS2	Pearson Correlation	-.026	-.052	.059	.075	.089	-.094
	Sig. (2-tailed)	.772	.566	.516	.403	.323	.300
	N	126	125	125	125	125	125
CLUS3	Pearson Correlation	.071	-.097	-.041	.029	-.014	.051
	Sig. (2-tailed)	.432	.282	.648	.751	.880	.572
	N	126	125	125	125	125	125

Functional area most associated with

The frequencies of the categories for functional area most associated with are presented in Table 6-26. As the *Other* category has only three cases it was eliminated from the analysis.

Table 6-26: Functional area most associated with frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	General Management	51	40.5	40.5	40.5
	Operations	19	15.1	15.1	55.6
	Human resources	9	7.1	7.1	62.7
	Technical	6	4.8	4.8	67.5
	Marketing/Sales	21	16.7	16.7	84.1
	Finance	17	13.5	13.5	97.6
	Other	3	2.4	2.4	100.0
	Total	126	100.0	100.0	

The remaining six categories were coded into 5 dummy variables holding general management as the reference.

Each of the dummy variables was correlated with CLUS1, CLUS2 and CLUS3 and the results are shown in Table 6-27. There is one statistically significant correlation between operations and CLUS2 with a negative correlation of 0.214 explaining 4.6% of the variation ($R^2=0.0457$) at a significance level $p<0.05$. The negative correlation is interpreted as implying that those who most associate themselves with the operations function are closer to cluster 2.

The independent dummy variables were then regressed on CLUS1, CLUS2 and CLUS3 in turn. No significant relationships were found.

The results provide very marginal support for hypothesis 4.

Table 6-27: Functional area most associated with correlations

		General Management	Operations	Human Resources	Technical	Marketing /Sales	Finance
CLUS1	Pearson Correlation	-.031	-.107	.056	.055	.133	.012
	Sig. (2-tailed)	.730	.232	.534	.540	.138	.892
	N	126	126	126	126	126	126
CLUS2	Pearson Correlation	.154	-.214*	-.026	.067	.107	-.119
	Sig. (2-tailed)	.085	.016	.773	.455	.234	.185
	N	126	126	126	126	126	126
CLUS3	Pearson Correlation	-.148	.029	.077	-.040	.110	.076
	Sig. (2-tailed)	.099	.746	.389	.656	.221	.398
	N	126	126	126	126	126	126

*. Correlation is significant at the 0.05 level (2-tailed).

6.10 HYPOTHESIS 5

H5 *Managers in similar hierarchical positions will show more similarity in their perception of managerial discretion than will managers with different hierarchical positions.*

Variables

The independent variable and three dependent variables used to test this hypothesis are presented in Table 6-28.

Table 6-28: Variables used in H5

Variable	Description	Type
Independent	Level in the organisation	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

Level in the organisation

The frequencies of the categories are presented in Table 6-29. To provide a more robust data set the First Level Management group were eliminated and the CEO/MD and Board groups were combined. This provides 6 groups for which 5 dummy variable categories were coded. The general manager category was held as the reference.

Table 6-29: Level in the organisation frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Board	8	6.3	6.5	6.5
	CEO/MD	6	4.8	4.8	11.3
	General Manager	18	14.3	14.5	25.8
	Function director	22	17.5	17.7	43.5
	Head of function	30	23.8	24.2	67.7
	Specialist	10	7.9	8.1	75.8
	Middle Management	24	19.0	19.4	95.2
	First Level Management	6	4.8	4.8	100.0
	Total	124	98.4	100.0	
Missing	System	2	1.6		
Total		126	100.0		

The independent dummy variables were regressed on CLUS1, CLUS2 and CLUS3 in turn. A significant relationship was found between hierarchical level model and CLUS2 with $R=0.375$ at a significance level of $P<0.01$. The model explains 14.1% ($R^2=0.141$) of the variance in the dependent variable with an adjusted R^2 of 0.102. The results are shown in Table 6-30 and Table 6-31. The normal probability plot produced in Table 6-10 suggests no major deviations from normality.

Table 6-30: Hierarchical level – CLUS2 model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.375 ^a	.141	.102	4.283129122

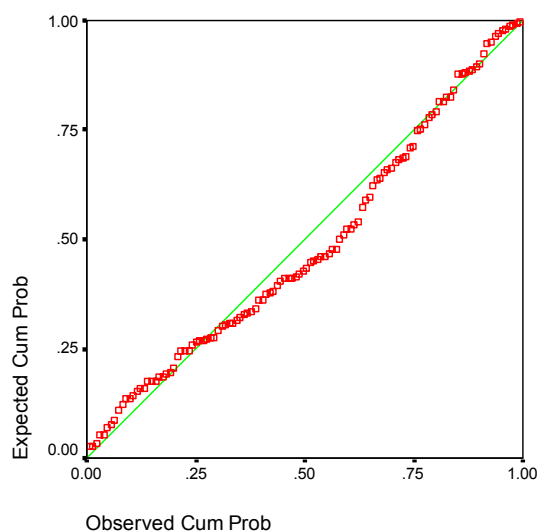
a. Predictors: (Constant), Middle management, Specialist, Board/CEO/MD, Function Director, Head of function

Table 6-31: Hierarchical level – CLUS2 regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	336.176	5	67.235	3.665	.004 ^a
	Residual	2054.662	112	18.345		
	Total	2390.838	117			

a. Predictors: (Constant), Middle management, Specialist, Board/CEO/MD, Function Director, Head of function

Figure 6-10: Hierarchical level – CLUS2 P-P plot



To ensure that the results were not confounded by age, a hierarchical regression was run controlling for age. As can be seen from Table 6-32 the relationship between age and CLUS2 is not statistically significant. The change in R^2 of 0.154, shown in Table 6-33 indicates that, with age controlled for, hierarchical level explains 15.4% of the variation in CLUS2.

Table 6-32: Age, Hierarchical level – CLUS2 regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.690	1	53.690	2.665	.105 ^a
	Residual	2337.148	116	20.148		
	Total	2390.838	117			
2	Regression	422.661	6	70.444	3.973	.001 ^b
	Residual	1968.176	111	17.731		
	Total	2390.838	117			

a. Predictors: (Constant), Age of respondent

b. Predictors: (Constant), Age of respondent, Middle management, Specialist, Board/CEO/MD, Function Director, Head of function

Table 6-33: Age, Hierarchical level – CLUS2 model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.150 ^a	.022	.014	4.488632930	.022	2.665	1	116	.105
2	.420 ^b	.177	.132	4.210857369	.154	4.162	5	111	.002

a. Predictors: (Constant), Age of respondent

b. Predictors: (Constant), Age of respondent, Middle management, Specialist, Board/CEO/MD, Function Director, Head of function

The results provide support for hypothesis 5.

6.11 HYPOTHESIS 6

H6 *Managers working in similar industries will show more similarity in their perception of managerial discretion than will managers working in different industries.*

Variables

One independent variable and three dependent variables, as presented in Table 6-34, are used to test this hypothesis.

Table 6-34: Variables used in H6

Variable	Description	Type
Independent	Industry sector	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The frequencies of the categories are presented in Table 6-35. To provide a more robust data set the *Other* category was eliminated from the analysis. This provides 4 groups for which 3 dummy variables were coded. The service category was held as the reference. No significant relationships were identified by the analysis.

Table 6-35: Industry group frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Service	51	40.5	40.5	40.5
	Distribution	18	14.3	14.3	54.8
	Manufacturing	33	26.2	26.2	81.0
	Public Sector	17	13.5	13.5	94.4
	Other	7	5.6	5.6	100.0
	Total	126	100.0	100.0	

Each of the coded dummy variables was correlated with CLUS1, CLUS2 and CLUS3 in turn and the results are presented in Table 6-36. Membership of the service category is negatively correlated with distance from cluster centre 1 at a significance of $p < 0.05$. The negative correlation is interpreted as implying that the service group are closer to the centre of cluster 1. However the level of explanation at 3.7% ($R^2 = 0.0369$) is small.

The significant positive relationship between the distribution group and cluster centre 1 can only imply that this group is less similar (more distant from the cluster centre) than are the other categories. Such positive correlations do not support the hypothesis.

Table 6-36: Industry group correlations

		Service	Distribution	Manufacturing	Public Sector
CLUS1	Pearson Correlation	-.192*	.206*	.048	-.001
	Sig. (2-tailed)	.037	.024	.606	.991
	N	119	119	119	119
CLUS2	Pearson Correlation	-.094	.111	.026	-.014
	Sig. (2-tailed)	.310	.230	.781	.881
	N	119	119	119	119
CLUS3	Pearson Correlation	-.126	.165	.023	-.020
	Sig. (2-tailed)	.173	.074	.806	.832
	N	119	119	119	119

*. Correlation is significant at the 0.05 level (2-tailed).

The results provide very marginal support for hypothesis 6.

6.12 HYPOTHESIS 7

H7 *Managers working in larger organisations will show more similarity in their perception of managerial discretion than will managers working in smaller organisations.*

Variables

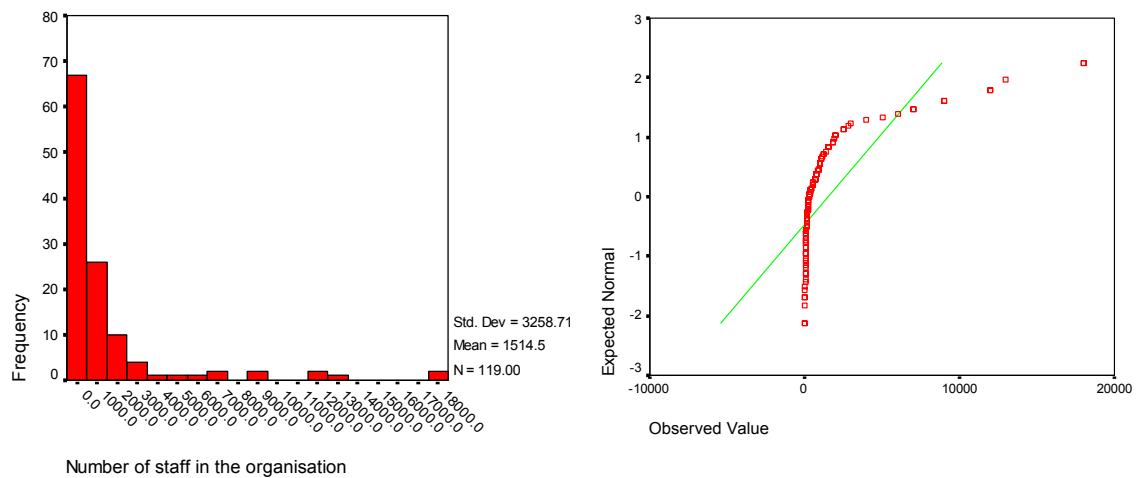
One independent variable and three dependent variables are used to test this hypothesis.

Table 6-37: Variables used in H7

Variable	Description	Type
Independent	Size of the organisation	Scale
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The distribution and Q-Q plots for size of the organisation are shown in Figure 6-11. As is obvious from the visual inspection the skewed distribution is unsuitable for parametric analysis.

Figure 6-11: Size of the organisation distribution and Q-Q plots



A Spearman rank order correlation was applied and the results are shown in Table 6-38. No significant correlations were identified.

Table 6-38: Size of the organisation correlations

			CLUS1	CLUS2	CLUS3
Spearman's rho	Number of staff in the organisation	Correlation Coefficient	-.022	-.176	.011
		Sig. (2-tailed)	.813	.056	.903
		N	118	118	118

The results provide no support for hypothesis 7.

6.13 HYPOTHESIS 8

H8 *Managers with similar education will show more similarity in their perception of managerial discretion than will managers with different educational backgrounds.*

Variables

Two independent variable and three dependent variables, as presented in Table 6-39, are used to test this hypothesis.

Table 6-39: Variables used in H8

Variable	Description	Type
Independent	Level of education	Category
Independent	Nature of 3 rd level education	Category
Dependent	Distance from cluster centre A	Scale
Dependent	Distance from cluster centre B	Scale
Dependent	Distance from cluster centre C	Scale

The frequencies of the categories are presented in Table 6-40.

Table 6-40: Level of education frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Certificate	12	9.5	10.2	10.2
	Diploma	25	19.8	21.2	31.4
	Degree or Professional	59	46.8	50.0	81.4
	Higher degree	22	17.5	18.6	100.0
	Total	118	93.7	100.0	
Missing	System	8	6.3		
Total		126	100.0		

Each of the categories was then correlated with CLUS1, CLUS2 and CLUS3. The results, presented in Table 6-41, show no significant correlations.

Table 6-41: Level of education correlations

		CLUS1	CLUS2	CLUS3
Certificate	Pearson Correlation	-.019	-.087	.020
	Sig. (2-tailed)	.836	.351	.828
	N	118	118	118
Diploma	Pearson Correlation	.084	.076	-.005
	Sig. (2-tailed)	.364	.415	.957
	N	118	118	118
Degree or Professional	Pearson Correlation	-.137	-.126	-.049
	Sig. (2-tailed)	.138	.174	.597
	N	118	118	118
Higher degree	Pearson Correlation	.103	.150	.053
	Sig. (2-tailed)	.268	.106	.571
	N	118	118	118

As no significant correlations were identified, no further analysis was carried out. The results provide no support for hypothesis 8.

Nature of 3rd level education

The frequencies associated with the categories are presented in Table 6-42.

Table 6-42: Nature of 3rd level education frequencies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Arts	8	6.3	7.4	7.4
	Business/Finance	50	39.7	46.3	53.7
	Science/Engineering	35	27.8	32.4	86.1
	Other	15	11.9	13.9	100.0
	Total	108	85.7	100.0	
Missing	System	18	14.3		
Total		126	100.0		

Each of the categories was then correlated with CLUS1, CLUS2 and CLUS3. The results presented in Table 6-43 show one significant correlation.

Table 6-43: Nature of 3rd level education correlations

		CLUS1	CLUS2	CLUS3
Arts	Pearson Correlation	.069	.090	.004
	Sig. (2-tailed)	.475	.356	.964
	N	108	108	108
Business/Finance	Pearson Correlation	-.107	-.121	-.003
	Sig. (2-tailed)	.269	.211	.979
	N	108	108	108
Science/Engineering	Pearson Correlation	.182	.024	.156
	Sig. (2-tailed)	.059	.807	.106
	N	108	108	108
Other	Pearson Correlation	-.145	.075	-.211*
	Sig. (2-tailed)	.135	.442	.028
	N	108	108	108

*. Correlation is significant at the 0.05 level (2-tailed).

The *Other* category is negatively correlated with cluster centre 3. All that can be inferred from this is that people with an education in a field other than arts, business and science are more similar in their perceived discretion. Because it is the *Other* category it cannot be inferred that people who are more similar in terms of educational background have similar perceived discretion.

As the results identified no significant correlations, no further analysis was carried out. The results provide no support for hypothesis 8.

6.14 HYPOTHESIS 9 THROUGH 13

H9 *Managers introvert/extravert preferences will coincide with similarity in their perception of managerial discretion.*

H10 *Managers with similar levels of open styles of information gathering will show more similarity in their perception of managerial discretion than will managers with different levels of openness.*

H11 *Managers with similar levels of concern for people will show larger similarities in their perception of managerial discretion than will managers with different levels of concern.*

H12 *Managers with similar levels of conscientiousness will show larger similarities in their perception of managerial discretion than will managers with different levels of conscientiousness.*

H13 *Managers with similar levels of emotional stability will show larger similarities in their perception of managerial discretion than will managers with different levels of emotional stability.*

Variables

Hypothesis H9 through H13 deal with the psychological predisposition variables as operationalised by the NEO-FFI inventory (Costa and McCrae, 1992). The scales used to test each hypothesis are presented in Table 6-44.

The big five dimensions operationalised by the NEO-FFI are distinct factors (Costa and McCrae, 1992) and so there should be no issues of with multicollinearity. To check the data set conformed to this prediction a correlation analysis was conducted between the five independent variables. As none of the correlations exceeded the limit of 0.7 (Tabachnick and Fidell, 1996:84) it was deemed appropriate to continue without concern for multicollinearity.

Table 6-44: Variables used in H9 through H13

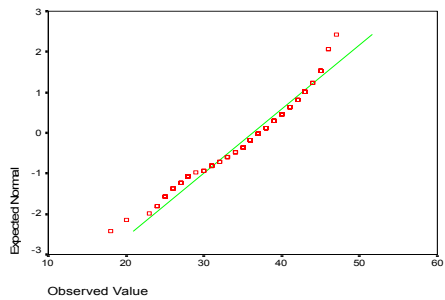
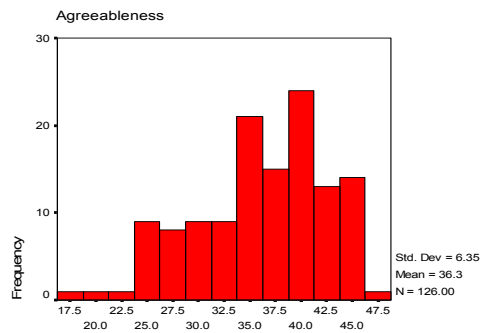
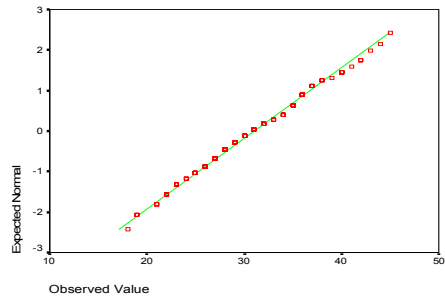
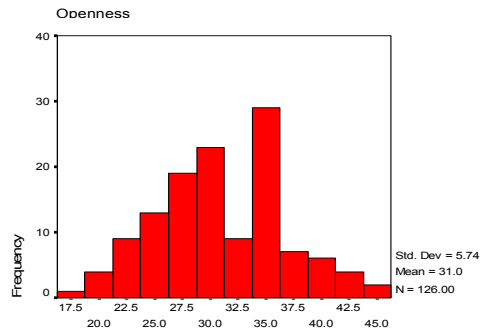
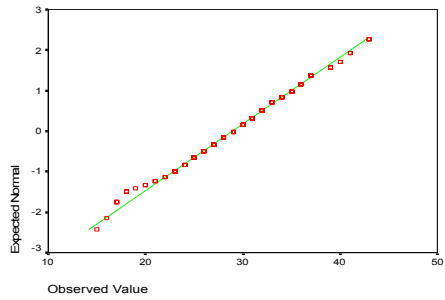
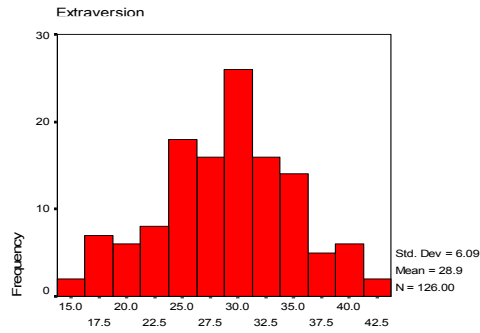
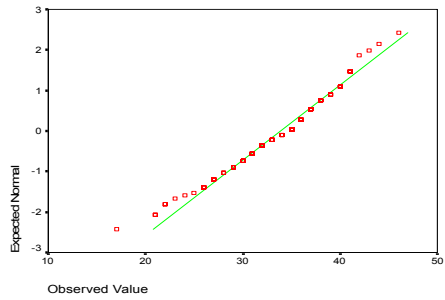
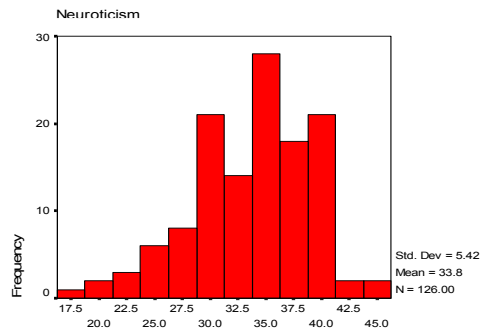
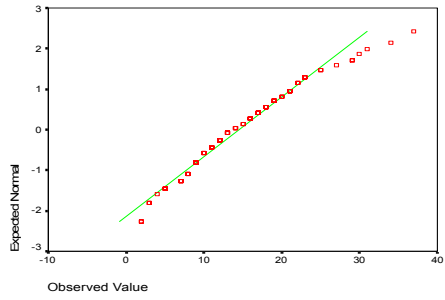
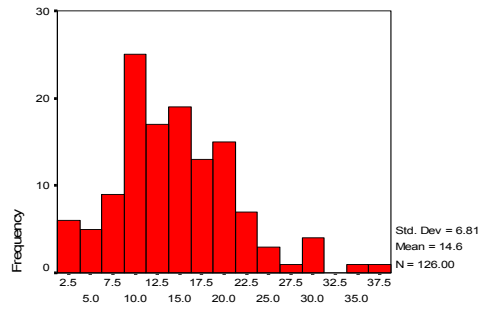
	Type	NEO-FFI Scale	Description	Type
H9	IV	Extraversion	Extraverted tendencies	Scale
H10	IV	Openness	Open information gathering style	Scale
H11	IV	Agreeableness	Concern for people	Scale
H12	IV	Conscientiousness	Conscientiousness, planful and organised	Scale
H13	IV	Neuroticism	Susceptibility to psychological distress	Scale
ALL	DV	N/A	Distance from cluster centre A	Scale
ALL	DV	N/A	Distance from cluster centre B	Scale
ALL	DV	N/A	Distance from cluster centre C	Scale

The distribution and Q-Q plots of the independent variables are shown in Figure 6-12. As all are reasonably normal they were deemed suitable for parametric tests. A correlation analysis was run between each of the independent and dependent variables and the results are shown in Table 6-45.

Significant correlations are identified for the neuroticism, extraversion and openness variables. Unlike some of the earlier analysis, both positive and negative correlations are of interest. The independent variables of N, E, O, A and C are bipolar concepts. For example, extraversion is associated with similarity to cluster centre 1 by virtue of the negative correlation with the distance score, where as introversion (the polar opposite end of the extraversion scale) is associated with similarity to cluster centre 2 by virtue of the positive correlation with the distance score.

To check for the effect of gender as a potential confounder a correlation analysis was conducted for each of the dependent variables.

Figure 6-12: N,E,O,A and C distribution and Q-Q plots



Conscientiousness

The gender split of the 126 case data set is 68% male and 32% female. As no significant correlations were found and the strongest correlation was only 0.146, gender was eliminated as a potentially confounding variable.

To test the predictive ability of the combined influence of neuroticism, extraversion and openness a hierarchical regression was conducted entering each of the independent variables in turn.

In the case of the regression on CLUS1 (Table 6-46) and CLUS3 (Table 6-48), the addition of openness added little to the predictive ability of the model, accounting for an R^2 change of 0.003 and 0.004 respectively. In the case of the regression on CLUS2 (Table 6-47) however the R^2 change was 0.146 when openness was added. To investigate the overlap in between neuroticism and extraversion when regressed on CLUS1 and CLUS3 a further hierarchical regression analysis was run first entering extraversion, then neuroticism.

Table 6-45: N, E, O ,A and C correlations

		CLUS1	CLUS2	CLUS3
Neuroticism	Pearson Correlation	.178*	-.245**	.340**
	Sig. (2-tailed)	.046	.006	.000
	N	126	126	126
Extraversion	Pearson Correlation	-.246**	.253**	-.379**
	Sig. (2-tailed)	.006	.004	.000
	N	126	126	126
Openness	Pearson Correlation	.005	.295**	-.139
	Sig. (2-tailed)	.954	.001	.122
	N	126	126	126
Agreeableness	Pearson Correlation	.112	.011	.102
	Sig. (2-tailed)	.213	.903	.258
	N	126	126	126
Conscientiousness	Pearson Correlation	-.035	.158	-.158
	Sig. (2-tailed)	.694	.078	.076
	N	126	126	126

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6-46: N, E, and O regressed on CLUS1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.178 ^a	.032	.024	4.511262688	.032	.046
2	.258 ^b	.066	.051	4.447418020	.035	.034
3	.263 ^c	.069	.046	4.459329807	.003	.559

a. Predictors: (Constant), Neuroticism

b. Predictors: (Constant), Neuroticism, Extraversion

c. Predictors: (Constant), Neuroticism, Extraversion, Openness

Table 6-47: N, E, and O regressed on CLUS2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.245 ^a	.060	.052	4.343438949	.060	.006
2	.293 ^b	.086	.071	4.300139927	.026	.063
3	.383 ^c	.146	.125	4.172653123	.060	.004

a. Predictors: (Constant), Neuroticism

b. Predictors: (Constant), Neuroticism, Extraversion

c. Predictors: (Constant), Neuroticism, Extraversion, Openness

Table 6-48: N, E, and O regressed on CLUS3

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.340 ^a	.115	.108	6.850267489	.115	.000
2	.425 ^b	.181	.167	6.619843771	.065	.002
3	.429 ^c	.184	.164	6.631177747	.004	.448

a. Predictors: (Constant), Neuroticism

b. Predictors: (Constant), Neuroticism, Extraversion

c. Predictors: (Constant), Neuroticism, Extraversion, Openness

Table 6-49: E and O regressed on CLUS1

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.246 ^a	.060	.053	4.443687879	.060	.006
2	.258 ^b	.066	.051	4.447418020	.006	.375

a. Predictors: (Constant), Extraversion

b. Predictors: (Constant), Extraversion, Neuroticism

Table 6-50: E and N regressed on CLUS3

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.379 ^a	.144	.137	6.740161571	.144	.000
2	.425 ^b	.181	.167	6.619843771	.037	.020

a. Predictors: (Constant), Extraversion

b. Predictors: (Constant), Extraversion, Neuroticism

From the results in Table 6-49 it is clear that the addition of neuroticism to the model regressed on CLUS1 adds little, with an R^2 change of just 0.006. The results in Table 6-50 also identify extraversion as the dominant influence, with extraversion accounting for an R^2 of 0.144 and neuroticism adding an R^2 change of 0.037. Therefore, while both neuroticism and extraversion are significant predictors of the dependent variable, because of the overlap between the effect of neuroticism and extraversion, extraversion can explain a substantial portion of the variation on its own.

To consider the interrelational effects of neuroticism, extraversion and openness on CLUS2, hierarchical regression were run rotating the sequence in which the independent variables were entered until the sequence with the strongest to weakest influences were identified. As can be seen in Table 6-51 this sequence coincides with the strength of correlation identified in Table 6-45. Openness explains 8.7% of the variation ($R^2=0.087$), extraversion adds a further 4.5% (R^2 change=0.045), with neuroticism adding 1.5% (R^2 change=0.015).

Table 6-51: O, E, N regressed on CLUS2

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics	
					R Square Change	Sig. F Change
1	.295 ^a	.087	.080	4.279738192	.087	.001
2	.363 ^b	.132	.118	4.190828476	.045	.013
3	.383 ^c	.146	.125	4.172653123	.015	.152

a. Predictors: (Constant), Openness

b. Predictors: (Constant), Openness, Extraversion

c. Predictors: (Constant), Openness, Extraversion, Neuroticism

While neuroticism is significantly correlated with CLUS2 and CLUS3 its effect is substantially accounted for by the presence of extraversion in the model. A significant effect of extraversion is common to all three dependent variables, openness however, is significant only to the effect on CLUS2.

While an explanation of why openness affects the variation in CLUS2 is beyond the scope of the study, it is useful to check for any obvious conceptual relationships that might provide validation. Referring to Figure 6-2 it is obvious that members of CLUS2 have less average perceived discretion than the other groups. The positive correlation between openness and CLUS2 (Table 6-45) indicates that those cases with low levels of openness (closedness) are closer to cluster centre 2, closedness therefore being correlated with lower levels of perceived discretion. This is consistent with closedness being associated with a conservative outlook (Costa and McCrae, 1992).

The results provide support for hypothesis 9, 10 and 11, but do not provide support for hypothesis 12 and 13.

6.15 SUMMARY

Overall the results provide substantial support for hypotheses H9, H10 and H11 which relate to the effect of psychological predisposition in the form of neuroticism, extraversion and openness. There is marginal support for H4 and H6 but the results are far from conclusive. Of the demographic variable hypotheses, only H5 which deals with hierarchical position, is clearly supported.

Table 6-52: Summary of results

Hypothesis	Support	Hypothesis	Support
H1	Not supported	H9	Supported
H2	Not supported	H10	Supported
H3	Not supported	H11	Supported
H4	Marginally supported	H12	Not supported
H5	Supported	H13	Not supported
H6	Marginally supported		
H7	Not supported		
H8	Not supported		

The implications of the results are discussed in the following chapter.

CHAPTER 7 - DISCUSSION

7.1 INTRODUCTION

In this chapter, the results from the full-study data analysis are considered. Conclusions are drawn in the light of these results and in the context of existing literature in the subject area. The contribution to knowledge that this thesis makes is then identified across dimensions of contribution to theory, practice, and methodology; with attention paid to the identification of confirmatory findings, extensions, developments, and new insights. Finally, several limitations of the research are identified, and future directions for researchers in the field are suggested.

7.2 DISCUSSION

The conceptual framework for this study was developed from the strategic leadership research stream, in particular upper-echelons (Hambrick and Mason, 1984), which posits that demographic characteristics are suitable – even if noisy – proxies for more fundamental psychological biases, that in turn influence behaviour in strategic choices. In light of the extant literature which challenges the use of demographic proxies and calls for explanation of the processes involved, a conceptual framework was developed to explore the black-box processes, and to consider the differential effects of demographics (in the form of experience measures), and psychological predisposition.

Figure 7-1: Confirmed hypotheses

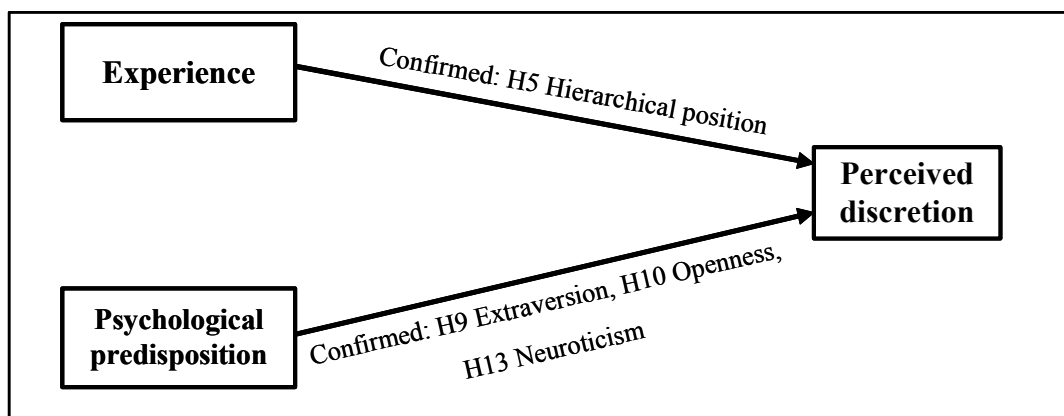


Table 7-1: Summary of results

HYPOTHESIS		RESULT
Experience		
H1	<i>Managers similarity in heterogeneity of functional experience will coincide with similarity in their perception of managerial discretion.</i>	Not supported
H2	<i>Managers similarity in age will coincide with similarity in their perception of managerial discretion.</i>	Not supported
H3	<i>Managers similarity in length of management experience will coincide with similarity in their perception of managerial discretion.</i>	Not supported
H4	<i>Managers with similar functional backgrounds will show more similarity in their perception of managerial discretion than will managers with different functional backgrounds.</i>	Very marginal support
H5	<i>Managers in similar hierarchical positions will show more similarity in their perception of managerial discretion than will managers with different hierarchical positions.</i>	Supported
H6	<i>Managers working in similar industries will show more similarity in their perception of managerial discretion than will managers working in different industries.</i>	Very marginal support
H7	<i>Managers working in larger organisations will show more similarity in their perception of managerial discretion than will managers working in smaller organisations.</i>	Not supported
H8	<i>Managers with similar education will show more similarity in their perception of managerial discretion than will managers with different educational backgrounds.</i>	Not supported
Psychological predisposition		
H9	<i>Managers introvert/extravert preferences will coincide with similarity in their perception of managerial discretion.</i>	Supported
H10	<i>Managers with similar levels of open styles of information gathering will show more similarity in their perception of managerial discretion than will managers with different levels of openness.</i>	Supported
H11	<i>Managers with similar levels of concern for people will show larger similarities in their perception of managerial discretion than will managers with different levels of concern.</i>	Not supported
H12	<i>Managers with similar levels of conscientiousness will show larger similarities in their perception of managerial discretion than will managers with different levels of conscientiousness.</i>	Not supported
H13	<i>Managers with similar levels of emotional stability will show larger similarities in their perception of managerial discretion than will managers with different levels of emotional stability.</i>	Supported

Despite a recognition in the literature that upper-echelons research takes a lopsided macro perspective (Hambrick and Mason, 1984), and challenges to the assumed proxy of demographics for psychological factors (Markóczy, 1997), little progress has been made in exploring the finer grained effects of psychological predisposition (Lawrence, 1997) or perceived managerial discretion (Hambrick and Abrahamson, 1995; Key, 2002). The conceptual framework developed for this study directly address these issues and considers the effect of two independent antecedent variable categories, experience and psychological predisposition, on perceived managerial discretion.

A review of the results summary, provided in Table 7-1 and Figure 7-1, demonstrates a single supported hypothesis dealing with the experience group of variables, and three supported hypotheses in the psychological predisposition group. The results demonstrate that psychological predisposition variables provide both more significant relationships, and the explanatory power of these relationships are also more substantive.

Referring back to the conceptual model developed in Chapter 3 (Figure 3-5), the relationship between psychological predisposition and perceived discretion has been confirmed for neuroticism, extraversion, and openness; and the relationship between experience and psychological predisposition has been confirmed for hierarchical position in the organisation.

7.2.1 Unsupported hypotheses

A number of studies consider the effect of functional experience, but they have generally been confined to a consideration of the effect of a focal functional experience. The current study applies the traditional focal function, and in addition, uses a less common approach, considering the heterogeneity of functional experience, as applied by hypothesis 1.

The results provided no support for hypothesis 1. Walsh (1995:885) also tested a similar hypothesis, that generalists show more functionally diverse work experience, and in that case also found no support for the hypothesis. In a study of MBA students Geletkanycz and Black (2001) reported significant negative correlation between diverse functional experience and a commitment to the status quo; although the correlation was insubstantial, explaining less than 1% of the variation ($r=0.09$, $p<0.05$). While it would appear conceptually appealing to believe that a generalist or open perspective is a derivative of diverse experience, and that perceived discretion might be shaped in a similar manner; the results of neither the Walsh (1988), Geletkanycz and Black (2001), or the current study provide substantive support.

Age and management experience were considered as antecedents of perceived discretion in hypotheses 2 and 3 respectively. The results provided no support for either hypothesis. The relationship between age and *similarity in beliefs* was examined by Markóczy (1997:1232; 2000:436) who found in both studies that age is correlated with *similarity in beliefs*. In a study of generational differences Schuman and Scott (1989) found that age correlated with events that were especially important to people. Their findings would appear to contradict the findings of this study, however, the specific nature of the operationalised measures may explain the different results. Schuman and Scott (1989) correlate age with events that were *important*, and Markóczy (1997; 2000) correlate age with *belief systems*; but, the operationalised measure applied by Markóczy incorporates a measure of how *important*, specific constructs are to the manager. So while age may indeed be correlated with the importance people place on events or constructs, it is not clear that age is correlated with the perceived discretion to influence those events or constructs. In other areas researchers have found that age negatively influences commitment to learning (Kolb, 1974) and positively influences commitment to learning (Klein, Astrachan and Kossek, 1996), while Rhodes (1993) in a review of the literature found conflicting evidence to support a relationship between age and beliefs. It can be concluded that while age does influence beliefs and behaviour in some contexts, the effect is not universal.

Management experience or tenure in a management team, has been treated extensively at the group level of analysis (Carpenter, 2002; Finkelstein and Hambrick, 1990; Pelled, Eisenhardt and Xin, 1999; Sutcliffe, 1994) but, there are fewer studies at the individual level of analysis. Waller et al., (1995:961), in a study at the individual level, used management experience as a control variable, and a review of the correlation tables presented in their paper identifies no significant correlations with the dependents. The results of the current study are in line with these non-findings, and no significant correlations were identified.

The test of hypothesis 4, proposing that functional background is an antecedent of perceived discretion, has received some significant but, insubstantive support in the literature. Researchers have taken a variety of operational measures to test hypotheses

of this nature, using functional affiliation at different career points (Geletkanycz and Black, 2001), terminal function role (Bowman and Daniels, 1995), and percentage of time spent in a function area (Beyer et al., 1997). The current study used two measures, the functional area in which the manager had most experience, and the functional area the manager most associated themselves with. No significant relationships were found using the functional area in which the manager had most experience; only one significant relationship ($r=-0.214$, $p<0.05$) was found using the area managers most associated themselves with (a relationship between operations and cluster centre 2). It is noteworthy that while the area managers most associate themselves with is an experience variable in the current study, it is not a demographic variable. An association is a perception of belonging to a particular group. While it maybe that association is a function of some factor of experience, it is also plausible that a manager finds an association with a function because they believe they think like people in that area; and so the measure may equally reflect a psychological predisposition component. In another study, Geletkanycz and Black (2001) found only one significant relationship between functional background and commitment to the strategic status quo, which explained less than half of one percent of the variation ($r=0.06$, $p<0.05$). Bowman and Daniels (1995) found significant and more substantive correlations in their study explaining almost 5% of the variance in participants beliefs about their own firms strategy ($r^2=0.049$, $p<0.001$). While at variance with findings in the current study, the very different conception of the dependent variable in that study, measuring belief about the focus of their organisations strategy – a measure that may actually have captured a managers belief about how important their current role is to the strategy, rather than their belief about the strategy itself – may be a contributing factor. Waller et al. (1995) report conflicting evidence of the effect of functional experience, identifying an influence in the case of organisational effectiveness, but failing to do so in the case of organisational environments. The effect of functional background is therefore an influential factor in the case of some beliefs but not others. Broadly, the findings of Bowman and Daniels (1995) in relation to beliefs about the attention paid to internal organisation issues would seem to support Waller et al.'s (1995:965) assertion that

Functional background will be found to be associated with selective perception most strongly in areas in which the cognitively directed, functionally related actions and intrinsic or extrinsic rewards associated with such actions is reliable and temporally short or and where the rewards are highly salient.

In other words functional background may be expected to influence perceptions as they relate to internal operational issues that have an immediate resonance with the managers circumstances rather than the strategically focused and consequentially temporally elongated focus of the current study.

Hypothesis 6 tested for a relationship between the industry managers operate in, and the similarity of their perceived discretion. Only very marginal support, in the form of one significant supporting negative correlation was found; the relationship between service industry and cluster centre 1 ($R^2=0.0369$, $p<0.05$). The lack of significant findings may be the result of a lack of correlation between industry context and perceived discretion, or it may have resulted from the classification of industry sector used. The data in this study was segregated along broad characteristics of service, distribution, and manufacturing. While this is a valid classification, it is not the only one. In addition, the lack of findings in this study is consistent with previous studies which have demonstrated that intra-industry segmentation – along dimensions of industry discretion (Finkelstein and Hambrick, 1990), and corporate performance (Norburn and Birley, 1988) – rather than inter-industry categories, may offer greater insight.

The relationship between organisational size and perceived discretion was tested with Hypothesis 7. It has been posited that firms with more employees must deal with a greater bureaucratic force (Mintzberg, 1978), and adapt structures accordingly (Pugh, 1969). Size of firm has also been associated with difficulties in implementing change (Aldrich, 1979) and consequently it was expected that exposure to different size organisations would shape perceived discretion. The results of this study do not support that hypothesis. This contrasts somewhat with Finkelstein and Hambrick's

(1990) finding that size correlates with strategic persistence – which would be expected to correlate with lower levels of perceived discretion. This apparent contradiction may be due to the skewed distribution of organisation size in this study. A significant proportion of smaller organisations are reported and the data may not have sufficient breadth. In addition, because of the skewed data, it was necessary to apply the less sensitive Spearman correlation statistic. The data does show a correlation ($Rho=-0.176$) between organisation size and lower overall perceived discretion (closeness to cluster centre 2) but the significance of the relationship ($P=0.056$) does not meet the required level ($p<0.05$), although the direction of the relationship is entirely consistent with the logic of Finkelstein and Hambrick (1990). Indeed if the hypothesis was conceived differently, and a directional relationship was proposed – for example, that those working in a larger organisations would exhibit lower levels of perceived managerial discretion a 1-tailed test would have been appropriate, and the result would have been returned as significant. Notwithstanding that argument, the level of explanation is small at 3% ($R^2=0.0309$).

Hypothesis 8, proposing a relationship between education and perceived discretion, was tested using both level of education and type of education. No significant relationships were found with either variable. Previous studies identified relationships between type of education (but not level of education) and decision making (Hitt and Tyler, 1991), failed to identify relationships between type of education and issue interpretation (Thomas et al., 1994), identified relationships between type of education (but not level of education) and management style (Entrialago, 2002), and failed to identify relationships between level and type of education when functional experience is accounted for (Geletkanycz and Black, 2001). The non-findings of this study relating to education type and level, support a contingency perspective on the influence of educational background. Clearly in some contexts, education – at least type of education – is an influential factor; but the influence is not universal.

Two of the five psychological predisposition hypotheses, Hypothesis 11 and Hypothesis 12, dealing with concern for people and conscientiousness respectively, were not supported. Previous research has identified the relationship of

conscientiousness, and the relationship of concern for people or agreeableness with conflict style (Moberg, 2001) and a variety of other behavioural outcomes (Costa and McCrae, 1992). While the results of this study do not call the broader utility of these variables into question; they do make it clear that similarity in perceived managerial discretion is not explained by either conscientiousness or agreeableness.

7.3 SUPPORTED HYPOTHESES

Only one of the experience based hypotheses, Hypothesis 5, dealing with hierarchical position was supported. This finding is broadly in line with other research which supported the effect of hierarchical level on the perception of organisational strengths and weaknesses (Ireland, Hitt, Bettis and de Porras, 1987), hierarchical level on strategic evaluation (Hitt and Tyler, 1991), hierarchical level on strategic interpretation and political interpretation (Thomas et al., 1994), but is in contrast with the findings of Markóczy (1997) who found no significant relationships between hierarchical level and beliefs, although that result is inconsistent with the finding of another study by Markóczy (2000) which used similar methods. Other studies have found significant relationships between hierarchical level and information preferences (Jones, Saunders and McLeod Jr., 1988), and hierarchical level and environment (but not strategic) perceptions (Pelham and Lieb, 2004).

On the basis of the empirical results of this study and the studies mentioned above, there is reason to conclude that hierarchical level does shape managers perceptions. This finding is of interest not only to the academic community, but also significantly to the practitioner community, particularly those charged with responsibility for management development. Because hierarchical level shapes perceptions, it is important to ensure that managers identified as having potential for progression, gain not only a breadth and depth of experience, but also gain the hierarchical experience that shapes their character. Indeed this finding supports Conger's (2003) assertion of the importance in identifying lynchpin roles for the development of high potential managers, a practice that has clearly been recognised as an important developmental process for several decades (Walker, 1972). In a study of American Chief Executives, Margerison and Kakabadse (1984) found that over two-thirds had been exposed to

leadership roles by 30 years of age, and over 40 percent had been exposed before 25 years of age.

However, the nature of non-experimental research means that there may be other explanatory factors not considered in the study. For example, intelligence is not measured in this study; yet intelligence has been correlated with job performance, particularly in complex roles (Schmidt and Hunter, 2004), and with career progression (Jencks, Smith, Acland, Bane, Cohen, Gintis, Heyns, and Michelson, 1972); consequently there is a correlation between level in the organisation and cognitive intelligence. The results in this study, correlating level in the organisation with perceived discretion, could therefore be a proxy for an underlying relationship between cognitive intelligence and perceived discretion. This argument, although speculative in the context of the current study, is consistent with other conceptions of the discretion and intelligence constructs. Jaques (1989) for example, deals with discretion in the context of capability to function according to the level of complexity associated with the task, and capability is defined in terms of the “exercise of judgement and discretion” (1994:10). Discretion, within Jaque’s (1989) framework of capability, is a pivotal concept as complex tasks are not open to calculable solution. Indeed he suggests that calculable solutions are inevitable, and therefore not even categorised as decisions (Jaques, 1989:33-37). The capability, to exercise discretion and judgement is therefore fundamental to operating at different levels in organisations.

While there a number of studies available to triangulate findings relating to the experience or demographic variables, the options as they relate to the psychological predisposition or personality variables are much more limited. Despite the calls for more fine grained research (Harrigan, 1983), challenges to the suitability of demographics as proxies for psychological biases (Markóczy, 1997), and continued warnings about the noise of surrogate demographic measures (Cannella, 2001; Hambrick and Mason, 1984), there are extremely few studies which deal directly with the influence of psychological biases. A recent review of upper-echelons research by Carpenter et al. (2004:771) noted that although “personality variables have long been included in the parlance of the UE [upper-echelons] literature but rarely incorporated

specifically in studies”. In their review they identify only one study (Peterson, Martorana, Smith and Owens, 2003) dealing with personality in the context of upper-echelons research, although there are a number of studies that address psychodynamic effects such as locus-of-control (Boone and De Brabander, 1996; Boone et al., 1998; Carpenter and Golden, 1997; Key, 2002; Miller and Toulouse, 1986; Miller et al., 1982). While there is an extensive range of studies dealing with the five-factor model of personality (described in Costa and McCrae, 1992), none deal directly with senior managers in a context comparable with upper-echelons research. Certainly no study deals directly with the effect of personality on perceived managerial discretion. The current study therefore stands somewhat as a lone figure in this rather barren research landscape.

This study found significant and substantial effects in the relationship between the three personality variables of neuroticism, extraversion, openness and perceived managerial discretion. The regression models employing all three variables explained 6.9% ($r^2=0.069$), 14.6% ($r^2=0.146$), and 18.4% ($r^2=0.184$) of the variation in similarity to cluster centre 1, 2 and 3 respectively. While extraversion and neuroticism explained the majority of the variation in the cluster 1 and cluster 3 variables, openness was the primary explanatory variable in the cluster 2 variable; indicating that the perceived managerial discretion variables capture multidimensional facets. These findings on their own clarify the potential for personality variables to explain managerial perceptions and beliefs. When the personality findings are combined with the broadly null findings of the demographic experience variables, the assertion that demographics are noisy surrogates (Cannella, 2001; Hambrick and Mason, 1984) is clearly supported.

The concepts of extraversion, neuroticism, and openness, while little explored in the context of upper-echelon research, have an extensive history in the psychological literature. Indeed, extraversion and neuroticism are posited to explain personality, not just from the perspective of psychological characteristics, but also to have physiological properties (Eysenck, 1967; Eysenck, 1990). Eysenck (1967; 1990) proposes that introverts levels of activity in the cortico-reticular loop are higher than

that of extraverts; neuroticism is proposed to be related to the visceral brain that produces autonomic arousal. Interestingly, the Eysenck model also predicts the collapse of two of the big five factors, agreeableness and conscientiousness, into the overarching category of psychoticism (Goldberg and Rosolack, 1994), and neither of these factors return confirmatory results in the current study.

Extraversion is widely discussed across several decades of literature and the construct has been derived from a variety of different studies adopting different methods (Botwin and Buss, 1989; Digman and Takemoto-Chock, 1981; Hakel, 1974; Hogan, 1983; Norman, 1963; Smith, 1967). Hogan (1986) describes extraversion in terms of two components, ambition and sociability. Costa and McCrae (1992) describe extraversion in terms of assertiveness, activity, and excitement-seeking, and also warmth, gregariousness and positive emotions; which have lexical parallels with ambition and sociability. Neuroticism or emotional stability also has extensive agreement in the literature (Borgatta, 1964; Conley, 1985; Lorr and Manning, 1978; Norman, 1963; Smith, 1967). Together with extraversion, they form the two principal facets of Eysenck's (1964) original framework. Costa and McCrae (1992) later described neuroticism in terms of anxiety, hostility, depression, self-consciousness, impulsiveness, vulnerability.

In studies looking at the effect of personality on leadership styles, extraversion was identified as a strong correlate of transformational leadership (Bono and Judge, 2004) and the use of an inspirational style (Cable and Judge, 2003); this is in contrast to those scoring higher on neuroticism who are less likely to use an inspirational approach. In an extensive meta-analytic study Judge et al. (2002) report similar findings, confirming that extraversion is the most consistent positive correlate of leadership emergence and leadership effectiveness, while neuroticism is the only negative correlate of the big-five and leadership, and in a military context Ployhart, Beng-Chong and Kim-Yin (2001) report similar confirmatory findings. Therefore postulating that transformational leaders exercise greater discretion, the findings of the studies just mentioned are then entirely consistent with the findings in the current study. Specifically extraversion is negatively correlated with distance from cluster centre 3

(the cluster with the highest level of aggregate perceived managerial discretion) and cluster centre 1, and conversely neuroticism is negatively correlated with distance from cluster centre 2 (the cluster with the lowest level of aggregate perceived managerial discretion). Interpreting that a negative correlation of distance means closer to the cluster centre, extraversion correlates with greater perceived managerial discretion, whereas neuroticism correlates with lower perceived managerial discretion.

Of the five personality factors considered in the current study, openness has perhaps been the one least open to common agreement. It is has been described as intellect or intellectance (Borgatta, 1964; Digman and Takemoto-Chock, 1981; Hogan, 1983), but even its more widely accepted description as openness to experience is open to debate (Digman, 1997). Although the measure is termed intellect, rather than intelligence, openness to experience has also been described as a self-report measure of intelligence (Chamorro-Premuzic and Furnham, 2004), and several studies have found that it correlates significantly (at a level of $r=0.33$) with measures of intelligence (Ackerman and Heggestad, 1997; Ashton, Lee, Vernon and Jang, 2000; McCrae and Costa, 1985).

The results of this study identify openness as a significant antecedent of perceived managerial discretion, finding a positive correlation of 0.295 with distance from cluster centre 2 (interpreted as meaning that closedness is correlated with similarity to cluster centre 2). This result maintains a logical consistency as cluster centre 2 returned the lowest aggregate value of perceived managerial discretion, closedness therefore being correlated with lower levels of perceived managerial discretion; although it is of note that the opposite correlation, of openness with higher level of perceived discretion, was not identified.

While this study has taken a psychological trait perspective to openness, there are other perspectives, which may offer alternative explanations or mediate the identified relationship. Taken as a trait openness is fixed, subconscious, and stable. Senge (1999:241-250) however, argues that openness is a system level construct, shaped through organisational social structures and process, and moreover can be changed through intervention strategies. Taking a normative approach he argues that

“entrenched mental models... thwart changes that could come from systems thinking” (Senge, 1990:203). From yet another perspective, openness is treated as a characteristic of, rather than an antecedent to, mental maps; and it is proposed that openness can be developed through training (Argyris, 1990:95). No doubt openness is in different ways influenced by learning, structures, processes, and personality traits. Clearly, from the perspective of a personality trait, openness appears to influence managers perceived discretion, but perhaps its influence will be better understood in the context of a developing, socially influenced capability.

7.4 CONCLUSION

This study focused on the development of the upper-echelons research stream in the context of calls to address the lack of understanding of the upper-echelons processes that exist within the black-box (Lawrence, 1997). Building on the extant literature in the field, a research framework was developed which proposed the pivotal role of perceived managerial discretion in place of the presumed, but poorly supported (Waller et al., 1995; Walsh, 1988), role of selective perception. Maintaining the independent variables of functional background in the study allowed the selective perception hypothesis to be evaluated, while at the same time expanding the scope of the research to include broader demographic variables, and more importantly introducing personality variables, so often discussed in upper-echelons research, but rarely implemented (Carpenter et al., 2004:771).

7.4.1 The role of experience

The largely null findings associated with the functional background variables are in contrast with the expectations that follow from Dearborn and Simon’s (1958) seminal work on selective perception. The results are in line with other challenges to Dearborn and Simon’s work in the form of the Walsh (1988), and Waller et al. (1995) studies, both of which failed to find consistent associations between functional background and selective perception in a strategic context. While these results are not conclusive evidence that selective perception does not play a role in circumstances of strategic choice, they do indicate that the effect is complex and overstated. Consequently the role of selective perception, as the implicitly presumed explanatory concept in the

black-box of upper-echelons theory is called into question. The importance of other explanatory mechanisms, such as the role of perceived managerial discretion as developed in this study, take on greater significance.

While it was hypothesised that demographic experience variables would shape the perceptions of managers, only one significant and substantive effect was found, that of hierarchical position. One explanation of the affect of hierarchical level may be the differences in experiences across levels. Ireland et al. (1987:471) argue that managers may have “some significant common historical experiences that vary across levels” although they stop short of providing examples of what these experiences might be. But if different experiences in the form of functional, organisational and educational experience do not influence managers perceptions, then why do hierarchical experiences? The difference may lie somewhere in the nature of the experience. As managers take on more senior roles the nature of the experience changes, not only in terms of the issues faced but also in terms of the responsibility that the manager holds. As managers move towards more strategic roles the nature of the experience becomes broader and less specialised, but also more significant, more complex, and more pressurised; all of which are characteristics likely to make the experience more traumatic and consequently formative. From a psychoanalytic perspective current thinking is a derivative of past formative experiences (Moore and Fine, 1968). Indeed Kisfalvi (2000) identified such past formative experiences as significant factors in the explanation of the persistent strategic behaviours of managers. Of particular relevance she noted how issues “rooted in trauma” influenced behaviour (Kisfalvi, 2000:622). In the context of this current study, the antecedent effect of hierarchical experience is perhaps explained as consequence of the formative character of the experience, a character not present in other experiences. It appears that categories of experiences, whether functional, educational or industry related do not have the same formative effect as experience of a hierarchical role.

7.4.2 The role of psychological predisposition

In an extensive review of the literature only two studies were identified that directly dealt with perceived managerial discretion. The Carpenter (1997) study considered the

antecedent affect of locus-of-control (Rotter, 1966) on perceived discretion and the Key (2002) study considered the affect of both locus-of-control and demographic variables on perceived discretion. Both studies found locus-of-control to have a significant relationship with perceived discretion. The Key (2002) study, while finding a significant relationship between locus-of-control and perceived discretion, found no significant relationships between demographic variables and perceived discretion.

Despite the insistence by leading researchers (Cannella, 2001; Hambrick and Mason, 1984) in the upper-echelons stream that demographics are noisy surrogates for psychological bases, and the challenges to the continued use of demographics (Beyer et al., 1997; Markóczy, 1997; Priem et al., 1999), personality variables are rarely incorporated (Carpenter et al., 2004:771). The principal arguments for their exclusion are that they are “not convenient to measure” (Hambrick and Mason, 1984:196) or that they are “unobservable” (Carpenter et al., 2004:750). The development of a comprehensive and broadly agreed measure of personality (Wiggins, 1996) and techniques to *observe* these measures (Peterson et al., 2003) must temper such arguments.

The current study, while recognising the difficulties associated with assessing managers personalities, sought to and succeeded in accessing the personality data of managers through the completion of personality profile questionnaires. While this approach is less convenient than accessing archival data, the results proved the process to be worthwhile. Two studies were identified as having a direct comparison with the current study through the application of psychological measures and a focus on perceived managerial discretion. The Key (2002) and Carpenter and Golden (1997) studies considered the effect of locus-of-control on perceived managerial discretion: they found significant relationships between locus-of-control and perceived discretion in organisational ethics, and perceived discretion on strategic issues respectively. While these findings are interesting in that they confirm a relationship between psychological predisposition and perceived discretion, the similarity between the instruments used in these studies for the independent and dependent variables limits the value of the findings. In both cases a measure of locus-of-control, a context free

measure of ability to influence versus be influenced, is correlated with a contextually based measure of ability to influence. As such, the findings provide little more than a construct validity of the instruments.

In the current study broad personality characteristics were included and significant relationships were found for the affect of neuroticism, extraversion, and openness on perceived discretion. The findings support the view that fundamental aspects of personality shape perceived managerial discretion. This supports, at the level of the individual, the assertion that “demographic indicators may contain more noise than purer psychological measures” (Hambrick and Mason, 1984:196).

7.4.3 The level of analysis

The non-findings from the experience group of variables present a serious challenge to the underlying assumptions in upper-echelons theory which posit that demographics, as proxies for underlying psychological biases, can predict the perceptions and ultimately the choices of managers. These non-findings are in line with Walsh’s (1988) non-findings in his replication of the Dearborn and Simon (1958) study (and it is of note that Walsh challenges the original findings of Dearborn and Simon based on a review of their data). Waller et al. (1995) obtained mixed results finding that functional background was correlated with perceptions of changes in internal organisational effectiveness, but not with perceptions of changes in the organisations external environment. Beyer et al. (1997), in a replication study of the Walsh (1988) and Dearborn and Simon (Dearborn and Simon, 1958) studies, identified only a few scattered relationships between functional background and problems identified and information attended to.

At a superficial level it could be argued that demographic research be abandoned in light of the current study findings and those mentioned above; indeed such an abandonment has been called for before (Boal and Hooijberg, 2001; Markóczy, 1997; Priem et al., 1999). If demographics cannot be shown to reliably inform researchers about the beliefs and perceptions of managers then they have little value. But while demographics, with the exception of formative experiences like hierarchical level,

have been unreliable predictors of individual beliefs and perceptions, they have provided significant predictive ability when applied at the group-level unit of analysis, the top-management-team (see for example Amason and Sapienza, 1997; Simons and Pelled, 1999; West and Anderson, 1996). This level-of-analysis difference may be central to the challenges associated with demographic research.

The multi-level issues can be identified in the development of upper-echelons theory as it was formed on the basis of selective perception. The derivation of selective perception can be described as follows. March and Simon's (1958) early work focuses on the individual concept of the organism (manager) and its memory. Memory in this context is in part a derivative of "records of past experiences" (March and Simon, 1958:10). It is these past experiences that provide managers with the "given... knowledge and assumptions about future events" (March and Simon, 1958:150). Nevertheless managers can "attend to only a limited number of things at a time" (March and Simon, 1958:151) and so have a propensity "to see those things that are consistent with their established frame of reference" (March and Simon, 1958:152), which resides in their memory and which was derived from their experience. Hence selective perception arises and managers experiences lead to a focus on issues they are familiar with. It is clear that the above focus on the level of the individual. In the development of upper-echelons theory Hambrick and Mason (1984) built on these individual notions of selective perception and transferred them to the group-level. In fact the entire language of the article, up to the point of introducing the group-level of analysis is focused on the individual, as is clear from the statement that "The manager's [singular] eventual perception of the situation combines with his/her values to provide the basis of strategic choice" (Hambrick and Mason, 1984:195). Then on the somewhat spurious basis that the concept of top team aligns with Cyert and March's (1963) concept of the dominant coalition, Hambrick and Mason switch the focus of upper-echelons research from the individual-level to the group-level of analysis, and no consideration is given as to whether the individual-level conception of selective perception might apply at group-level (Hambrick and Mason, 1984:196).

Research that followed the development of upper-echelons theory identified an unexpected twist in the use of demographic or experience variables. Research that has concentrated on individual-level experience effects on interpretation and beliefs (research consistent with the individual-level conception of selective perception) has largely failed to support the selective perception proposition (Beyer et al., 1997; Key, 2002; Sutcliffe, 1994; Thomas et al., 1994; Walsh, 1988). On the other hand, upper-echelons research that focuses on group-level demographics (applying the individual concept of selective perception at the group-level, largely without theoretical explanation) has been successful in finding relationships between group demographics and action propensity (Hambrick et al., 1996), management skills (Keck, 1997), and decision comprehensiveness (Simons and Pelled, 1999) among others.

So while demographic variables have questionable use as predictors (except where they capture formative experiences) in individual level studies, they may play a significant role in group-level studies. At an individual-level the current study has identified that formative experiences and psychological predisposition in the form of personality factors have greater utility at the individual-level.

7.5 CONTRIBUTION

A broad objective of this study was to add to the development of the upper-echelons research stream. In doing so the study aimed to address two specific aspects of criticism that have been levelled at the research stream. One, the over reliance on demographic variables, and two, to explore the black-box processes with the objective of explaining how managers matter in the context of their strategic leadership roles.

While the predominant focus of the study was to provide a contribution to theory, contributions to methodology emerged as the research was being operationalised, and consequential contributions to practice followed as a result of some of the findings. The contributions are summarised in Table 7-2. They are classified as contributing to theory, practices and methodology and are dealt with fully in the sections that follow.

Table 7-2: Contribution

	Confirmed or replicated	Further developed or added to	Contributed to new knowledge
Theory	Inconsistency of demographic variables as predictors at an individual level Need to focus on formative experience variables	Challenge to the role of selective perception as the explanation of upper-echelons black-box processes Identification of perceived discretion as a partial explanation of upper-echelons black-box processes	The specific effect of neuroticism, extraversion and openness factors on perceived managerial discretion.
Practice	Formative experiences as key determinants of managerial perceptions	The substantive role of psychological predisposition in shaping perceptions	
Methodology		Nomothetic approach to the use of causal maps	Development and application of the discretion map concept

7.5.1 Contribution to theory

Upper-echelons theory (Hambrick and Mason, 1984), at the individual-level, and theories based on the concept of selective perception (Dearborn and Simon, 1958) rely on an assumption that demographic experience variables, either as proxies for underlying psychological biases or directly as memory forming experiences, will shape perceptions and ultimately influence behaviour. The findings of subsequent research (Beyer et al., 1997; Key, 2002; Walsh, 1988), that general categories of demographic variables prove inconsistent and unreliable at the individual-level, have been confirmed in the current study. Also of note is the confirmed finding that some formative experiences, in this case hierarchical level, do shape perceptions. So while simply categorising experience in the form of demographic variables like function, age, industry has proved unreliable, a focus on formative experiences and events proves to be more reliable.

The extensive non-findings in the experience variables category calls into question the underlying assumption that selective perception, on the basis of functional experience is at play in upper-echelons theory. While managers do demonstrate differences in

their perceptions of discretion, these differences are better accounted for by personality characteristics than by the presumed experience influences.

The introduction of perceived managerial discretion into the process model of upper-echelons theory offers an alternate conception to the selective perception approach. From the results of the current study it is concluded that perceived discretion of managers ability to influence strategic issues is strongly influenced by the personality of the manager; this provides a more theoretically and now empirically grounded explanation of the black-box processes.

While personality variables have been applied extensively to explain managerial behaviour; and psychodynamic approaches, in the form of locus-of-control measures, have been applied to perceived managerial discretion; no study was identified that specifically applied the influence of managers personality profiles on perceived managerial discretion. The findings that neuroticism, extraversion, and openness shape perceived managerial discretion to influence strategic issues, is new to the field. This is particularly important in light of the non-findings associated with the presumed demographic surrogates, the lack of research applying psychological measures to senior managers, and the continued presumption in the literature that such variables are unobservable and difficult to access (Carpenter et al., 2004). The current study has demonstrated that although capturing personality measures is more cumbersome, it can be done, and the results are worthwhile.

7.5.2 Contribution to practice

The overarching objective of this research was to provide a contribution to theory. Even so, a number of the findings have a consequential contribution to the practice of management.

The identification of hierarchical experience as the primary formative experience variable is of specific interest to both the management development and the human resource management communities. While cross-functional experience and education provides some development, more formative roles that challenge developing leaders

through hierarchical responsibility in key roles, and through action-learning projects are also called for (Conger and Fulmer, 2003; Fulmer and Conger, 2004).

While formative experiences clearly play a role in shaping executives perceptions, this study has also identified the significant and substantive role of psychological predisposition in shaping perceptions. This finding is of interest to those involved in selection processes, as it validates the use of psychological assessment as part of a selection process. Clearly if perceptions are substantially influenced by personality, then a sound assessment of personality characteristics adds vital information to the selection process.

The substantial role of personality in shaping perceptions is of interest to those involved in management development, whether classroom based, coaching oriented, or on the job. Because personality shapes perceptions, or in other words creates biases, it is vital that managers are aware of these biases in order to broaden their range of choices. As part of the process of the data collection in this study, the assessment of personality was integrated into case studies exploring the roles of managers, and the implications of their biases in the process of large strategic change projects. Participants were able to assess the personality of actors in the case and identify the biases that they exhibited. Then, having received feedback on their own personality characteristics, they explored their own biases in similar contexts. This process has proved extremely useful and is now routinely incorporated in a range of senior executive development programmes at the Irish Management Institute. At the time of writing over 250 senior managers have benefited from this approach.

7.5.3 Contribution to methodology

This study adapted the approach of capturing and comparing cognitive maps developed by Langfield-Smith and Wirth (1992), and further developed by Markóczy (1995). The use of ideographic or nomothetic approaches to capture cognitive maps has been the subject of voracious debate (Daniels and Johnson, 2002; Daniels et al., 2002; Hodgkinson, 2002). Broadly the argument is that nomothetic approaches induce convergence (making it less likely that differences between maps will be identified),

where as ideographic approaches induce divergence (leading to differences that amount to no more than surface level triviality) (Hodgkinson, 2002:65). Markóczy and Goldberg (1995) used an intermediate approach, allowing participants to select the 10 most important items from a list of 40 to 50. This ensured that participants would notice duplicates, and at the same time ensured that there would be enough overlap of selected items to allow comparison across participants.

While the approach adopted Markóczy and Goldberg (1995) creates a balance between ideographic and nomothetic approaches it comes at considerable cost. Participants are required to select the 10 most important items from the list and then conduct the pairwise ratings. As a result the variable contains both the causal relationship between the variables, but also a component of item *importance*. The difficulty arises because importance is a very different concept to causal relationship, and in cases where all items overlap, distance between maps is based on differences in causal relationships, whereas in cases where there is little overlap distances between maps is based on item selection on the basis of importance. In addition to these conceptual difficulties, the use of this intermediate approach creates significant mathematical complication in the comparison of the maps and these mathematical difficulties in turn create conceptual difficulties in terms of what is and is not being captured in the distance measure.

The approach taken in this study moved from a broad list to a fixed list of constructs. This, apart from being more appropriate to the realist philosophy that underpins this thesis, creates a more conceptually sound variable, with distance between participants maps based on causal relationships alone. As this more nomothetic approach induces convergence, differences that emerge can be said to have met a more stringent test, and are unlikely to include surface level trivialities. The use of a fixed list also allowed the mathematical formulation of the distance measures to be simplified and made more robust through the use of a metrical Euclidian norm. The result is a robust and conceptually sound variable which, in light of the significant findings in the study, was not hampered by data convergence.

The concept of the discretion map, as an extension of the causal map, was developed specifically for this study. No reference could be found to this approach having been used elsewhere. The standard causal mapping approach requires a participant to rate the causal relationship between two constructs. For example, a participant could be asked to rate the causal relationship between the engine size of a car and its top speed. In such cases the participant is making an observation about two objective pieces of data without consideration of their interaction in that relationship. The discretion map extends this notion and requires participants not only to identify if there is a causal relationship, but if there is a causal relationship, to what extent that relationship can be influenced. In the case of the engine size to top speed relationship, participants might recognise a strong causal relationship and also recognise that the driver has substantial influence over this relationship. Where as, if the participant recognised a causal relationship between engine size and servicing costs, they may feel that they can do little to influence the relationship. This extension to the causal map concept, while relatively simple, is extremely significant as it captures not only a participants beliefs about a causal relationship, but also their perception of ability act on that relationship.

7.6 LIMITATIONS

Several limitation of this study must be acknowledged. One limitation is the content of the discretion map or contextual measure of perceived managerial discretion. The content list of the map was developed using a nomothetic approach. Participants were given no opportunity to add or to change the items presented. The result is an elicitation of participants beliefs relative to a fixed set of constructs. Although every effort was made to ensure that the items were clear and recognisable participants may have attached different meanings to the items and attached relevance to some more than others. Distances calculated between maps may therefore contain a spurious element based on relevance and understanding. However while an interpretivist based ideographic approach would address this limitation, such an approach severely limits the potential for statistical analysis called for in this study.

Second, the fixed list provides a measure of perceived discretion based only on a limited set of items. Perceived discretion as it relates to different items or aspects of belief systems may produce different results. For example, items accessing more

emotive issues such as corporate social responsibility, might elicit responses more associated with personal values and organisational context than personality.

Third, regardless of how comprehensive or accurate a list is in capturing a specific domain of cognition, it will suffer from some form of domain overlap. Domains, for example that of long term organisational success as applied in this study, are not unique, whole, or isolated; human cognition is complex and dynamic and any measure can only assess a particular facet at a moment in time.

Fourth, the sample of participants were almost exclusively based in Ireland, and of Irish nationality. The results are therefore not generaliseable across cultures or geography.

Fifth, the strongest regression solution explained approximately 20% of the variance. Clearly there are other factors at play and future research should aim to improve the amount of variance explained and identify additional factors that explain the variance.

Sixth, a major shortcoming of studies of cognition is the failure to use “real-life conditions” (Stubbart, 1987:46). This study suffers from this shortcoming, although it is less significant because it explicitly aims to explore perceived discretion rather than actual or enacted discretion. Even so, it is important to recognise that the discretion maps captured may be more akin to theory-espoused rather than theory-in-use (Argyris, 1991).

Seventh, because the study is focused at the individual-level, it does not capture any of the enactment processes that take place at the group-level. When senior managers engage at the group-level, perceptions are shaped by the both political and power influences as discussions of alternatives are transacted (Kakabadse and Kakabadse, 1999).

Eighth, the study is based on perceived discretion and not discretionary behaviour. While in the broader research framework there is a presumed causal link between perceived discretion and enacted discretion, this link is not tested in the current study.

Ninth, the study is a field study and as such takes place in an open system subject to uncontrolled influences. While the framework developed proposes a direction of causality, the field-study, as opposed to experimental study approach, means that no manipulation of the variables is possible and so causality is presumed but not tested. This means that while consistent with the framework, the proposition that hierarchical level shapes perceived discretion is statistically untested.

7.7 FUTURE RESEARCH

Traditionally data used in upper-echelons research has come from public sources such as annual reports, letter to shareholders and directories (Carpenter et al., 2004), and this convenience sampling method has encouraged researchers to stay with demographic based research in the face of growing criticism about its utility (Lawrence, 1997; Markóczy, 1997; Priem et al., 1999). This focus on a mono-dimensional aspect of the research has resulted in a failure of the research stream to conduct the iterative and reflective development (Lawrence, 1997) required of good theory (Whetten, 1989). Future research should focus not only on the instrumental approaches, but also on the explanation of the how individual and group level factors are transacted and so build a micro as well as a macro understanding of upper-echelon theory.

While upper-echelons research is built upon the individual-level concept of selective perception, it is operationalised at the group-level with a focus on top management teams. The utility of studying the top management team in aggregate is not disputed (Carpenter et al., 2004:768), but it should not remain the sole or even predominant approach. Individual-level effects of personality, power, values, and orientation all play a role in the shaping the process and performance of top management teams (Boal and Hooijberg, 2001). In addition to a focus on the effect of individual managers on top management team processes, the effect of external connection of individuals needs to be considered, and research has identified the effect of executive celebrity (Hayward and Hambrick, 1997), and external networks (McDonald and Westphal, 2003) on the strategic alternatives. Future research should not exclude group-level analysis but it

will be greatly enhanced by the recognition and inclusion of individual-level influences.

Since its inception upper-echelons theory has consistently identified demographic characteristics as proxies for more complex psychological factors (Cannella, 2001; Carpenter et al., 2004; Hambrick and Mason, 1984). Despite this insistence research has remained stubbornly towards the macro, instrumental, and demographic end of the scale. The traditional arguments for this focus include difficulty of accessing personality information, and its unobservability. Progress in the development of a broadly agreed set of personality factors (Costa and McCrae, 1992) and easily administered self report measures, together with methodological approaches to *observe* personality factors (Peterson et al., 2003) are rapidly negating the demographic argument. Researchers now have the opportunity “to supplement simplistic measures of demographic profiles with richer measures” (Carpenter et al., 2004:772). The current study has made progress in this regard. The proposition that demographics are poor surrogates, if surrogates at all, for complex human psychology has been confirmed. Future research should take this finding into account, and begin the process of rebalancing the macro oriented demographic face of upper-echelons research with fine grained research that captures the richness and complexity of human psychology in shaping the strategic options of managers.

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APPENDIX A : EXPERIENCE VARIABLES QUESTIONNAIRE



**Strategic Leadership
Research Programme**



		<i>Official Use Only</i>
Name:	_____	01. id ...
Organisation:	_____	02. org ...
Address:	_____	

Phone:	_____	
Email:		
Industry/sector	_____	
Total number of full time staff in this part of the organisation:	_____	
Your current position / title:	_____	
How long have you been in this position? (years):	_____	
How long have you been in this management team? (years):	_____	03. industry ...
What is your total experience in top management teams? (years):	_____	04. size ...
Who do you report to? :	_____	05. level ...
Number of staff who report directly to you:	_____	06. tenure_p ...
Year of your birth:	_____	07. tenure_p ...
Your gender: Male <input type="checkbox"/> Female <input type="checkbox"/>		08. tmt_exp ...
		09. reportto ...

Previous Experience

Functional area	Manager (Y/N)	Years in area
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Total years of full-time work experience: _____

Number of years in management positions: _____

3rd level education

Function/Area	Pre/post experience	Level	Award year
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Which functional area do you most associate yourself with? _____
(None or general management are acceptable answers.)

How strong is your association to the functional area you selected in the question above? Strong Moderate Weak

APPENDIX B : DOMAIN DESCRIPTIONS OF THE NEO-FFI

The following is an extract from the NEO PI-R Professional Manual (Costa and McCrae, 1992). The content makes extensive reference to the NEO PI-R personality instrument. The NEO-FFI used in this study is an abbreviated version of the NEO PI-R, by the same authors, which has been adapted to suit this type of research requirement. The five domains are however the same for both instruments and in the following sections where the text references NEO PI-R the reader can assume it also refers to NEO-FFI.

The Five-Factor Model of Personality

The Neo PI-R was developed to operationalize the five-factor model of personality, a representation of the structure of traits which was developed and elaborated over the past four decades (Digman, 1990). The five factors represent the most basic dimensions underlying the traits identified in both natural languages and psychological questionnaires.

One major line of research, the lexical tradition (John, Angleitner and Ostendorf, 1988), began with an analysis of trait adjectives found in English and other natural languages. Words like *nervous*, *energetic*, *original*, *accommodating*, and *careful* evolved over the course of centuries to allow individuals to describe themselves and others. Thousands of such words are found in the dictionary, and trait theorists like (Cattell, 1946) and (Norman, 1963) proposed that this list of terms could be considered an exhaustive enumeration of personality traits. By factor analyzing ratings on all these adjectives, they argued, one should uncover the structure of personality traits themselves. Through a series of studies, this research led to the identification of five factors (John, 1990).

Although derived from an analysis of lay terms, these factors were familiar to personality psychologists who had studied similar traits. Since 1985, research using the NEO-PI has demonstrated that the same five factors can account for the major dimensions in personality questionnaires designed to measure Jungian functions, Murray's needs, the traits of the Interpersonal Circumplex, and the DSM-III-R personality disorders (McCrae and Costa, 1990). It appears that these factors are indeed comprehensive.

Factors are defined by groups of intercorrelated traits. We refer to these more specific traits as *facets*, and each cluster of facets as a *domain*. Summing the facet scales yields the domain score, which can be thought of as an approximation to the factor score. Factor scores are calculated directly by the computer scoring systems.

By describing the individual's standing on each of the five factors, we can provide a comprehensive sketch that summarizes his or her emotional, interpersonal, experiential, attitudinal, and motivational styles.

The Five Domains

The first step in interpreting a NEO PI-R [or NEO-FFI] profile is to examine the five domain scales to understand personality at the broadest level. This section describes each of the domains or factors and presents basic definitions as well as crucial distinctions.

Neuroticism (N)

The most pervasive domain of personality scales contrasts adjustment or emotional stability with maladjustment or neuroticism. Although clinicians distinguish among many different kinds of emotional distress, from social phobia to agitated depression to borderline hostility, innumerable studies have shown that individuals prone to any one of these emotional states are also likely to experience others (Costa and McCrae, 1992). The general tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt, and disgust is the core of the N domain. However, N includes more than susceptibility to psychological distress. Perhaps because disruptive emotions interfere with adaptation, men and women high in N are also prone to have irrational ideas, to be less able to control their impulses, and to cope more poorly than others with stress.

As the name suggests, patients traditionally diagnosed as suffering from neuroses generally score higher on measures of N (e.g., Eysenck and Eysenck, 1964). But the N scale of the NEO PI-R, like all its other scales, measures a dimension of normal personality. High scorers may be at risk for some kinds of psychiatric problems, but the N scale should not be viewed as a measure of psychopathology. It is possible to obtain a high score on the N scale without having any diagnosable psychiatric disorder. Conversely, not all psychiatric categories imply high levels of N. For example, an individual may have an Antisocial Personality Disorder without having an elevated N score.

Individuals who score low on Neuroticism are emotionally stable. They are usually calm, even-tempered, and relaxed and they are able to face stressful situations without becoming upset or rattled.

Extraversion (E)

Extraverts are, of course, sociable, but sociability is only one of the traits that comprise the domain of Extraversion. In addition to liking people and preferring large groups and gatherings, extraverts are also assertive, active, and talkative. They like excitement and stimulation and tend to be cheerful in disposition. They are upbeat, energetic, and optimistic. Salespeople represent the prototypic extraverts in our culture, and the E domain scale is strongly correlated with interest in enterprising occupations (Costa et al., 1984).

While it is easy to convey the characteristics of the extravert, the introvert is less easy to portray. In some respects, introversion should be seen as the absence of extraversion rather than what might be assumed to be its opposite. Thus, introverts are reserved rather than unfriendly, independent rather than followers, even-paced rather than sluggish. Introverts may say they are shy when they mean that they prefer to be alone: they do not necessarily suffer from social anxiety. Finally, although they are not given to the exuberant high spirits of extraverts, introverts are not unhappy or pessimistic. Curious as some of these distinctions may seem, they are strongly supported by research and form one of the most important conceptual advances of research on the five-factor model (Costa and McCrae, 1980; McCrae and Costa, 1987). Breaking the mental sets that link such pairs as "happy - unhappy," "friendly - hostile," and "outgoing - shy" allows important new insights into personality.

Users familiar with Jungian psychology should note that the conceptualization of Extraversion embodied in the NEO PI-R differs in many respects from Jung's (1923) theory. In particular, introspection or reflection is not related to either pole of E, being instead a characteristic of individuals who are high on Openness to Experience. Further discussion of these points is provided in McCrae and Costa (1989).

Openness (O)

As a major dimension of personality, Openness to experience is much less well known than N or E. The elements of O - active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, intellectual curiosity, and independence of judgement--have often played a role in theories and measures of personality, but their coherence into a single broad domain has seldom been recognized. The NEO PI-R Openness scale is perhaps the most widely researched measure of this broad domain (McCrae and Costa, 1985). Open individuals are curious about both inner and outer worlds, and their lives are experientially richer. They are willing to entertain novel ideas and unconventional values, and they experience both positive and negative emotions more keenly than do closed individuals.

Alternative formulations of the five-factor model often label this factor *Intellect*, and O scores are modestly associated with both education and measured intelligence. Openness is especially related to aspects of intelligence, such as divergent thinking, that contribute to creativity (McCrae, 1987). But Openness is by no means equivalent to intelligence. Some very intelligent people are closed to experience, and some very open people are quite limited in intellectual capacity. In a factor analytic sense, measures of cognitive ability form a sixth, independent factor that we regard as being outside the domain of personality proper.

Men and women who score low on O tend to be conventional in behaviour and conservative in outlook. They prefer the familiar to the novel, and their emotional responses are somewhat muted. Although openness or closedness may influence the form of psychological defense used (McCrae & Costa, in press), there is no evidence that closedness itself is a generalized defensive reaction. Instead, it seems likely that closed people simply have a narrower scope and intensity of interests. Similarly, although they tend to be socially and politically conservative, closed people should not be viewed as authoritarians. Closedness does not imply hostile intolerance or authoritarian aggression. These qualities are more likely to be signs of extremely low Agreeableness.

A related distinction must be made at the open pole. Open individuals are unconventional, willing to question authority, and prepared to entertain new ethical, social, and political ideas. These tendencies, however, do not mean that they are unprincipled. An open person may apply his or her evolving value system as conscientiously as a traditionalist does. Openness may sound healthier or more mature to many psychologists, but the value of openness or closedness depends on the requirements of the situation, and both open and closed individuals perform useful functions in society.

Agreeableness (A)

Like Extraversion, Agreeableness is primarily a dimension of interpersonal tendencies. The agreeable person is fundamentally altruistic. He or she is sympathetic to others and eager to help them, and believes that others will be equally helpful in return. By contrast, the disagreeable or antagonistic person is egocentric, skeptical of others' intentions, and is competitive rather than cooperative.

It is tempting to see the agreeable side of this domain as both socially preferable and psychologically healthier, and it is certainly the case that agreeable people are more popular than antagonistic individuals. However, the readiness to fight for one's own interests is often advantageous, and agreeableness is not a virtue on the battlefield or in the courtroom. Skeptical and critical thinking contributes to accurate analysis in the sciences.

Just as neither pole of this dimension is intrinsically better from society's point of view, so neither is necessarily better in terms of the individual's mental health. (1945) discussed two

neurotic tendencies--moving against people and moving toward people - that resemble pathological forms of agreeableness and antagonism. Low A is associated with Narcissistic, Antisocial, and Paranoid Personality Disorders, whereas high A is associated with the Dependent Personality Disorder (McCrae and Costa, 1990).

Conscientiousness (C)

A great deal of personality theory, particularly psychodynamic theory, concerns the control of impulses. During the course of development most individuals learn how to manage their desires, and the inability to resist impulses and temptations is generally a sign of high N among adults. But self-control can also refer to a more active process of planning, organizing, and carrying out tasks' and individual differences in this tendency are the basis of Conscientiousness.

The conscientious individual is purposeful, strong-willed, and determined, and probably few people become great musicians or athletes without a reasonably high level of this trait. Digman and Takemoto-Chock (1981) refer to this domain as *Will to Achieve*. On the positive side, high C is associated with academic and occupational achievement; on the negative side, it may lead to annoying fastidiousness, compulsive neatness, or workaholic behaviour.

Conscientiousness is an aspect of what was once called *character*, high C scorers are scrupulous, punctual, and reliable. Low scorers are not necessarily lacking in moral principles, but they are less exacting in applying them, just as they are more lackadaisical in working toward their goals. There is some evidence that they are more hedonistic and interested in sex (McCrae et al., 1986).

APPENDIX C : SAMPLE DISCRETION MAPS

Discretion Map A

0	3	2	3	3	1	3	3	1
3	0	3	3	3	3	3	3	3
2	2	0	2	2	2	3	2	3
3	1	3	0	1	1	2	3	2
2	3	3	2	0	3	3	2	1
2	3	2	1	3	0	3	3	3
3	3	3	3	2	3	0	3	3
2	0	2	2	0	0	2	0	1
3	2	3	2	1	2	2	3	0

Discretion Map B

0	3	3	3	3	3	3	3	2
2	0	3	1	2	1	2	2	2
2	1	0	2	0	3	2	3	2
0	2	3	0	0	0	3	2	2
2	3	2	0	0	3	3	2	1
3	0	2	0	0	0	3	0	1
3	2	3	3	3	3	0	2	2
1	0	0	1	0	0	0	0	0
2	0	3	2	1	0	3	1	0

Discretion Map C

0	3	3	3	3	2	3	3	2
0	0	3	2	0	2	3	1	3
0	0	0	0	0	0	2	2	3
0	0	2	0	0	0	3	0	1
0	1	2	0	0	3	3	1	3
0	0	2	0	0	0	2	3	1
3	2	3	3	0	0	0	3	3
0	0	0	2	0	2	3	0	0
0	2	3	0	0	0	2	0	0

APPENDIX D : SAMPLE DISTANCE MATRIX

diff(A,B)

0	0	1	0	0	2	0	0	1
1	0	0	2	1	2	1	1	1
0	1	0	0	2	1	1	1	1
3	1	0	0	1	1	1	1	0
0	0	1	2	0	0	0	0	0
1	3	0	1	3	0	0	3	2
0	1	0	0	1	0	0	1	1
1	0	2	1	0	0	2	0	1
1	2	0	0	0	2	1	2	0

$$\text{distance (A,B)} = \sum_{i=1}^p \sum_{j=1}^p d_{ij} = 63$$

diff (A,C)

0	0	1	0	0	1	0	0	1
3	0	0	1	3	1	0	2	0
2	2	0	2	2	2	1	0	0
3	1	1	0	1	1	1	3	1
2	2	1	2	0	0	0	1	2
2	3	0	1	3	0	1	0	2
0	1	0	0	2	3	0	0	0
2	0	2	0	0	2	1	0	1
3	0	0	2	1	2	0	3	0

$$\text{distance (A,B)} = \sum_{i=1}^p \sum_{j=1}^p d_{ij} = 83$$

diff (B,C)

0	0	0	0	0	1	0	0	0
2	0	0	1	2	1	1	1	1
2	1	0	2	0	3	0	1	1
0	2	1	0	0	0	0	2	1
2	2	0	0	0	0	0	1	2
3	0	0	0	0	0	1	3	0
0	0	0	0	3	3	0	1	1
1	0	0	1	0	2	3	0	0
2	2	0	2	1	0	1	1	0

$$\text{distance (A,B)} = \sum_{i=1}^p \sum_{j=1}^p d_{ij} = 64$$

APPENDIX E : EXPERT PANEL LIST OF ITEMS

The item list as presented by the expert panel. The highlighted items were selected by the panel.

Financial	1 Profitability
	2 Debt equity ratio
	Fixed and variable costs
	Investment intensity
Operations	3 EOS
	Quality control
	Inventory planning
HR	4 Employee Morale
	5 CEO Leadership
	Unionisation
	Management flexibility
	Employee recruitment
	Responsibility to employees
	Equal employment opportunity
	Dept of management
	Personnel turnover
	Career ladders
Marketing	Market share
	Product line
	New products
	Number of customers
	6 Brand recognition
	Public relations
	Responsibility to customers
	7 Market segmentation
Sales	Skillful sales force
Governance	8 Responsibility to shareholders
	Responsibility to creditors
	Lobbying capabilities
	Stock price
	Responsibility to community
	Responsibility to government
	Regulation environment
	Responsibility to suppliers
R&D	Internal capability
	External accessibility
	Sophistication of technology
	9 Product research
	10 Process research
	Patents advantage
	Basic research
Strategy	11 Strategic planning
	Vertical integration
	12 Macro economic environment
	Market growth rate
	13 Shared corporate culture
Other	Legal expertise
	Consultants
	Coordination among functions
	Responsibility to yourself

APPENDIX F : PRACTITIONER GROUP LIST OF ITEMS

List prepared by practitioner groups with added items.

Profitability
Debt equity ratio
Economy of scale
Employee Morale
Organisational Leadership
Brand recognition
Market segmentation
Responsibility to Shareholders
Product research
Process research
Strategic planning
Macro economic environment
Shared corporate culture
Information Technology

APPENDIX G : FINAL SELECTED ITEMS

Final list of items agreed by the practitioner group

Profitability
Staff morale
Organisational leadership
Brand recognition
Market segmentation
Research and development
Strategic planning
Macro economic environment
Corporate culture

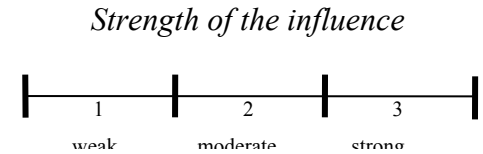
APPENDIX H : SAMPLE DISCRETION MAP ELICITATION FORM

In the context of long-term organisational success...

(tick both if influence occurs in both directions)

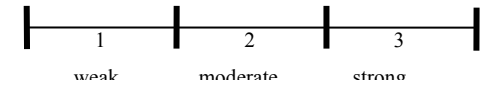
Does **Net Margin** influence **Staff Morale**
and/or

No Yes



Does **Staff Morale** influence **Net Margin**

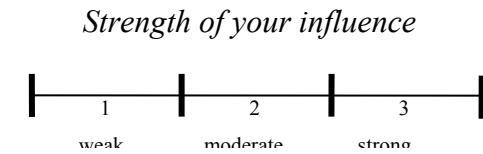
No Yes



Do you believe that you can exert influence on the effect of

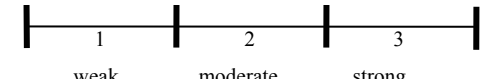
Net Margin on Staff Morale
and/or

No Yes



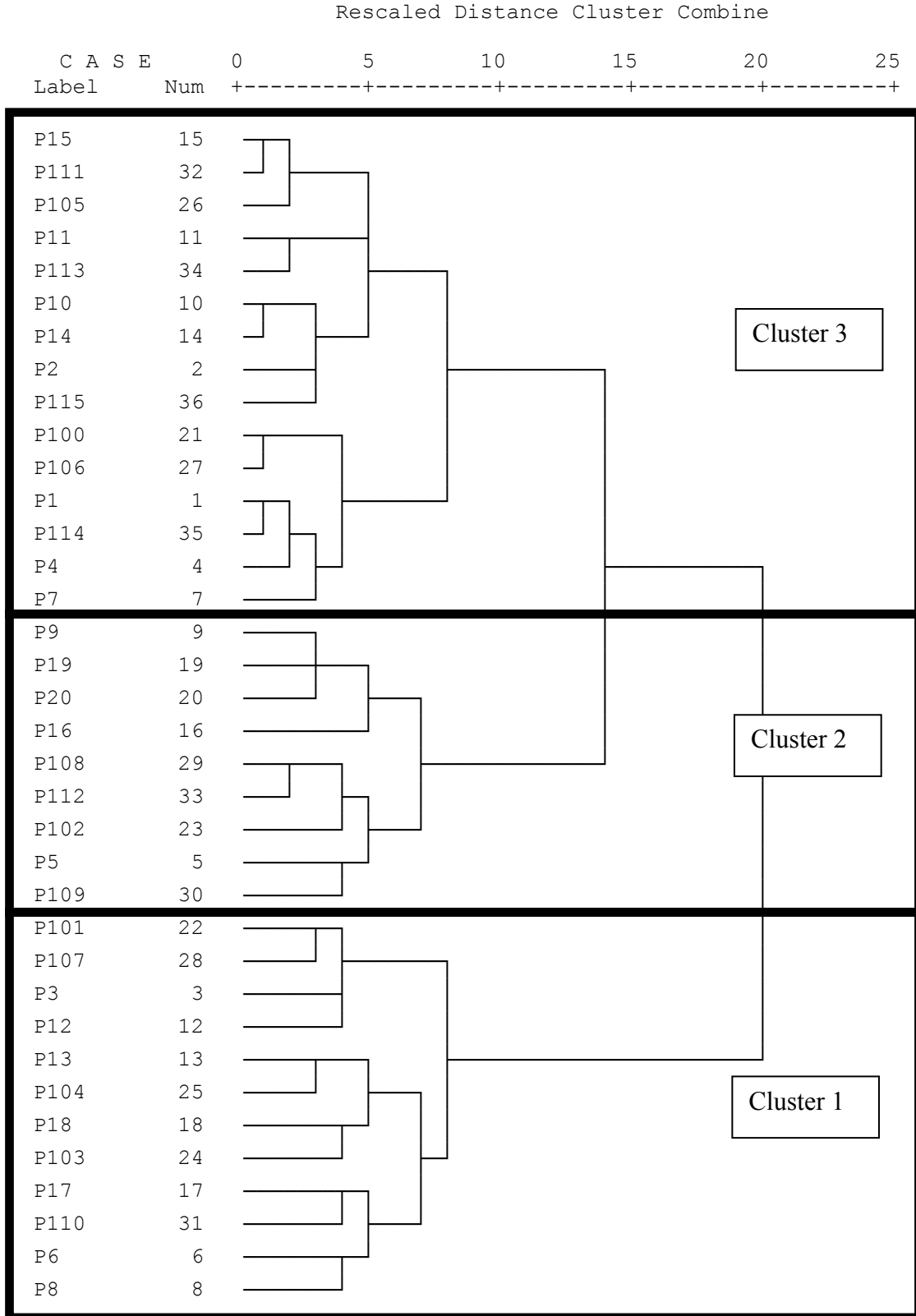
Staff Morale on Net Margin

No Yes



THANK YOU, PLEASE CONTINUE TO THE NEXT PAGE

APPENDIX J : DENDROGRAM USING WARD METHOD



APPENDIX K : CLUSTER MEMBERSHIP

Case	4 Clusters	3 Clusters	2 Clusters
P1	1	1	1
P2	1	1	1
P3	2	2	2
P4	1	1	1
P5	3	3	1
P6	4	2	2
P7	1	1	1
P8	4	2	2
P9	3	3	1
P10	1	1	1
P11	1	1	1
P12	2	2	2
P13	4	2	2
P14	1	1	1
P15	1	1	1
P16	3	3	1
P17	4	2	2
P18	4	2	2
P19	3	3	1
P20	3	3	1
P100	1	1	1
P101	2	2	2
P102	3	3	1
P103	4	2	2
P104	4	2	2
P105	1	1	1
P106	1	1	1
P107	2	2	2
P108	3	3	1
P109	3	3	1
P110	4	2	2
P111	1	1	1
P112	3	3	1
P113	1	1	1
P114	1	1	1
P115	1	1	1

APPENDIX L : REVISED EXPERIENCE QUESTIONNAIRE



**Strategic Leadership
Research Programme**



Name: _____

Organisation: _____

Address: _____

Phone: _____

Email: | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- 1. What is the industry or sector that your organisation operates in:

- 2. Which category best describes your organisation (tick one):
 - 1) Service
 - 2) Distribution
 - 3) Manufacturing
 - 4) Public sector
 - 5) Other

- 3. What is the total number of staff (permanent and temporary) in this part of the organisation: _____

- 4. Is the level of your current position best described as (tick one):
 - 1) Board of directors
 - 2) M.D. /CEO
 - 3) General Manager
 - 4) Function Director
 - 5) Head of Function
 - 6) Specialist
 - 7) Middle Management
 - 8) First Level Management

- 5. How long have you been in your current position? (years): _____

- 6. How long have you been in this organisation? (years): _____

- 7. What is your total experience in senior management teams? (years): _____

- 9. What is the total number of staff who report either directly or indirectly to you?: _____

- 10. What year were you born?: 19 ____

11. Are you
 1) Male
 2) Female

12. How many years experience have you had in the following functional areas?

<i>Functional area</i>	<i>Years in area</i>
1) General Management	_____
2) Operations (any type)	_____
3) Human Resources	_____
4) Technical	_____
5) Marketing / Sales	_____
6) Finance	_____
7) Other _____	_____

13. How many years of full-time work experience do you have? (years): _____

14. How many years of management experience do you have? (years): _____

15. a) Do you have a third level qualification in any of the following areas (tick all that apply)?

- Arts
- Business/ Finance
- Science/Engineering
- Other: _____

b) What is your highest level of award (tick one)?

- Certificate
- Diploma
- Degree (or professional equiv.)
- Higher degree

16. With which functional area do you most associate yourself (tick one)?

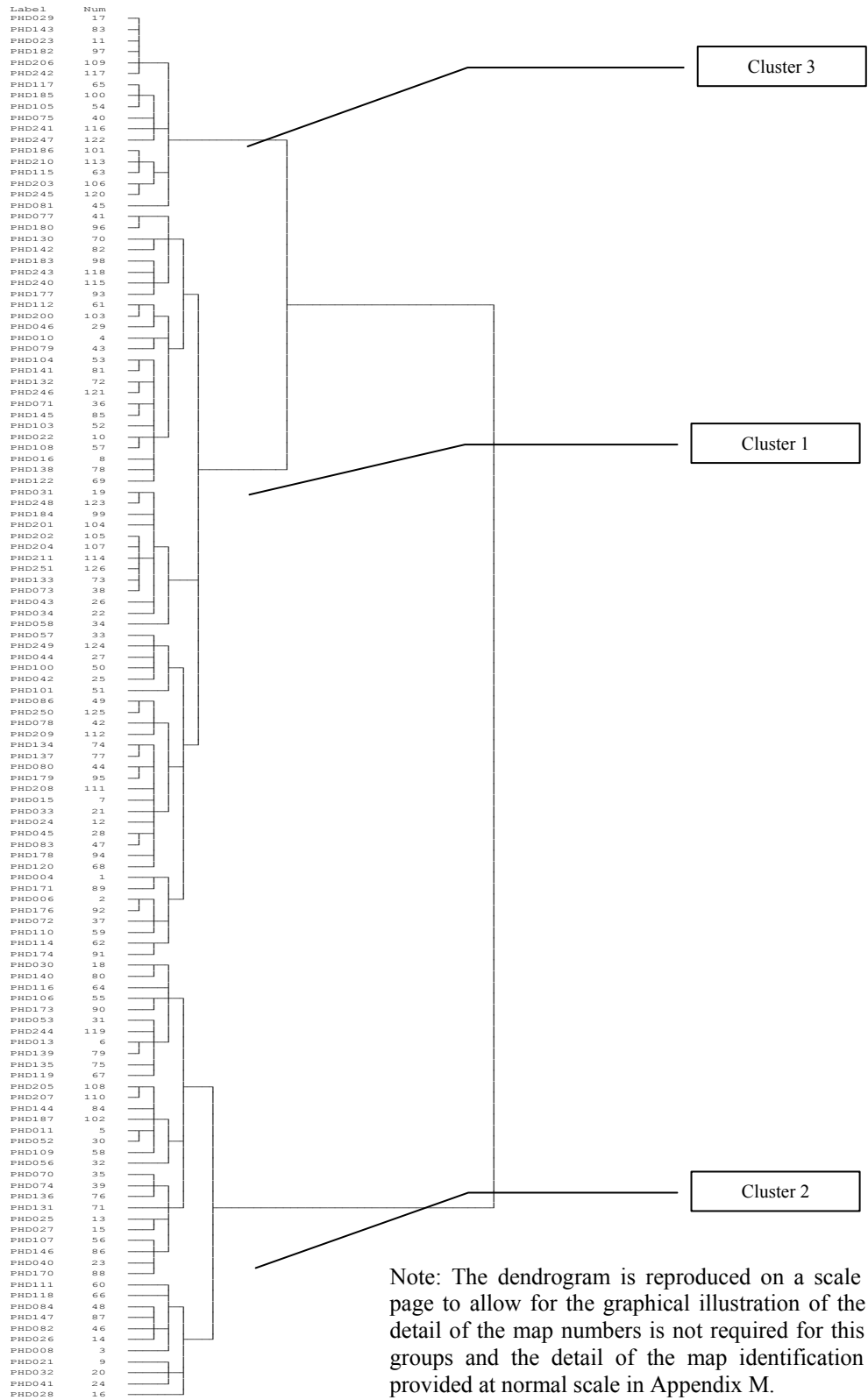
- 1) General Management
- 2) Operations (any type)
- 3) Human Resources
- 4) Technical
- 5) Marketing / Sales
- 6) Finance
- 7) Other _____

APPENDIX M : CLUSTER MEMBERSHIP

Case	4 Clusters	3 Clusters	2 Clusters
PHD004	1	1	1
PHD006	1	1	1
PHD008	2	2	2
PHD010	1	1	1
PHD011	3	2	2
PHD013	3	2	2
PHD015	1	1	1
PHD016	1	1	1
PHD021	2	2	2
PHD022	1	1	1
PHD023	4	3	1
PHD024	1	1	1
PHD025	3	2	2
PHD026	2	2	2
PHD027	3	2	2
PHD028	2	2	2
PHD029	4	3	1
PHD030	3	2	2
PHD031	1	1	1
PHD032	2	2	2
PHD033	1	1	1
PHD034	1	1	1
PHD040	3	2	2
PHD041	2	2	2
PHD042	1	1	1
PHD043	1	1	1
PHD044	1	1	1
PHD045	1	1	1
PHD046	1	1	1
PHD052	3	2	2
PHD053	3	2	2
PHD056	3	2	2
PHD057	1	1	1
PHD058	1	1	1
PHD070	3	2	2
PHD071	1	1	1
PHD072	1	1	1
PHD073	1	1	1
PHD074	3	2	2
PHD075	4	3	1
PHD077	1	1	1
PHD078	1	1	1
PHD079	1	1	1
PHD080	1	1	1
PHD081	4	3	1
PHD082	2	2	2
PHD083	1	1	1
PHD084	2	2	2
PHD086	1	1	1
PHD100	1	1	1
PHD101	1	1	1
PHD103	1	1	1
PHD104	1	1	1
PHD105	4	3	1
PHD106	3	2	2
PHD107	3	2	2
PHD108	1	1	1
PHD109	3	2	2
PHD110	1	1	1
PHD111	2	2	2
PHD112	1	1	1
PHD114	1	1	1
PHD115	4	3	1

Case	4 Clusters	3 Clusters	2 Clusters
PHD116	3	2	2
PHD117	4	3	1
PHD118	2	2	2
PHD119	3	2	2
PHD120	1	1	1
PHD122	1	1	1
PHD130	1	1	1
PHD131	3	2	2
PHD132	1	1	1
PHD133	1	1	1
PHD134	1	1	1
PHD135	3	2	2
PHD136	3	2	2
PHD137	1	1	1
PHD138	1	1	1
PHD139	3	2	2
PHD140	3	2	2
PHD141	1	1	1
PHD142	1	1	1
PHD143	4	3	1
PHD144	3	2	2
PHD145	1	1	1
PHD146	3	2	2
PHD147	2	2	2
PHD170	3	2	2
PHD171	1	1	1
PHD173	3	2	2
PHD174	1	1	1
PHD176	1	1	1
PHD177	1	1	1
PHD178	1	1	1
PHD179	1	1	1
PHD180	1	1	1
PHD182	4	3	1
PHD183	1	1	1
PHD184	1	1	1
PHD185	4	3	1
PHD186	4	3	1
PHD187	3	2	2
PHD200	1	1	1
PHD201	1	1	1
PHD202	1	1	1
PHD203	4	3	1
PHD204	1	1	1
PHD205	3	2	2
PHD206	4	3	1
PHD207	3	2	2
PHD208	1	1	1
PHD209	1	1	1
PHD210	4	3	1
PHD211	1	1	1
PHD240	1	1	1
PHD241	4	3	1
PHD242	4	3	1
PHD243	1	1	1
PHD244	3	2	2
PHD245	4	3	1
PHD246	1	1	1
PHD247	4	3	1
PHD248	1	1	1
PHD249	1	1	1
PHD250	1	1	1
PHD251	1	1	1

APPENDIX N : DENDOGRAM



Note: The dendrogram is reproduced on a scale to fit on one page to allow for the graphical illustration of the clusters. The detail of the map numbers is not required for this purpose. The groups and the detail of the map identification numbers are provided at normal scale in Appendix M.

APPENDIX O : AVERAGE MAPS FOR CLUSTERS

Average map for cluster 1 (CLUS1)

0.000	6.176	6.838	6.485	7.294	6.191	7.544	4.765	6.103
4.809	0.000	8.044	5.721	6.632	6.397	7.074	4.706	7.294
5.309	5.721	0.000	5.250	5.103	4.721	6.529	5.618	5.265
4.426	4.412	6.118	0.000	4.603	4.912	6.529	2.794	5.147
5.838	6.882	6.853	3.971	0.000	7.044	6.044	4.309	6.132
4.779	4.029	5.985	2.779	5.191	0.000	6.529	3.971	6.029
6.485	5.515	7.118	5.721	5.382	6.103	0.000	5.926	6.382
2.132	1.397	2.206	1.779	2.132	2.794	3.118	0.000	2.000
5.721	6.176	6.029	4.853	5.485	5.176	6.926	4.294	0.000

Average map for cluster 2 (CLUS2)

0.000	5.950	5.500	4.950	6.450	5.050	6.850	2.025	4.325
3.275	0.000	7.550	4.100	5.650	5.675	5.600	3.475	6.250
3.925	4.700	0.000	2.950	3.150	2.625	4.850	3.625	4.200
1.675	3.000	3.850	0.000	2.700	3.250	5.975	1.900	3.400
4.175	5.950	5.925	2.550	0.000	6.350	6.025	2.375	4.725
2.850	2.050	3.800	1.375	3.800	0.000	5.150	1.475	2.825
4.725	3.250	5.875	4.250	4.125	4.050	0.000	4.450	4.300
0.850	0.200	0.800	1.900	1.900	1.750	1.575	0.000	1.050
3.975	4.875	5.275	2.875	3.875	3.150	5.275	2.100	0.000

Average map for cluster 3 (CLUS3)

0.000	7.667	7.889	7.667	8.056	7.556	7.889	5.444	7.222
5.944	0.000	8.333	6.889	7.444	6.833	8.000	6.722	7.778
6.500	7.167	0.000	6.333	6.667	6.833	7.722	7.056	6.111
6.444	5.222	7.056	0.000	6.389	6.944	8.056	3.556	6.667
7.222	7.667	8.056	6.444	0.000	7.889	7.667	5.500	7.444
5.444	6.722	7.056	6.111	6.722	0.000	7.944	4.722	6.389
7.056	7.444	8.167	7.333	6.056	6.611	0.000	6.611	7.444
5.167	3.833	5.000	4.556	3.389	5.222	6.056	0.000	4.500
7.222	7.278	7.278	6.111	6.556	6.944	7.611	6.500	0.000