

**The Relationship between Organizational Fitness
and Business Performance:
Specific Evidence for SMEs**

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of a university or other institution of higher learning, except where due acknowledgement is made in the acknowledgements.

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Intellectual Property Rights

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Ethics Approval

The research undertaken here has received approval by the Auckland University of Technology Ethics Committee (AUTEK). Such approval was granted on 13 June 2007 under Ethics Application Number 06/223, for a study titled ‘Small Enterprise Performance: The Impact of Business Fitness’

Abstract

In today's technological environment, organizational capabilities for managing change are regarded as important for business survival and growth. In particular, dynamic organizational capabilities have attracted considerable research interest over the past decade. Recently several studies have suggested that dynamic capabilities may be associated with a concept termed *organizational fitness*. What is not clear in this emerging research stream is whether firms with superior organizational fitness are more likely to prosper than unfit firms. In addition, relatively little attention has been directed toward creating a systemic model of dynamic capabilities that explains organizational fitness.

The nature of fitness has been intensively debated in the biological sciences over a period of several decades. A confusing variety of fitness definitions have emerged from this literature. The lack of an agreed definition of fitness has resulted in several streams of research on organizational fitness. As a result of this fragmentation, there has been little progress toward answering the question of how to measure organizational fitness. The fragmentation in organizational fitness literature is problematic, because research into the relationship between organizational fitness and firm performance is not well-advanced.

In this study, organizational fitness is defined in terms of organizational capability to produce variation. By defining fitness in this way, the tautological criticisms leveled against existing concepts of fitness are avoided. The definition of fitness proposed here accommodates both an evolutionary learning perspective and a perspective of strategic management, and thus reflects an integrative approach to the concept.

A notable feature of the literature exploring organizational fitness is that it has been focused on large corporations. However, a growing body of literature suggests that SMEs are different from large firms and need to be examined in their own right. SMEs are important contributors to business in most countries throughout the world. This study addresses that perceived gap in the literature and asks: *What relationship, if any, is there between organizational fitness and business performance for SMEs?*

Theory is developed and tested here by means of a large sample of SMEs in New Zealand. Two distinct aspects of organizational fitness are identified for SMEs. First, *survival* fitness is associated with generic combinative capabilities. Second, *growth* fitness is associated with knowledge assimilation and transformation.

SME growth fitness and survival fitness are each found to be positively related to business performance under a variety of contexts. Further, an increase of growth fitness and survival fitness provides a means of alleviating selection pressures for SMEs. That is, dynamic capabilities of knowledge assimilation and integration are found to be positively associated with SME business performance.

In contrast to studies that advocate SME development of context-dependent capabilities, the findings of this study suggest an alternative perspective: variable selection pressures can be influenced by SMEs with a high level of survival and growth fitness.

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PART 1: INTRODUCTION

Chapter One: Introduction

This study examines the relationship between organizational fitness and business performance of small and medium-sized enterprises (SMEs). Three central issues are explored. First, what is organizational fitness? Second, to what extent is the organizational fitness of a SME related to its business performance? Third, can a SME improve its organizational fitness?

The first issue involves a search for a robust conceptualization of organizational fitness. Organizational fitness might tentatively be associated with the ‘health’ of an organization. But is organizational health described in terms of flexibility, resilience, agility, or potential for success? Evidently a definition of organizational fitness requires considerable thought and reflection.

The second central issue explored is whether the organizational fitness of a SME is related to its business performance, defined here to include financial and operational performance. An initial response from practitioners and academics might be that ‘fitter’ SMEs are likely to achieve superior business performance. Conversely, a SME with a relatively low level of fitness might not be expected to survive and prosper. Owners and managers aim for their firms to be as ready and as prepared as possible for perceived threats and opportunities that may arise (Keats & Hitt, 1988). To what extent is an organization being fit and ‘ready for action’ associated with superior business performance?

Given organizational fitness may foster improved profitability and growth, the third issue arises: Can a SME improve its organizational fitness? Asked differently: Are there behaviours that enable an SME to alter its fitness level, or is fitness determined wholly by an external environment? Before this third issue can be explored, dimensions and outcomes of organizational fitness must be identified and understood. The thread of the discussion inevitably returns to the first two issues: What is organizational fitness, and what is its relationship to business performance? Thus the three issues outlined in this section probe the concept of organizational fitness from different but related perspectives.

There are relatively few studies that have explored organizational fitness as a central theme. These studies adopt different definitions of the organizational fitness concept, and provide different suggestions as to how organizational fitness might be measured. Fitness has traditionally been conceptualized in organization theory as increased survival possibilities that result from superior fit between environmental contingencies

and organizational forms. However, this conceptualization has been criticized for circular reasoning (Mills & Beatty, 1979; Mathen & Ariew, 2002; Ariew & Lewontin, 2004; Durand, 2006). Some authors have suggested that there is a positive relationship between organizational fitness and business performance, but there is a scarcity of evidence supporting this expectation. As a result, concepts related to organizational fitness are only partially formed and there is little agreement as to how the concept is constructed.

It is surprising that the impact of organizational fitness on business performance has not been more extensively studied. There are a number of possible explanations for this deficit in the literature. First, organizational fitness and performance have frequently been viewed as closely related concepts with overlapping domains, so scholars have struggled to establish a useful, non-tautological definition of organizational fitness. Second, organizational fitness has proved to be difficult to operationalize; empirical work in this area is sparse. Third, outcomes of organizational fitness are not agreed. Finally, a variety of organizational fitness definitions and antecedents have been proposed, resulting in a somewhat fragmented literature.

The relatively piecemeal nature of existing research on organizational fitness is problematic. There is a need for additional research that searches for commonalities across this diverse literature. In the early 1990s there were calls for more comprehensive studies of organizational fitness (Schwaninger, 1993), and the topic has begun to attract greater interest from organizational researchers (Voelpel, Leibold, & Mahmoud, 2004). This study aims to contribute to that emerging research stream.

Existing studies of organizational fitness and performance focus on large corporations with multiple business units. Perhaps research in organizational performance has contained selection bias towards large organizations because of their publicly available data and dominant influence in most economies (Aldrich & Ruef, 2006). Whatever the explanation, there are very few studies that have explored links between organizational fitness and business performance for SMEs. However, there are several reasons why research that focuses specifically on SME organizational fitness is needed.

First, large organizations are strongly hierarchical, devising structures that provide constraints on lower-level structures (Ethiraj & Levinthal, 2004). Interactions among elements of large organizations tend to be clustered into isolated pockets (Weick, 1979), in contrast to SMEs where all elements are usually more tightly coupled. SMEs are generally managed by the owners, who own most of the shares, provide most of the

finance and make most of the principal decisions (Cameron & Massey, 1999:5). Further, role differentiation increases with organizational size and complexity (Aldrich, 2006). These structural features influence the effectiveness of both first-order change (incremental, local adaptation within a given structure) and second-order change (change in a firm's underlying structure) (Ethiraj & Levinthal, 2004). That is, firm structure is an "important arbiter of the success of human design efforts" (p.430). Thus the manner in which a firm attempts to be 'ready for action' may differ for a SME and a large firm in terms of balance between first-order and second-order change capabilities.

Second, SMEs have been found to be different from large firms in terms of competitive behaviour (Porter, 1980; Chen & Hambrick, 1995). Large organizations are better protected from selection pressures that might otherwise weed out unfit smaller firms due to their size, structure or market position. Corporations circumvent and avoid competition by attaining positional advantage (Barnett et al., 1994). That is, business performance of a small firm is more likely to result from idiosyncratic properties of the firm (which may include organizational fitness), rather than from its location in the market. Thus the extent to which organizational fitness is related to business performance may be different for small versus large firms.

Third, in contrast to the relatively mindless, mechanistic nature of large corporations, SMEs are multi-minded systems, voluntary associations of purposeful members bonded by knowledge coordination, sharing and interaction (Davenport, Leibold, & Voelpel, 2006). Because of this potentially different organizational nature, the purpose of fitness could be different between SMEs and large corporations. For example, desired outcome of fitness for SMEs is likely to be the achievement of self-determined goals. The purpose might be development of distinctive competencies and competitive advantage whereas for large firms the desired outcome is more likely to be persistence or satisficing. In this way the nature of the firm may influence the balance between exploitation and exploration which has implications for organizational fitness.

In summary, organizational fitness of SMEs needs to be examined in its own right and this study aims to address a gap in the literature by exploring the relationship between organizational fitness and business performance with specific evidence for SMEs.

BACKGROUND TO THE RESEARCH

Fitness is the state of being fit. According to the *Concise Oxford English Dictionary*, to be fit is to be of "suitable quality, standard or type", or to have "requisite qualities or

skills to do something competently”. Further, to be fit is to be “in good health, especially as the result of regular exercise” (2004: 537). These definitions suggest that fitness is a broad and flexible concept with a variety of meanings. Fitness can equally well describe a machine’s suitability for a specified purpose, compatibility of a potential employee with a job specification, or an organization’s ability to survive and grow.

Academic journals from a wide diversity of disciplines publish articles that involve fitness. These disciplines include health sciences research; sport and recreation; engineering design problems; bioenergetics; technological innovation (Ma & Nakamori, 2005); ecology (Bock, 2003); biology (Michod, 1986; Kingsolver & Huey, 2003); philosophy (Mathen & Ariew, 2002; Ariew & Lewontin, 2004); scientific theories (Simon, 1983); accounting (Jermias & Gani, 2005); and manufacturing strategy (McCarthy, 2004). Scholars from various disciplines construct different conceptualizations of fitness according to differing objectives and context. “The issue of what constitutes fitness in varying conditions, and how this is maintained, is a central research question in many domains. In entrepreneurship, the normative question of how fitness can be maintained is also a central issue” (Fuller & Moran, 2001:56).

In this thesis, a concept of *organizational fitness* relevant to management and business-related literature is explored. The notion of an organization being in good health and ‘ready for action’ gives rise to a concept of organizational fitness. Owners and managers aim to ensure that their firms are in a state of constant readiness and as prepared as possible for turbulence and opportunity that may arise. As Keats & Hitt (1988) noted “...the important issue for organizations is preparedness for future action” (p.576).

How then can an organization prepare itself to realize superior performance? An evolutionary perspective would emphasize organizational learning and persistence (Nelson & Winter, 1982). A strategic perspective would emphasize competitive advantage that results from decision making and dynamic organizational capabilities (Teece, Pisano, & Shuen, 1997; Eisenhardt & Martin, 2000; Tallman, 2003). These two perspectives are particularly relevant here. In this study, organizational fitness is explored by integrating a strategic management perspective within an evolutionary framework of organizational change.

RESEARCH PROBLEM

What relationship, if any, is there between organizational fitness and business performance for SMEs?

The purpose of the study was to examine the relationship between organizational fitness and business performance for small and medium profit-seeking organizations. Within the overall purpose, four objectives were identified:

- Operationalize organizational fitness in terms of an evolutionary framework that allows for managerial control (a strategic management perspective).
- Investigate the dimensionality and measurement of organizational fitness and business performance for SMEs.
- Assess the extent to which organizational fitness is related to business performance for SMEs.
- Construct a model that examines links between organizational fitness and business performance for SMEs.

Overview of Research Findings

This study finds that two dimensions of SME organizational fitness, survival fitness and growth fitness are each positively related to business performance. Further, dynamic capabilities of knowledge assimilation and integration are found to be associated with the organizational fitness of a SME. Relationships were not moderated by several contextual variables. The findings jointly imply that SMEs can improve their organizational fitness by fostering dynamic capabilities for knowledge assimilation and integration, which in turn improves the likelihood of superior business performance. That is, organizational fitness enables a firm to control its organizational trajectory to some extent, rather than being wholly subjected to environmental control.

JUSTIFICATION FOR THE RESEARCH

Practical Importance

SMEs comprise more than 95 percent of firms in many economies (Keats & Bracker, 1988; Boer, Thomas, & Webster, 1997) and play a dominant role in the New Zealand economy (Corner, 2001). In 2003, 92 percent of NZ firms employed fewer than ten persons (EU 92.3%), and 98 percent of NZ firms employed fewer than fifty persons (EU 98.8%). Further, SMEs are significant employers. In 2003, over 60% percent of NZ employees worked in firms of less than 100 persons (USA 36%) (MEDNZ, 2004; Aldrich & Ruef, 2006). The importance of small business in New Zealand is evident

from the fact that SMEs accounted for over 38 percent of the economy's output in 2002 (MEDNZ, 2004).

However, SME profits per employee in NZ have been declining since 1995; thus considerable effort is made by central and local government in NZ to provide training and support for smaller enterprises. Economic development agencies attempt to profile risk and provide advice to SMEs in order to ensure that this important part of the economy can prosper (Cameron & Massey, 1999). For example, the New Zealand Small Business Advisory Group has identified the importance of high quality and relevant advice for SMEs (MEDNZ, 2006). In particular, a partnership between the private and public sectors has been founded in the belief that organizational capabilities have a direct impact on business success. This partnership, called 'Project Collaboration', is focused on the delivery of management and business development (MEDNZ, 2005). The project grouping considers that advice given to SMEs should be based on both theoretical and practical considerations. Advice should be shared between firms and frequently updated to reflect the current environment.

There is thus a practical need for research that might provide owners of SMEs with ideas for reversing the trend of falling profits per employee (Corner, 2001). Both public and private sector advisors need to be able to call upon relevant empirical research. However, the heterogeneity of SMEs in terms of size, goals, sector, age, and management experience, makes meaningful business advice difficult. The research conducted here contributes to efforts to inform and advise SMEs on a broad range of capability development issues. Ultimately, this study attempts to make a contribution toward improved business performance of SMEs in New Zealand.

Theoretical Importance

This research answers calls for the unification of adaptation and selection approaches to performance (Levinthal, 1991; Haveman, 1992; Amburgey, Kelly, & Barnett, 1993; McKelvey, 1994; Bruderer & Singh, 1996; Lewin, Weigelt, & Emery, 2004; Jones, 2005). Scholars continue to argue the relative merits of strategic choice, adaptation, and intention versus determinism, selection, and emergence (Astley & Van de Ven, 1983; Hannan & Freeman, 1984; Singh & Lumsden, 1990; Stacey, 1995). Whether the managerial function is proactive or reactive polarises the two perspectives¹. Burgelman (1991) described the polarisation in terms of opposition between the ideas of strategy

¹ Kant discussed this division of perspectives in terms of whether causality resides in nature or in human action.

and ecology. Strategy involves design efforts to achieve a long-term aim; ecology is concerned with relations between organisms and their physical surrounds.

A strategy perspective (Prahalad & Hamel, 1990; Hitt & Tyler, 1991; Collis, 1994; Teece et al., 1997; Sanchez, 2003) would argue the importance of organizational resources, capabilities and competencies of the firm. Firms are seen as able to adapt their core activities to environmental conditions rapidly enough to enhance prospects of survivability.

An evolutionary perspective places more emphasis on ecological aspects of environmental selection. Thus evolutionary perspectives create ontological tension in organization theory (Burgelman, 1991), management literature (Volberda & Lewin, 2003), sociology (Levitt & March, 1988) and complexity science (Stacey, 1995; 2003). “Even the branch of organizational evolutionary theory that puts most stress on organizations not changing does not imply that organizations are completely inert. However, it must be emphasized that an evolutionary theory does require a degree of stability in the characteristics that are being selected for” (Barron, 2003:85).

Organizational fitness is hypothesized here to be related to both strategy and evolutionary perspectives. A concept of organizational fitness that allows for strategic intent within an evolutionary framework is proposed. This study attempts to make a contribution (Whetten, 1989) to the emerging literature concerning organizational fitness, and also attempts to contribute to the integration of strategic management and evolutionary theory.

The four rows of Table 1 show that this study can be differentiated from prior organizational fitness research in four broad areas: organization, fitness, performance, research framework.

Table 1: What Differentiates this Study?

	How this study is differentiated from existing organizational fitness studies
Organization	<ul style="list-style-type: none"> • Dual hierarchical nature of entities – both genealogical and ecological • Focus on SMEs
Fitness	<ul style="list-style-type: none"> • Capability for variation by knowledge assimilation and integration • Two aspects of organizational fitness
Performance	<ul style="list-style-type: none"> • Two dimensions of business performance are measured, and linked individually with each aspect of fitness
Research Framework and Method	<ul style="list-style-type: none"> • Evolutionary framework that allows for strategic management • Multiple lenses of organizational change are utilized • Quantitative approach

Organization. This study makes the assumption that organizational entities exist in two hierarchies, a *genealogical* hierarchy and an *ecological* hierarchy (Table 1, row 1). As will be described more fully in Chapter 2, genealogical entities replicate and transfer information. Ecological entities interact with the environment, causing differential replication (Boyd & Richerson, 1985; Levitt & March, 1988; Baum & Singh, 1994; Kogut & Zander, 1996; Jones, 2005). By viewing organizations in terms of both historical events and current form, this study broadens the research domain of organizational fitness.

Further, previous studies have explored the fitness of large firms, but this research examines SMEs that have clearly-defined identities. Multi-unit, multi-market firms may have different variation, selection and retention processes (Volberda & Lewin, 2003), and a different trade-off between strategic position and competitive capabilities (Barnett et al., 1994) than smaller firms. Thus it is assumed here that SMEs are different from large corporations in several pertinent respects, and are examined in their own right.

Fitness. A novel conceptualization of organizational fitness is proposed in this study. Organizational fitness is defined in terms of capability to produce variation rather than in terms of survival as commonly encountered in the literature (Table 1, row 2). Operationalization of organizational fitness that is non-contextual provides fresh insight into the concept.

Further, two distinguishable types of SME fitness are identified and developed in this study. A number of previous studies in the biological literature have hypothesized multiple aspects of fitness. For example, Byerly & Michod (1991a) hypothesized fitness as a “combination of two very different adaptive capacities, representing a fundamental division between viability (capacity to survive) and fertility (capacity to reproduce)” (p.5). Constructing two aspects of organizational fitness is a departure from prior management research that has largely theorized a single overall fitness concept.

Performance. The study examines whether SMEs with relatively high fitness levels can indirectly influence the selection pressures they face. Relationships between organizational fitness and two dimensions of SME business performance are examined (Table 1, row 3). That is, this study distinguishes between two levels of selection. First, there is industry selection of firms, which is termed *survival* performance here. Second, there is firm selection of internal capabilities, which is termed *growth* performance here.

Research framework. A theoretical framework that accommodates more than one lens of strategic change (Table 1, row 4) is developed. Previous studies have discussed linkages between fitness and performance mainly from the viewpoint of a single theory.

The approach adopted here responds to Van de Ven & Poole (1995) and Poole (2005) who called for a ‘multiple-motor’ approach to organizational development.

Finally, this study makes a theoretical contribution by employing a quantitative approach to examine issues of SME fitness and performance. Previous studies of organizational fitness have proposed theoretical models, but have not sought empirical evidence. In plain terms, no other quantitative study of organizational fitness was found in an extensive literature search. Existing models are based on literature and deductive logic, but this research attempts to quantify how SME owners might use fitness determinants either to improve the likelihood of business performance or to pass selection pressures on to competitors.

Potential Applications

There is increased interest in developing navigation and measurement tools that guide and assess the adaptive and proactive capabilities of small enterprises to manage change successfully (Voelpel et al., 2004). The relative importance of various enablers of business performance is currently decided using accounting-based weightings derived from corporate performance tools. Ten common performance measurement systems are summarised in Table 40 (Appendix B). Relative weightings specifically developed from SME performance data are not widely available.

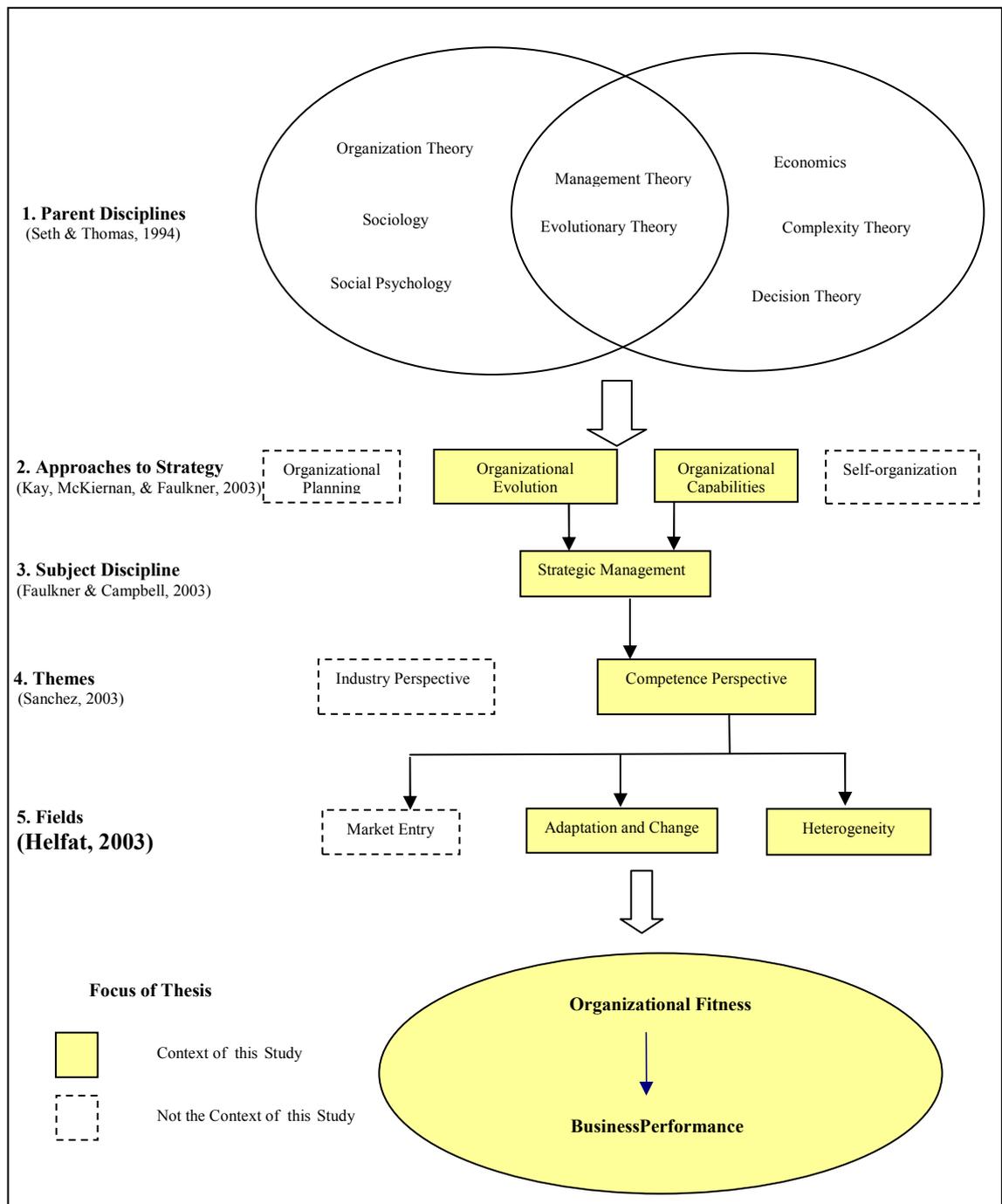
The questionnaire developed for this study, as well as the weightings provided by the two proposed fitness models, can be potentially applied to SMEs that seek to improve their organizational fitness. The two fitness models developed here potentially enable SME owners to monitor their own organizational fitness scores, and to focus on areas of knowledge management that might improve their business performance. Thus the models developed for growth fitness and survival fitness are relevant to individual SMEs, either as self-reports or in partnership with advisors.

A potential further application arises from the emphasis in this study on generic dynamic capabilities underpinning organizational fitness. Business advisors can collate and share fitness data across communities of SMEs by means of a software-enabled database. Organizational fitness measurement, data capture, analysis, reporting, and improvement planning are all potentially enhanced. This research can potentially contribute toward development of a practical tool for assessment of SME fitness and its impact on business performance.

SCOPE OF THE STUDY

Figure 1 is a schematic that illustrates how a number of parent disciplines broadly inform the current research effort. At the top of Figure 1, evolutionary theory and management theory are depicted as central disciplines because each is broadly associated with organizational change and strategy research. Economics, complexity and decision theory provide insights for strategy formulation; organization theory, sociology and psychology inform strategy implementation (Seth & Thomas, 1994).

Figure 1: Where this Study Sits in the Literature



As indicated in the second level of Figure 1, the approach to strategy in this study is grounded in the evolution of distinctive capabilities and resources of an organization. Greater emphasis is placed on strategy *process* rather than *content*. Strategy process concerns the interactions of stakeholders; strategy content concerns the goals, plans and formal competitive strategies of the firm (Verreynne, 2005a). Further, this study adopts the viewpoint that strategy for SMEs is partially emergent and partially directed, and both aspects are interrelated (Weick, 1995). Such an approach blurs the distinction between strategy formulation and implementation. Organizational resources need to be continually reconfigured according to internal capabilities and environmental changes.

The third level of Figure 1 suggests that strategic management (Porter, 1985; Covin & Slevin, 1989; Barney, 1991; 1995; 2003b; Teece, 2003) is the subject discipline that links the various literatures that inform this study.

The fourth level of Figure 1 shows that a theme of internal competency driving organizational change is accompanied by a similar emphasis on a competence perspective of strategic management. The study thus adopts an internal analysis perspective of strategic management (Rumelt, Schendel, & Teece, 1991; Faulkner & Campbell, 2003). Emphasis is placed here on strategic management of an organization's dynamic capabilities within a theory of organizational evolution. Economic perspectives, important for analysing conditions at the industry level, were not emphasized in this study.

The fifth level of Figure 1 shows that the focus of the study lies with explanations for intrinsic firm heterogeneity, and with organizational change mechanisms that account for differences in organizational performance (Collis, 1994; Zollo & Winter, 2002; Helfat, 2003; Dimovski & Škerlavaj, 2005). Specifically, strategic flexibility for creating dynamic capabilities and competitive advantage (Volberda, 2003) underpins the exploration of organizational fitness in this study.

The broadness of the research domain is signalled by Kay, McKiernan, & Faulkner (2003):

In more recent years strategy has come to concentrate on discovering how to capitalize on a firm's resources and in particular to aid the development of dynamic capabilities. To this extent, organizational learning has come to the fore as a key ingredient of a successful company. Uncomfortable with the volatility of the environment and the difficulty of dealing with it, strategists have more recently come to wonder whether lessons can be learnt from the study of biological and physical sciences, notably chaos theory and complexity theory. The future for strategy may then be both evolutionary and revolutionary (p.50).

Delimitation of scope

The issue of firm size is a boundary condition of the study: theory was tested for SMEs only. As discussed earlier in this chapter, it is arguable whether relationships between organizational fitness and business performance developed for large corporations can be generalised to small firms. Barriers that block organizations from building organizational fitness (Beer & Eisenstat, 2000) may not be the same as those for smaller firms that are less hierarchical and more strongly coupled (Ethiraj & Levinthal, 2004).

A possible limitation of the study is that only New Zealand SMEs were surveyed. Data were collected only from small firms with fewer than 100 employees. United States and Canadian SMEs are defined as firms with fewer than 500 employees, Australian and European SMEs have fewer than 250 employees. Thus the generalisation of causal relationships to other countries is questionable (Verreynne, 2005a). Many attempts have been made to define a small enterprise (Cochran, 1981; Watson & Everett, 1993; 1996; Cameron & Massey, 1999; Kilpatrick & Crowley, 1999). In New Zealand, medium-sized firms are relatively small by world standards; the terms SME and small enterprise are thus used interchangeably herein. A SME is defined here as an independent, profit-oriented business that employs from 6-99 full-time equivalent people and is registered on the Statistics NZ Business Frame (Pettigrew, 2003). This latter requirement implies that a SME has a Goods and Service Tax turnover greater than \$NZ 30,000.

Further, the study is limited in scope to the observation of effects and the subsequent search for causes. This is a correlational study; correlation does not prove causation. There are no deliberately varied conditions, and it is difficult to discover the effects of nonmanipulable causes. Nevertheless “nonmanipulable causes should be studied using whatever means are available and seem useful. This is true because such causes eventually help us to find manipulable agents” (Shadish, Cook, & Campbell, 2001:8). Manipulation of SMEs was not possible for the purposes of this study; the same SME cannot demonstrate both a high and a low fitness rating. Thus an approximation of manipulation was sought here by examining SMEs that are similar in many ways. The emphasis is on improving knowledge of the antecedents and effects of organizational fitness, rather than about how or why those effects occur.

There are several other potential limitations of this exploratory study which merit discussion, including the issue of common method bias and lack of consideration of

interaction effects. These and other limitations, caused by the methods chosen, are evaluated in the final chapter of the thesis.

ORGANIZATION OF THE STUDY

Part One consists of a single chapter with a general overview and introduction.

Part Two is a literature review, and consists of three chapters. Chapter Two is a literature review of organizational fitness. Chapter Three is a broader literature review of organizational evolution, capabilities and performance. Chapter Four provides background material directly related to the theory developed.

Part Three consists of three chapters. A theoretical research model of organizational fitness together with a discussion of hypotheses to be tested is presented in Chapter Five. Chapter Six contains a description of the broad research methodology. In Chapter Seven, the research methods are presented.

Part Four has a single chapter. Chapter Eight describes detailed results of hypothesis testing with Structural Equation Modelling.

Part Five has a single discussion chapter. Chapter Nine presents the conclusions and implications of the study, and offers suggestions for further research.

Part Five addresses the three central issues identified at the start of this chapter:

- What is organizational fitness? Two aspects of organizational fitness are defined here in terms of a firm's capability for variation.
- To what extent is the organizational fitness of a SME related to its business performance? This study finds that each aspect of organizational fitness is invariantly and positively related to the business performance for SMEs
- How can a SME achieve organizational fitness? Development of dynamic capabilities associated with knowledge management and integration enable growth fitness and survival fitness respectively.

PART 2: LITERATURE REVIEW

Chapter Two: Organizational Fitness

The purpose of this chapter is to familiarise the reader with existing theory concerning organizational fitness. A search of management journals revealed nineteen relevant academic articles, four of which propose theoretical models of organizational fitness. However, only half of these studies explore organizational fitness as a central theme. After reviewing the studies and models it became apparent that a variety of perspectives of organizational fitness currently exist. The review presented in this chapter classifies research on this topic under four perspectives. That is four idealized lenses are deployed to examine prior research on organizational fitness: a population ecology lens, an evolutionary lens, a strategic management lens, and a complexity lens. Existing conceptualizations all draw from a combination of these perspectives, suggesting that no single perspective appears to provide sufficient theory to model the perceived dimensions of organizational fitness. The resulting implication is that an integrated approach to the concept should be adopted.

A definition of organizational fitness must necessarily begin with a definition of organization and some discussion of the nature of organizations. Thus Section One discusses an adopted definition of organization, and presents a review of the nature of an organization. In Section Two, the different theoretical approaches underpinning the four lenses utilized for viewing organizational fitness is presented. This background material describes how the purpose, underlying determinant, content and immediate causes of fitness are differently perceived through each of the four lenses. Following this, Section Three contains a comparison of the nineteen existing organizational fitness studies mentioned above. The operationalization of fitness differs for each study with respect to perceived dimensions of fitness, and these differences reveal a problematic fragmentation in the literature. In Section Four a review of four existing organizational fitness models is presented. The models, based on deductive logic, have very few common themes, and serve to illustrate the broadness and diversity of ideas in the field. The chapter concludes with a summary that discusses several summary observations concerning the approach that is adopted in this study and the performance implications of organizational fitness.

ORGANIZATIONS

In this first section, an operational definition of organization is presented along with some discussion of their systemic nature. Theoretical disputes about organizational

change and performance are intertwined with critical dimensions of organizational definition such as the nature of transactions, the nature of management and the nature of the firm itself. Neoclassical economics viewed the firm as a production function operating in a certain, deterministic environment with open and efficient markets. Production is increased until average costs are minimized; firms take prices that are determined by the market (Seth & Thomas, 1994; Wickham, 2004). However the self-limitations of some neoclassical assumptions have long been recognized, and numerous modifications and alternative definitions of the firm have been proposed². A manageable definition of organizations and a description of their conceptualized nature is presented next.

Definition of an Organization

An organization may be described as a group of people with a particular purpose (*Concise Oxford English Dictionary*, 2004). The definition of an organization adopted in this study is that of Aldrich (1979): *Organizations are goal-directed, boundary-maintaining, and socially-constructed systems of human activity* (p.4).

The above definition identifies three key aspects of an organization: goal direction, boundary maintenance, and systemic activity. Goal-direction suggests purposive and deliberate design efforts. Boundary maintenance (Slater, 2003) suggests that the continued existence of the organization depends on a distinction between members and non-members, as well as retention and protection of controlled resources. Systems of *activity* emphasizes interaction with other organizations and institutions, as well as learning and transformative activities (Aldrich & Ruef, 2006; Durand, 2006). Organizations are thus distinguished from other social groupings such as audiences, friendship circles, collectives, and families. Underlying the adopted definition is the notion that organizations are not inert entities or static objects; they are dynamically changing and developing.

Further, under this definition an organization is recognized as a *system*, rather than a mechanism or organism. Given that this research is focused on SMEs, Aldrich's definition of organization was appropriate for the purpose of the study. Smaller firms often have recognizable boundaries and simply articulated goals, in contrast to large corporations with multiple branches, multiple business units, institutional shareholders,

² For a review of alternative definitions see Seth & Thomas (1994), Wickham (2004), and (Williamson, 1981; 1999; 2002; 2003).

non-profit objectives and complex structures. Thus a large corporation may have a *nature* that is more mechanistic than systemic.

The Nature of Organizations

Is an organization more accurately described as mindless, or as mindful? There are three distinguishable perspectives regarding the nature of organizations: mechanism, organism, or system (Davenport et al., 2006; Durand, 2006). In a *mechanism*, the parts exist only in order that the whole can perform a specified function. A clock is an example of a mechanism (Dawkins, 1986); the parts have no meaning without the whole, and before the clock can function the parts must be designed. Organizations may be viewed analytically as mindless machines that consist of discrete parts each performing only a simple task. A set of rules for individual behaviour, task performance, and motivation, if properly designed by a manager, can produce optimal outcomes as suggested by Decanio, Dibble, & Amir-Atefi (2000). Managers of mechanistic organizations are cast as rational designers of change, split off from the remainder of the organization that is treated as a 'black box'.

In contrast to a mechanism, a fertilized egg is an example of an *organism*. An egg has a nature with no purpose other than its own form. In this sense an organism is not externally goal-oriented; it is a self-organizing whole. The organization viewed as an organism is conceptualized as a living whole and is single-minded. The whole is maintained by the parts, and the whole maintains the parts for its own benefit. That is, organizational entities exist by means of each other, and the whole emerges as a result of interactions within the developing organism (Stacey, 1995). Further, if an organization is viewed as a *complex* organism, managers simply participate in spontaneous change and have little control over development (Kauffman, 1993; Anderson, 1999; Dooley & Van de Ven, 1999; Stacey, Griffin, & Shaw, 2000; Dagnino, 2004).

A third perspective is that organizations are *systemic* in nature. A system has aspects of both a mechanism and an organism. In a system, there are identifiable parts, but they do not simply add to the whole as in a mechanism. Interactions between the parts are self-regulating and are of critical importance. It is this process of self-regulation that organizes the observed pattern of behaviour. For systems, the rules which govern interaction of parts cause the behaviour of the whole (Stacey et al., 2000). Single-minded organisms are information and coordination bonded. In contrast, a system is a

multi-minded voluntary association of purposeful members who come together to serve themselves by serving demand from the environment (Davenport et al., 2006).

In systems thinking, intendedly rational managers design control systems and rules of interaction between members and entities (Schwaninger, 1990; Senge, 1990; Schwaninger, 2000). Once these rules are in place, the designed interactions drive the system forward. The manager understands the system to be self-regulating, and focuses attention on problem-solving and action to improve the system so that it moves toward pre-chosen goals.

ORGANIZATIONAL FITNESS

As organizations change and develop (March, 1981; Van de Ven & Poole, 1995; Poole, 2004) their fitness also changes. What is meant by organizational fitness? The answer to this question is not clear. In the 1960s and 70s the concept of *fit* was central to population ecology and contingency models of organizational evolution, which theorized that firms must fit environments if they are to survive. The concept became important for industrial organization economics (Porter, 1980) and organization theory, and subsequently the entrepreneurship and strategy literatures. Organizational fitness has thus been associated with firms that *have* fit (noun), or with firms that are *able to* fit environment (verb). However, fitness conceptualized in terms of adaptation, coherence or alignment is criticized as tautological (Durand, 2006). There are several pitfalls to adaptation, including: assuming that environment is identified and independent of the firm; the nature of the firm is constrained to reaction; only *ex post* validation is possible; and attributing a property to an entity that involves broader external units.

An alternative viewpoint of organizational fitness has recently emerged. For example, in one contemporary description, Davenport et al. (2006) suggest that organizational fitness “transcends traditional profitability measures, by including an organization’s dynamic capabilities to be innovative for continuous organizational survival and prosperity” (p.427).

That alternative viewpoint is developed in this thesis. A new definition of organizational fitness is proposed in Chapter Four that focuses on identifying which organizations *are* fit (adjective). The conceptualization of organizational fitness adopted here parallels the notion of being in good health and ‘ready for action.’ Firms aim to ensure that they are in a state of constant readiness and as prepared as possible for turbulence and opportunity that may arise.

Prior to the development of a new definition of organizational fitness, a review of conceptualizations, definitions and descriptions of organizational fitness is presented here. Four lenses for organizational fitness were identified from the literature review: a population ecology lens, an evolutionary lens, a strategic management lens and a complexity lens. Following a description of each of the four perspectives of organizational fitness, a summary table is presented at the end of this section (Table 3).

Population Ecology Lens

A population ecology perspective conceptualizes the purpose of organizational fitness (its desired outcome) in terms of persistence and reproduction. Under population ecology perspective, organizational fitness is determined mainly by the population density distribution of the 'niche' that the firm occupies, that is the corner of the market or the role taken by a firm within its community. Early entry to a niche, or construction of one's own niche (Aldrich & Martinez, 2001) allows profits until an industry reaches carrying capacity. Sustainable fitness is best achieved by barring new entries (Johnson & Van de Ven, 2002).

For a population ecology approach, inertia and fitness are positively related. Retention of the best elements of prior solutions leads to increased reliability and clearer inferences about new strategies. For example, Amburgey, Kelly, & Barnett (1993) suggested that standardization of routines enhances a firm's fitness and lowers the risk of failure in the long term. Hannan and Freeman (1984) advocate 'reproducibility of structure from day to day' (p.154) with reliable, non-variable routines. Modern societies arguably favour firms which offer rationally-based performance that is reliable (in the sense of reproducible with minimal variation) and accountable (appropriate rules and procedures exist). Firms with outcomes that are highly reproducible are more likely to survive than those that are less reliable and accountable (Hannan & Freeman, 1984; Levinthal, 1991; Haveman, 1992; Amburgey et al., 1993; Garvin, 1993).

A population ecology perspective would typically emphasize a life cycle explanation of organizational change: events are a linear and irreversible sequence of prescribed changes. A prescribed mode of change channels the development of entities in a pre-specified direction, involving incremental, stable adaptation (Van de Ven & Poole, 1995). Thus the present state of an organization has within it an underlying form that regulates the process of change (Dodge & Robbins, 1992; Reid, 1998; Helfat & Peteraf, 2003; Massey et al., 2004). Population ecologists assume that structural inertia limits the capacity of organizations to make important changes in strategy and structure.

Inertial pressures are both internal and external to the organization. For example, internal pressure results from money invested in machinery and personnel; externally there are legal barriers blocking entries and exits. Thus organizational forms³ that are relatively inert are regarded as having greater fitness (Hannan & Freeman, 1977; 1984; Astley, 1985; Lambkin & Day, 1989; Haveman, 1992).

Evolutionary Lens

An evolutionary perspective would view a firm as a structured collection of individuals with differing goals; thus satisficing occurs. Satisficing is the quest for an alternative that is ‘good enough’ (Williamson, 2002:174). March (1981) described satisficing organizations as those that maximize the probability of achieving goals, rather than seek the highest possible expected value. An evolutionary approach might typically describe the desired outcome of fitness to be survival through satisficing.

An evolutionary process is a struggle or competition for scarce resources, and it is this struggle that is the underlying final cause of fitness. Organizational fitness viewed through an evolutionary lens is associated with a gradual, path-dependent development of the organization. Durand (2006) argued that evolutionary events must be causally linked together, and are a cumulative and probabilistic sequence (p.16). Three distinct mechanisms are involved in an evolutionary process: variation, selection and retention (Burgelman, 1991; Barron, 2003). *Variation* is any departure from routine or tradition. Evolutionists hold that variations are blind: innovations with unknowable outcomes are introduced. The process of *selection* distinguishes between innovations and rewards them differently; *retention* enables the diffusion of beneficial innovations between units of selection. The three mechanisms occur simultaneously, not sequentially.

Evolutionary theories thus seek to explain the dynamic process of firm adjustment to a constantly changing environment (Alchian, 1965; Nelson & Winter, 1982; Seth & Thomas, 1994; Barnett & Burgelman, 1996; Audretsch, Houweling, & Thurik, 2004; Winter, 2005). Evolutionary change is a recurrent, cumulative, and probabilistic sequence of variation, selection and retention events (Campbell, 1969; March, 1994; Aldrich & Ruef, 2006; Durand, 2006). The mode of change is prescribed, that is, change occurs within an existing framework that produces variation on a theme. A balance between variation and retention determines the survival of current forms and practices.

³ An organizational form is a “set of rules that patterns social interaction between members, facilitates the appropriation of resources, and provides an internally and externally recognized identity for an organization” (Aldrich & Ruef, 2006) (p.114).

Evolutionary theories of change are sometimes seen as a contemporary extension of behavioural theory⁴. Behavioural theory focuses on empirically valid behaviour and decision making processes of managers; thus a viewpoint of realism is adopted. Evolutionists link organizational fitness to continuity in behavioural patterns that result from routines. Routines are capabilities of organizations that may be viewed metaphorically as multi-person skills (Winter, 2005). Nelson and Winter (1982) described routines as “repositories for productive knowledge that code for particular behavioural patterns” (Knudsen, 2001:149).

There are three classes of routines: operating characteristics that govern short-run behaviour; investment routines that alter the period-by-period capital of the firm; and ‘searches’ which are routine-guided, routine-changing processes that modify operating characteristics over time. It is the joint action of search and selection that causes firms to evolve their fitness over time: the condition of the firm in each period bears the seeds of its condition in the next period (Nelson & Winter, 1982).

Winter (1994) suggested that for a firm to be considered fit it must continually exercise its available repertoire of routines (the storage place of the firm’s operational knowledge) so as to constantly refresh organizational memory, preserve coordination, and maintain flexibility. Constant exercising of routines leads to innovation that results from recombination and chance mutations, all adding to organizational fitness. The best components of new combinations are provided by well-understood routines (Nelson & Winter, 1982). In the same way individual skills deteriorate when they are not exercised, so it is hard for a firm to hold in memory a coordinated response to contingencies.

Evolutionary conceptualizations of organizational fitness contain underlying themes of replication⁵, transmission, and conservation of knowledge, capabilities, and routines. There is thus some overlap between evolutionary and population ecology approaches. Nevertheless there are important differences which distinguish the two perspectives. These differences include selection criteria and levels, bounded rationality, adaptation, and the predictability of path outcomes (Durand, 2006).

⁴ Motivational and cognitive assumptions underlying the rationality of economic man are rejected; theory relies on observations of overt behaviour (Seth & Thomas, 1994).

⁵ Replication involves “transferring or redeploying competences from one concrete economic setting to another” (Teece et al., 1997) (p.525).

Strategic Management Lens

“Strategic management is about charting how to achieve a company’s objectives, and adjusting the direction and methods to take advantage of changing circumstances” (Faulkner & Campbell, 2003:3). The mode of change typically assumed under this perspective is constructive, rather than prescribed, since it may involve a reformulation of the organization. Organizational development is a recurrent, discontinuous, and intentional sequence of goal setting, implementation, and adaptation in order to reach a desired end state. Progress toward self-determined goals can be monitored (Poole, 2004). The process of achieving organizational fitness under a strategic management perspective involves re-design of organization goals, strategies and structure in order to re-align with environmental conditions. “Firms are guided by continual feedback through which they adjust their interacting elements to achieve a higher degree of organizational fitness” (Jones, 2005:16). A traditional strategic management view of performance is concerned with a process of continuously matching environmental fit and internal fit, e.g. Miller (1992). An organization has high levels of fitness if it continues to meet the demand for perceived value from the environment (Fuller & Moran, 2001).

Strategic management literature has conventionally examined alignment or fit of internal and external components of the business (Hambrick, 1980; Churchill & Lewis, 1983; Venkatraman & Camillus, 1984; Venkatraman, 1989; Venkatraman & Prescott, 1990; Randolph, Sapienza, & Watson, 1991; Naman & Slevin, 1993; Ittner, Larcker, & Rajan, 1997; Chrisman, Bauerschmidt, & Hofer, 1998; Barth, 2003; McCann, 2004; Leung, Zhang, Wong, & Foo, 2006). A higher level of performance has generally been attributed to optimal ‘fit’ between and within contextual⁶ factors such as technology, environmental, design, and structural factors.

More recently, strategic management perspectives of fitness have focused on the dynamic capabilities of a firm to revise its business model. For example, Voelpel, Leibold, & Tekie (2006) argued that ‘dynamic fitness’ (p.272) is enhanced when knowledge created and utilized by search routines provides the basis for maintaining the firm’s operating routines (Zott, 2003). A firm with a high level of dynamic fitness employs a continuous cyclical process of pre-emptively destroying and reinventing its own business model to remain competitive. This requires initiation, experimentation and

⁶ The literature traces its origins to systems thinking, and takes a contingency theory approach, assuming that context has causal primacy. Thus the firm does not create and define its own context (Astley & Van de Ven, 1983).

development of new capabilities alongside the management of current capabilities (Voelpel, Leibold, & Tekie, 2004; Voelpel et al., 2006). Organizational fitness thus requires ability to be adaptable in the ever-changing business environment (Low & MacMillan, 1988; Beer & Eisenstat, 2000; Beer, 2003; Jones, 2004; Voelpel, Leibold, & Mahmoud, 2004; Jones, 2005). Through managerial foresight, firms can realize socially constructed and pre-defined goals by means of various paths.

Complexity Lens

A fourth lens for viewing organizational fitness is associated with complexity theory (Kauffman, 1993; Anderson, 1999; Dooley & Van de Ven, 1999). Organizational change occurs by means of recurrent, discontinuous sequences of confrontation, conflict and synthesis. The organization changes because it must cope with the effects of contradictions, conflicts and tensions. A constructive mode of change generates unprecedented, novel forms that are discontinuous and unpredictable departures from the past. The end state of development does not have a pre-determined path, but rather emerges from the dialectical process (Stacey et al., 2000; Poole & Van de Ven, 2004).

Under a complexity approach, coevolutionary parts form an interdependent unity with the whole. Self-organization, emergence, and non-linearity are three central concepts underlying a complexity approach.

Self-organization. Self-organization is a dynamic process by which a system spontaneously becomes more organized (Morel & Ramanujam, 1999). Order at higher levels arises from stochastic lower level behaviour. A 'strong' approach to organizational complexity emphasizes total self-organization. Managers participate in spontaneous change but have no control over it. Thus human freedom, ethics, and spontaneity are critical to an organization's development and fitness. The essential features of human action are cooperation and conflict in the living present; managerial foresight is considered irrelevant (Stacey et al., 2000).

A complex *systems* approach restricts self-organization to only a subset of the organization. That is, an organization is viewed as a system rather than as an organism. A firm is theoretically split between an intendedly rational management and the remainder of the firm as a complex system from which outcomes emerge.

Emergence. For a network of randomly connected individuals with randomly assigned decision-making rules, order may emerge⁷ depending on the degree of connectedness between individuals. That is, *relational complexity* arises from the number of formally and informally linked elements in a system (Kauffman, 1993; Stacey, 1995; Eisenhardt & Galunic, 2000; Allen, 2001; Foster & Metcalfe, 2001). Simple, stable behaviour results from sparse connectivity; random patterns result from rich connectivity. There is a point between the two extremes at which unanticipated order emerges. The emergent patterns are a property of the interactions rather than the individual elements (Stacey, 1995).

Kauffman (1993) described social organizations as existing in ordered, chaotic⁸, and complex regimes. It is under a complex regime, lying between order and chaos, that spontaneous order may be exhibited. Kauffman argued that ‘edge of chaos’ complex systems are best able to adapt, and have superior fitness levels. A complex organization is not so structured that processes are fully controlled, nor so unstructured that chaos ensues (Brown & Eisenhardt, 1997; Boisot & Child, 1999). The nature of the interactions between the elements, their structural hierarchy and how loosely they are coupled thus influence the likelihood that innovation emerges from the system (Lawrence & Lorsch, 1967; Weick & Roberts, 1993; Ethiraj & Levinthal, 2004; Lengnick-Hall & Beck, 2005). Organizations need to monitor the number of interacting elements of the firm and their interconnectedness. If the elements are too richly coupled together, conflicting constraints lead to mediocre performance. If the elements are too independent, fitness deteriorates as small errors remain unnoticed (Kauffman, 1993).

Nonlinearity. A third concept underlying complexity theory is nonlinearity of feedback. Surprising results emerge from organizations at the edge of instability, when the feedback process is both positive and negative. Human interactive systems are intrinsically nonlinear, as described by Stacey (1995):

The choices of agents in human systems are based on perceptions which lead to non-proportional over- and under-reaction; there are almost always many outcomes possible for any action; group behaviour is more than the sum of individual behaviours; outcomes are usually stubbornly individual and often peculiar; and without doubt small changes often escalate into major outcomes (p.481).

Organizational fitness in an environment of nonlinear feedback relates to effective facilitation of formal systems that define goals and strategies while also seeking to

⁷ Emergence is the manifestation of new system performance due to the collective behaviour of the elements, as opposed to the individual behaviour of each element (McCarthy, 2004) (p.127).

⁸ A chaotic system is locally unstable but globally stable. The laws of the system prevent it from converging to a particular equilibrium state, but also prevent it from moving very far from its globally stable equilibrium (its attractor). Such a system restlessly explores a subset of the states in the neighbourhood of the attractor (Foley, 2003).

undermine those systems in the interests of changeability (Stacey, 1995; Lengnick-Hall & Beck, 2005). Coping with nonlinear feedback is discussed in the literature in terms of organizational cognitive complexity, adaptive generalization, and ambidexterity.

Organizational cognitive complexity is an organizational ability to absorb complexity rather than reduce it. Organizational cognitive complexity is demonstrated by a firm that encourages development of multiple and sometimes conflicting goals, and considers a variety of strategic activities (Ashmos, Duchon, & McDaniel, 2000; Kuratko, Goodale, & Hornsby, 2001). A similar concept, *adaptive generalization* is a consciously managed process by which slack resources (both tangible and intangible) are invested in overintegration followed by overdifferentiation of the firm relative to the environment. As the firm seeks to restore internal equilibrium, the cognitive complexity with which it perceives the environment increases (Chakravarthy, 1982; 1986; Voelpel et al., 2006).

The theme of managing conflicting demands occurs in a variety of organizational literatures. Penrose (1959) referred to the importance of managers providing contexts that ‘stretch’ and ‘support’ (p. xviii) an organization. The problem is how to maintain sufficient exploitation, using and developing things already known to ensure current viability, while ensuring future viability through exploration or pursuit of new knowledge (March, 1991; Levinthal & March, 1993; Gupta, Smith, & Shalley, 2006; Lavie & Rosenkopf, 2006). As March (1991:71) noted: “Adaptive systems that engage in exploration to the exclusion of exploitation are likely to find that they suffer the costs of experimentation without gaining many of its benefits”.

Some scholars have concluded that a solution to the problem of managing conflicting demands lies in ‘punctuated equilibrium’ where organizations cycle through periods of exploration and exploitation (McKelvey, 1994; Romanelli & Tushman, 1994; Gupta et al., 2006). Other research suggests that a more viable approach is simultaneous pursuit of exploration and exploitation. This latter approach implies that successful organizations in a dynamic environment are *ambidextrous* (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2004; Gupta et al., 2006; Voelpel et al., 2006).

Ambidexterity. An ambidextrous organization has the behavioural capacity to simultaneously demonstrate alignment and adaptability (Gibson & Birkinshaw, 2004). Table 2 shows that ambidextrous organizations require a range of strategies,

competencies⁹ and structures to exploit existing capabilities for profit while also exploring new opportunities for growth.

Table 2: The Scope of the Ambidextrous Organization

	Exploitation	Exploration
Strategic intent	profit	innovation, growth
Critical tasks	efficiency, incremental innovation	adaptability, breakthrough innovation
Competencies	operational	entrepreneurial
Structure	formal, mechanistic	adaptive, loose
Culture	low risk, customers	flexibility, experimentation

Source: Adapted from O'Reilly & Tushman (2004)

Structural ambidexterity occurs when dual structures are created in an organization to manage trade-offs between the paradoxical demands of inertia and adaptability. Thus structural ambidexterity refers to the “synchronous pursuit of both exploration and exploitation via loosely coupled and differentiated subunits or individuals, each of which specializes in either exploration or exploitation.” (Gupta et al., 2006:693). *Contextual* ambidexterity (Gibson & Birkinshaw, 2004) for an organization is not achieved through temporal, structural or task separation, but rather by encouraging individuals to make their own judgments “as to how best divide their time between the conflicting demands for alignment and adaptability” (p.211).

In sum, under a complex systems approach to organizational fitness, managers experiment with the richness of interactions between members so as to allow novelty to emerge (relational complexity), and deliberately introduce discontinuity and ambidexterity into the system to improve fitness (Voelpel et al., 2006). Organizational fitness is improved when the functioning formal systems that provide negative feedback are subverted and challenged by informal systems of ambiguity and learning.

Summary: Organizational Fitness

The four perspectives of organizational fitness are summarised and compared in Table 3, constructed from Campbell (1969), Hannan & Freeman (1977, 1984), Nelson & Winter (1982), Simon (1991), Stacey (1995), Van de Ven & Poole (1995), Stacey et

⁹ Competencies are sets of interrelated capabilities that can be used in a number of contexts (Sanchez, 2003).

al. (2000), Wernerfelt (2003), Lewin et al. (2004), Poole & Van de Ven (2004), Durand (2006), and Aldrich & Ruef (2006).

Table 3: Organizational Fitness: Comparison of Four Lenses

	Population Ecology Lens	Evolutionary Lens	Strategic Management Lens	Complexity Lens
The purpose of fitness, (its desired outcome) is:	to persist through successive cycles	to achieve survival; to satisfice	to realize self-determined goals	successful coevolution
The underlying or end determinant of fitness is:	population density	competition; struggle	human motivation, planning, reasoning, managerial intention within constraints	interdependency, conflict and tension
Fitness is achieved (immediate cause) as a result of:	replication, reliability and accountability	problemistic search, variation, selection retention mechanisms	knowledge management, learning, interaction adaptability	relational, cognitive complexity at the edge of chaos
Changes in fitness (mode) are:	prescribed, regulated, linear, predictable	prescribed, gradual, cumulative, unpredictable	constructive, gradual or abrupt; unpredictable	constructive: gradual or abrupt; nonlinear, unpredictable
Content of fitness is:	successful reproduction of existing routines	adoption of routines and properties that are selected in	degree of fit of internal and external attributes	emergent, self-organizing, self-fulfilling
Agency implied:	none	bounded or intended rationality	the agent is a sense maker who directs change	none
Approach to measurement of fitness:	birth and death rates; growth rate, size, age	adaptability and selection for properties	propensity to achieve; competitive advantage	degree of functionality on fitness landscapes

As Table 3 shows, existing perspectives of organizational fitness differ in terms of purpose, end determinant, immediate cause, mode, content and measurement approach. An agreed conceptualization of organizational fitness has not emerged from these four perspectives.

OPERATIONALIZING ORGANIZATIONAL FITNESS

The previous section described how organizational fitness has been viewed in the literature through four different lenses. Each lens provides different insights into organizational fitness. A review is now presented of specific studies that have attempted to define organizational fitness. For each study, more than one lens comes into play, giving rise to a diversity of operationalizations of organizational fitness.

A search of academic organizational literature revealed nineteen sources that discuss organizational fitness; however only half of these studies explore organizational fitness as a central theme; most studies refer to the concept relatively briefly. The literature review revealed that components, antecedents and outcomes of organizational fitness

are neither well understood nor agreed. The influence of the natural sciences on thinking about fitness was evident. For example, Beer (2003) stated “In a Darwinian economic environment, *unfit* organizations - those that *do not adapt to fit new circumstances* - do not survive” (p.1, original italics).

Table 4 displays alternative fitness operationalizations from the nineteen studies, and describes dimensions and theoretical perspectives of organizational fitness. The studies are listed in order, with the most recent studies at the start of the table.

Table 4: Organizational Fitness Conceptualizations

Author	Fitness Operationalization	Dimensions	Theoretical Lens
1. Helfat et al. (2007)	Evolutionary fitness measures how well a dynamic capability enables a firm to make a living.	<ul style="list-style-type: none"> • Technical fitness • Market Demand • Competition 	<ul style="list-style-type: none"> • Evolutionary • Strategic management • Population ecology
2. Davenport, Leibold, & Voelpel (2006)	Organizational fitness includes an organization’s dynamic capabilities to be innovative for continuous organizational survival and prosperity.	<ul style="list-style-type: none"> • Adaptation • Self-organization 	<ul style="list-style-type: none"> • Strategic management • Complexity
3. Jones (2005)	A “corridor of fitness” (p.15) refers to the degree of freedom afforded by the operating environment. Firm-environment interaction determines degree of fitness.	<ul style="list-style-type: none"> • Learning Capabilities • Activities • Identity • Products/services • Absorptive Capacity 	<ul style="list-style-type: none"> • Evolutionary • Strategic management • Population ecology
4. Voelpel, Leibold, & Tekie (2004)	The dynamic capabilities for systemic and adaptive reinventive activities.	<ul style="list-style-type: none"> • Customer attitudes • Technology • Potential for firm structure (re)configuration • Economic feasibility 	<ul style="list-style-type: none"> • Evolutionary • Strategic management
5. Dervitsiotis (2004)	Possession of a “repertoire of available responses whose variety matches the variety of challenges presented by changes in the environment”.	<ul style="list-style-type: none"> • Unlearning • Quality of conversations • Connectivity • Diversity, empowerment • Optimum stress 	<ul style="list-style-type: none"> • Evolutionary • Complexity
6. Voelpel, Leibold, & Habtay (2004)	Dynamic organizational fitness is a range of organizational capabilities driven by purposeful goals for both successful adaptive and proactive change processes.	<ul style="list-style-type: none"> • Organizational Fitness Profiling • Self-managing teams develop capabilities • Coherent capabilities 	<ul style="list-style-type: none"> • Strategic management • Evolutionary
7. McCarthy (2004)	The capability to survive in one or more populations and imitate and/or innovate combinations of capabilities which will satisfy objectives and market needs, and be desirable to competing firms.	<ul style="list-style-type: none"> • Survival fitness, the ability to adapt and exist • Reproductive fitness, the ability to endure and produce similar systems 	<ul style="list-style-type: none"> • Evolutionary • Strategic management

Author	Fitness Operationalization	Dimensions	Theoretical Lens
8. Voelpel, Leibold, & Mahmoud (2004)	Ability to adapt and survive in the ever-changing business environment (p.128).	<ul style="list-style-type: none"> • Context • Coordination • Communication • Leadership style 	<ul style="list-style-type: none"> • Evolutionary • Strategic management
9. Beer (2003)	The capacity to adapt organizational design, behaviour and culture to fit new circumstances.	<ul style="list-style-type: none"> • Learning • Clarity of direction • Coordination • Leadership • Vertical communication 	<ul style="list-style-type: none"> • Evolutionary • Strategic management
10. Larréché (2002)	Competitive fitness is the measure of fundamental capabilities of firms to compete in the marketplace	<ul style="list-style-type: none"> • Direction • Unity • Steering • Resources • Action • Results 	<ul style="list-style-type: none"> • Evolutionary • Strategic management
11. Foster & Metcalfe (2001)	Fitness is a dynamic concept, associated with growth rates of competing units of selection.	<ul style="list-style-type: none"> • Fitness, adaptation, unit of selection and environment form a unit; cannot have one without the other • Fitness is a consequence of interaction within a specified environment, and not an attribute of any particular selection unit. 	<ul style="list-style-type: none"> • Population ecology • Evolutionary
12. Fuller & Moran (2001)	The ability to survive over competitors.	<ul style="list-style-type: none"> • Evolution • Adaptability • Inter-dependence 	<ul style="list-style-type: none"> • Evolutionary • Strategic management • Complexity
13. Schwaninger (1990; 2000)	Multilevel concept. "Adapt to an environment in constant transformation and to shape it creatively in a process of coevolution" (p.263).	<ul style="list-style-type: none"> • Operational: Profitability • Strategic: Competitive and cooperation capabilities • Normative: Legitimacy • Meet all three levels in the long run. 	<ul style="list-style-type: none"> • Evolutionary • Strategic management • Complexity
14. Morel & Ramanujam (1999)	The underlying dynamic of organizational change is a mix of randomness and reaction to external and internal pressures which is successful if it leads to increased fitness.	<ul style="list-style-type: none"> • Connectivity is an important parameter for self-organization • Organizational change is largely uncontrollable and consequences are difficult to anticipate 	<ul style="list-style-type: none"> • Evolutionary • Complexity
15. Anderson (1999)	Fitness is a combination of returns to exploitation, exploration, reputation, market position, and capabilities built from past adaptations.	<ul style="list-style-type: none"> • Agents with schemata • Self-organizing networks • Coevolution at the edge of chaos • Recombination and system evolution 	<ul style="list-style-type: none"> • Evolutionary • Complexity
16. Metcalfe (1998)	Economic fitness is a measure of the rates of expansion of activity. It is a measure of the tendency to expand as a joint result of environmental effects and behavioural traits.	<ul style="list-style-type: none"> • Partly determined by the capabilities and intention of the unit • Arises from the interaction between rival units in a given market environment 	<ul style="list-style-type: none"> • Evolutionary • Strategic management

Author	Fitness Operationalization	Dimensions	Theoretical Lens
17. Ruef (1997)	The optimality of the characteristics of the organization judged against environmental criteria	<ul style="list-style-type: none"> • Adaptability • Efficiency • Legitimacy 	<ul style="list-style-type: none"> • Population ecology • Strategic management
18. Hannan & Freeman (1984)	The capacity to repeatedly produce collective outcomes of a certain minimum quality.	<ul style="list-style-type: none"> • Reliability • Accountability • Environmental change • Age and Size • Complexity 	<ul style="list-style-type: none"> • Population ecology
19. Hannan & Freeman (1977)	The probability that a given form of organization will persist in a certain environment.	<ul style="list-style-type: none"> • Size • Competition • Niche Identification • Excess capacity 	<ul style="list-style-type: none"> • Population ecology • Evolutionary

The second column of Table 4 illustrates there has been a wide variety of operationalizations of organizational fitness. Fitness has been associated with performance, growth, survival, adaptedness, competitiveness, optimality, and persistence, and has been viewed as both an outcome and as a causal variable. Organizational fitness has frequently been associated with organizational capabilities, organizational learning, and organizational context. The various operationalizations of fitness differ with regards to the nature of the organizational capabilities that lead to fitness, the underlying mechanism that drives organizational development, and the influence of the environment on fitness.

Dimensions of fitness. The third column of Table 4 shows hypothesized dimensions of organizational fitness. A common theme across many of the articles is that organizational capabilities and competencies are associated with organizational fitness.

For example, Davenport, Leibold, & Voelpel (2006) suggested guidelines for measuring fitness (p.427). Davenport et al. argued that organizational fitness can be measured internally by assessing the ability to self-organize quickly and effectively in the face of change. There are three levels of internal fitness: at the lowest level, there is ineffective self-organization that results in deterministic behaviour. At an intermediate level, internal fitness is an ability to keep pace with current change; and at the highest level it is the ability to reorganize faster than competitors.

Other studies e.g. Beer (2003) and Voelpel et al. (2004), also suggest the importance of organizational capabilities, in particular dynamic capabilities. Dynamic capabilities are related to performance indirectly via the alteration of the firm's bundle of resources and routines (Helfat & Peteraf, 2003). Teece et al. (1997) defined dynamic capabilities as "the firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments" (p.516).

Lenses. The fourth column of Table 4 shows the lenses through which fitness has been viewed for each study. As described in the previous section, there are at least four idealized lenses for viewing organizational fitness that view fitness in terms of population density; variation, selection and retention; adaptability; and complexity absorption. All of the studies in Table 4 conceptualize organizational fitness through more than one of these four lenses. The more recent studies listed early in Table 4 tend to draw from at least three perspectives of organizational change, and most of these studies explore the evolution of complex adaptive systems (Morel & Ramanujam, 1999; Fuller & Moran, 2001; Voelpel, Leibold, & Mahmoud, 2004). Fuller & Moran suggested that “concepts of adaption, evolution, fitness, and interdependence coupled with the theory of evolutionary autopoietic¹⁰ structures generate a plausible field for the study of enterprise dynamics” (p.47).

Summary. All of the articles in Table 4 draw from a combination of perspectives. Table 4 shows that in total, sixteen studies utilise an evolutionary lens to some degree; thirteen a strategic management lens, six a complexity lens, and six a population ecology lens. Many of the articles approach organizational fitness from both the evolutionary and strategic management perspectives, and reinforce the importance of dynamic capabilities for organizational fitness.

MODELS OF ORGANIZATIONAL FITNESS

Four of the studies in Table 4 propose theoretical models that go further than merely conceptualizing, operationalizing or suggesting measures of organizational fitness. The models attempt to explain relationships between hypothesized antecedents and outcomes of organizational fitness. Notably, these models are based on literature and deductive logic, and do not have empirical underpinning. Each of the four models is described now in chronological order.

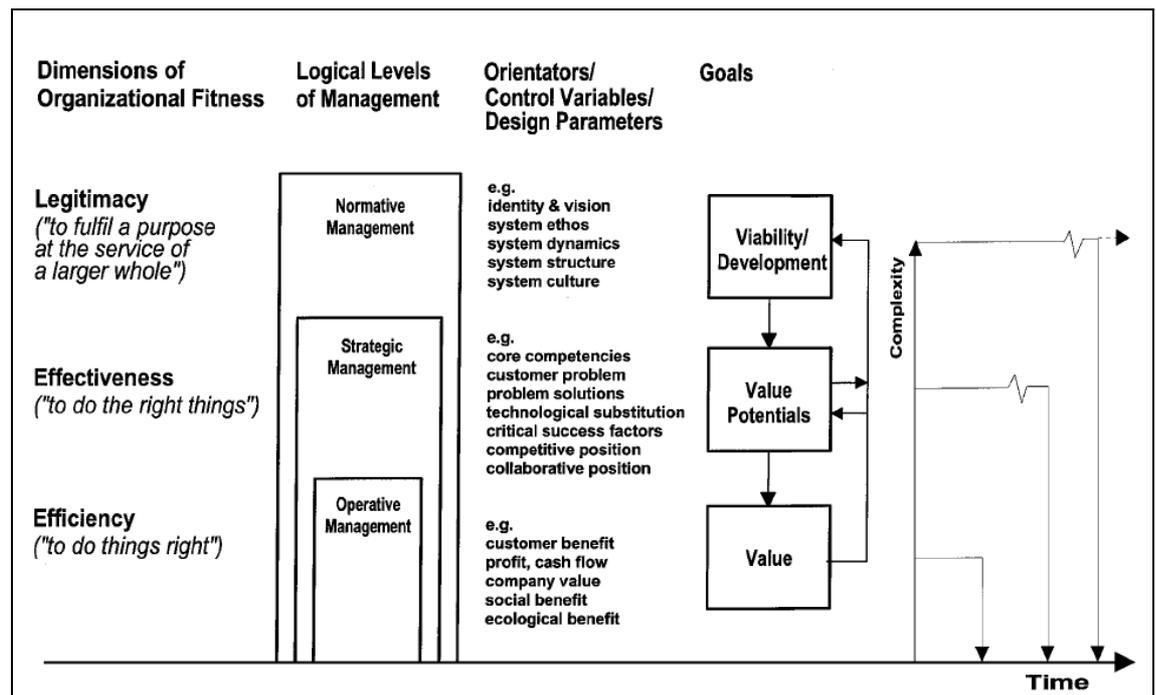
The Model of Systemic Control (2000)

The Model of Systemic Control (Schwaninger, 1990; 2000) is based on the theory that a system with high levels of fitness can regulate itself “by means of control variables that may contradict each other because they belong to different logical levels:

¹⁰ In living complex adaptive systems, self-organizing behaviour is called autopoiesis. Structure creation is not imposed from outside the system. In a parallel concept for non-living systems, if a product catalyses its own production, the feedback process is called autocatalysis (Fuller & Moran, 2001).

the levels of *operative, strategic and normative management*” (p.213, original italics). The Model of Systemic Control is shown in Figure 2. The model conceptualizes management in terms of reduction of complexity, and draws from the field of *management cybernetics* which assigns priority to self-control and self-organization. Cybernetics has been described as the science of effective organizations; management is the profession that practises this science (Espejo & Schwaninger, 1993).

Figure 2: Goals and Orientators at Different Logical Levels of Management



Source: Schwaninger (2000:216).

Three dimensions of organizational fitness are listed in the first column of Figure 2: legitimacy, effectiveness, and efficiency. Legitimacy is the potential to fulfil the claims of all relevant stakeholders (p.259). The three dimensions of fitness are related to three logical levels of management, namely normative, strategic and operative management (column 2). Control variables (indicators of performance) of the higher logical levels of management exert a pre-control influence on the lower level goals (columns 3 and 4). For example, the design parameters of the normative level exert a pre-control function in relation to strategic goals, which in turn exert a pre-control function in relation to liquidity and profit goals (value) of the operative level. Value potentials, the goal of the strategic management level, are the set of all business-specific prerequisites that must exist for the realization of value¹¹. The viability goal at the normative level is the

¹¹ This does not mean that they are a guarantee (or sufficient prerequisite of value) as would be the case for a mechanical system (Schwaninger, 2000) (p.215).

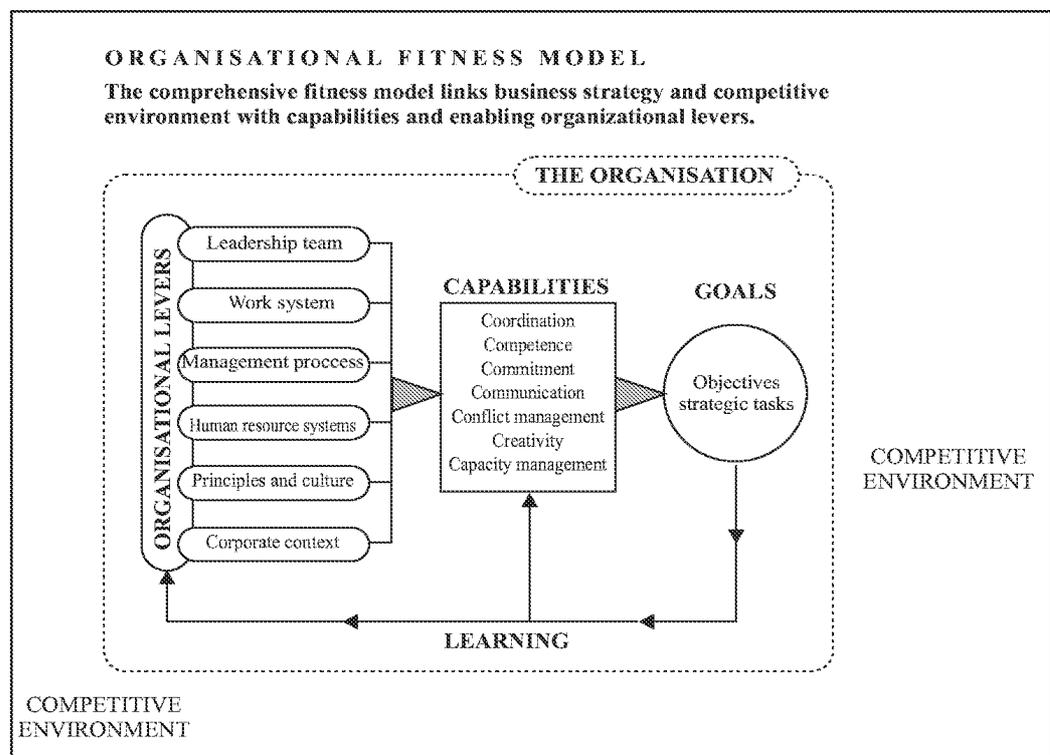
maintenance of organizational identity, defined as a distinct configuration which makes a system identifiable (Schwaninger, 1990; 2000). The model shows that the ultimate goal of the system is viability beyond survival (Schwaninger, 1993); development is a higher objective in its own right. An organization with a relatively high level of viability/development will likely create value potentials over time.

The Model of Systemic Control suggests that different criteria for organizational fitness may apply to different levels of analysis. Thus efficiency is the criterion at the operative level; effectiveness (cooperative and competitive) at the strategic level; and legitimacy (fulfil the claims of all stakeholders) at the normative level (Schwaninger, 1990; 2000).

Organizational Fitness Model (2003)

Beer (2003) developed the Organisational Fitness Model (Figure 3). Organizational fitness was defined as the capacity to adapt organizational design, behaviour and culture to fit new circumstances.

Figure 3: Organizational Fitness Model



Source: Beer (2003)

The Organizational Fitness Model (Beer, 2003:321) is shown in Figure 3. Organizational fitness depends on the capacity of leaders and organizations to confront and learn from internal tensions. Capabilities and culture are shaped by the leadership

team, work system, management processes, human resource system, principles and environment. These shaping mechanisms are called ‘organizational levers’. Organizational levers provide the means to renew capabilities that are needed to achieve goals and strategic tasks in a competitive environment. There are six barriers that block organizations from building organizational fitness (Beer & Eisenstat, 2000). The barriers identified are: an unclear strategy, an ineffective top team, and top-down management style (all of which affect quality of direction); poor vertical communication (affects the quality of learning); poor coordination and insufficient development of lower management.

The Dynamic Organizational Fitness Model (2004)

A Dynamic Organizational Fitness Model was developed by Voelpel, Leibold, & Habtay (2004), who perceived that a weakness of Beer’s Organizational Fitness Model was its emphasis on adaptation to environmental change. Organizations need to “trigger revolutionary changes by developing capabilities in sensing, creating, and experimenting on a continuous basis” (p.42). The ability to shape the environment proactively, forcing competitors to adapt, suggests that proactive fitness capabilities are a necessity for long-term survival (Beinhocker, 1999; Leibold, Probst, & Gibbert, 2002). Thus Voelpel et al added a seventh barrier, ‘absence of strategy for explorative new business models’ to the six barriers of Beer & Eisenstat (2000).

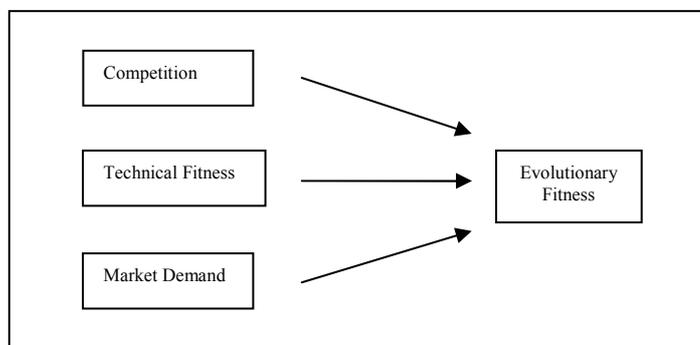
Further, Voelpel et al proposed a three-phased approach within a managerial framework. In the first phase, barriers to building organizational fitness are removed using organizational fitness profiling (Beer & Eisenstat, 2000). The second phase involves building capabilities for successful adaptive change. This phase involves making systemic change and developing self-managing processes. Further, *communities of practice* (Brown & Duguid, 1998) are created inside these self-managing processes. Finally, the third phase involves creating internal variety in the system, by developing explorative new business models and by developing leadership-coherence capabilities¹². This third phase creates dynamic organizational fitness for adaptive and proactive change processes.

¹² Four types of coherent mechanisms are identified: shared identity, knowledge sharing and utilization, network coupling, and modularity and co-evolution (Voelpel, Leibold, & Habtay, 2004).

Evolutionary Fitness Model (2007)

In a recent book that focused on dynamic capabilities and strategic change in organizations, Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece & Winter (2007) presented a model of evolutionary fitness (Figure 4). The model is derived from the idea that resources are valuable when they ‘fit’ the requirement of customers in a particular place at a particular time. Operational capabilities enable a firm to earn a living in the present (Winter, 2003), but dynamic capabilities concern modification of operational capabilities. Helfat et al. define a dynamic capability as “the capacity of an organization to purposefully create, extend, or modify its resource base” (p.1).

Figure 4: Factors that Influence Evolutionary Fitness



Source: Adapted from Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece & Winter (2007: 8)

Evolutionary fitness refers to how well *dynamic capabilities* enable a firm to make a living by creating, extending, or modifying its resource base (p.63). Thus evolutionary fitness is seen as a property of a dynamic capability, not of the firm. “Evolutionary fitness depends on the external “selection” environment. Evolutionary fit dynamic capabilities enable a firm to survive and perhaps grow and to prosper in the marketplace” (p.7).

Influences on evolutionary fitness are *technical fitness*, *market demand*, and *competition* as shown in Figure 4. Technical fitness has two dimensions: first is a quality dimension, regardless of the cost of creating and utilizing the capability. The second dimension is the cost of capability creation and utilization. Technical fitness is the ratio of quality to cost, and is an internal measure of capability performance. Technical fitness and market demand do not necessarily go together; high-quality products are not always wanted by consumers.

For Helfat et al., the competitive environment affects evolutionary fitness, but not technical fitness. A firm might make a very good living (high evolutionary fitness) if it

operates in a munificent market environment, despite having less technically fit capabilities. Helfat et al. (2007) proposed concepts of technical fitness and evolutionary fitness as a first step toward unpacking the determinants of the performance of dynamic capabilities.

SUMMARY

Organisations, defined as goal-directed, boundary-maintaining, and socially-constructed systems of human activity, have been perceived in the literature as mechanisms, organisms, and systems. They have been investigated using both systemic and analytical approaches. Organizational fitness has been examined through four lenses: a population ecology lens, an evolutionary lens, a strategic management lens, and a complexity lens. An agreed conceptualization of organizational fitness has not emerged from these four perspectives. Further, no single perspective appears to provide sufficient theory to model the various perceived dimensions of organizational fitness.

The literature review of this chapter revealed widely divergent perspectives of organizational fitness, each providing useful insights. However each perspective is linked in some degree with survival or adaptation to the environment. The adaptationist approach has been criticized as tautologous. That is, organizational fitness perceived as adaptation is open to criticisms of circular reasoning and the tautological trap of not defining fitness independently of actual survival (Mills & Beatty, 1979; Byerly, 1986; Mathen & Ariew, 2002; Ariew & Lewontin, 2004; Durand, 2006). Several questionable assumptions are made when organizational fitness is linked with adaptation. These include assumptions that environment can be identified independently of the firm, that selection occurs only at one level of the firm, that organizational change involves some form of teleology or final cause, and that firms play only passive, reactive roles in their environment.

Thus the focus of this study was to suggest a new definition of organizational fitness that would identify which organizations are in good health and 'ready for action'. In order to provide an alternative non-tautological conceptualization to those currently existing, a broader literature review was undertaken, so that underlying theory might be explored. Most studies of organizational fitness have drawn from a combination of lenses in some degree, and a similar integrative approach to organizational fitness was adopted here. Referring to Figure 1, a broader review of organizational evolution, organizational capabilities, and organizational performance was indicated. Thus the literature review of this chapter resulted in three summary observations.

First, the review suggested that research and modelling of organizational fitness should proceed by employing an underlying evolutionary framework that operates at several levels with variable selection criteria and bounded rationality of managers. Thus a review of *evolutionary models* provides essential background material (Figure 1) for this study and is presented in the next chapter.

Second, the Organizational Fitness Model (Beer, 2003), the Dynamic Organizational Fitness Model (Voelpel, Leibold, & Habtay, 2004) and other articles in Table 4 suggested that dynamic capabilities are important antecedents to organizational fitness. A strategic management lens provides useful firm-level insights into organizational capabilities, and a review of *organizational capabilities* (Figure 1) is therefore presented in the next chapter.

Third, the purpose of fitness (its desired outcome) is not agreed when viewed through the four lenses. Prior studies (implicitly) hypothesize that organizational performance is an outcome of organizational fitness, but the nature of this performance and how it is related to organizational fitness is not well understood. Thus a review of *performance implications* of organizational fitness (Figure 1) is also provided in the next chapter.

Chapter Three: Organizational Evolution

The purpose of this chapter is to familiarise the reader with the broader theoretical foundations that underlie organizational fitness. The review of the previous chapter identified that in order to define organizational fitness non-tautologically, a broader literature review should be undertaken. Similar to most prior studies of organizational fitness that have drawn from a combination of lenses, an integrative approach to organizational fitness should be adopted. Chapter 2 concluded with three summary observations.

First, evolutionary frameworks underpin and give meaning to organizational fitness. This study aimed to build on previous research, so it was assumed here that an evolutionary framework underpins the concept of organizational fitness. Accordingly, in Section One of this chapter a review of contemporary evolutionary frameworks for organizational change is presented.

The second summary observation of Chapter 2 was that organizational capabilities are important components of organizational fitness, and several prior studies associate dynamic capabilities with organizational fitness, e.g. Helfat et al. (2007), Davenport et al. (2006). Thus Section Two contains a review of the organizational capabilities literature. An introduction to the resource-based view and its offshoot the knowledge-based view of the firm is presented. These theories refer to capabilities internal to the firm that may impact on organizational fitness. In particular, it is examined whether organizational capabilities provide a vehicle for exploring the interdependence of strategy and selection.

The third summary observation of Chapter 2 signalled that performance has been predominantly viewed as an outcome of organizational fitness rather than an antecedent. Section Three thus contains a review of the organizational performance literature. In particular, the review focuses on business performance of SMEs.

EVOLUTIONARY MODELS

Evolutionary models began to appear in organization theory and management literature in the 1970s (Murmann, Aldrich, Levinthal, & Winter, 2003). Foundational ideas of Campbell (1969) were developed for individual-level organizing processes (Weick, 1979), organizational levels (Aldrich, 1979; Barnett & Burgelman, 1996; Aldrich & Ruef, 2006) and population levels (Hannan & Freeman, 1977; 1984; Singh & Lumsden, 1990). A complementary stream of research that originated in routine-based

models of organizational behaviour (Cyert & March, 1963) has led to evolutionary explanations of economic organization (Nelson & Winter, 1982; Witt, 1998; Winter, 2005) which have influenced a wide variety of fields (Murmman et al., 2003). These fields include business strategy (Zander & Kogut, 1995; Barnett & Burgelman, 1996; Durand, 2006); organizational culture (Schein, 2004); organizational learning (Levinthal & March, 1981; 1993); and the resource-based theory of the firm (Barney, 2003a). Aldrich & Ruef (2006) noted that “evolutionary models encompass many levels and units of analysis and thus typically take an inter-disciplinary perspective on change processes” (p.4). The review of foundational evolutionary models in this section begins with an eclectic and meta-theoretical Variation, Selection and Retention model (Campbell, 1969).

Variation-Selection-Retention (VSR) Model (1969).

Campbell (1969) identified three essentials for “selective propagation of cultural forms” (p.73). First, there is chance variation; second, consistent selection criteria which selectively eliminate certain types of variations; and third, a mechanism for preservation, duplication or propagation of the positively selected variants. If these three requirements are met at the level of social forms and customs, Campbell argued that a social ‘learning’ or ‘evolutionary’ process is inevitable. Evolution would be “in the direction of better fit to the selective system” (p.73).

Variation. Variation arises in three forms according to Campbell: between social groups; internally within a group; and across occasions (temporal variation). The source of variations, whether they are intelligent or random, is irrelevant; the more numerous and heterogeneous the variations “the richer the opportunities for an advantageous variation” (p.73).

Selection. Selective systems arise through six mechanisms: survival of a complete group; diffusion or borrowing between groups; individual learning through pleasure-pain and memory; imitation of individual variations; leadership and education; and rational selection. The selection process was for Campbell the primary source of uncertainty, since it is difficult to identify selective criteria independently of what they seem to have selected. There needs to be numerous entities with high mortality rates for selection to make itself felt above a random pattern of events.

Retention. Retention occurs when variations are preserved, duplicated or reproduced. Campbell highlighted two aspects critical to the retention process: first, the value of time that is spent ‘passing on’ accumulated knowledge; and second, the importance of

coding and recording information. This latter aspect saves time spent on cultural accumulation and allows more freedom for variation, which in turn makes advance possible.

VSR provided a baseline model that ecologists and evolutionists from a variety of schools have embraced. It has been described as a naïve selection model (Barnett, Greve, & Park, 1994; Volberda & Lewin, 2003). Shortcomings of a baseline VSR approach include constant selection criteria that do not appear to evolve themselves over time, lack of inter-relationships between different levels of a hierarchy of entities, and lack of relevance for strategic management. For example, it is unclear whether an organization can influence selection criteria (Durand, 2006). These perceived shortcomings spurred further modelling efforts.

VSR and Struggle (1999)

Aldrich (1999) described social evolution as the result of VSR processes together with a process of *struggle*. Struggle is a dynamic process by which market participants engage each other through mobility of resources, transactional arrangements, rivalry, and behavioural contests (Porter, 1980; Chen & Hambrick, 1995; Metcalfe, 1998).

Some life-cycle theories hypothesize that struggle and competition leads to a state of equilibrium; a long term ‘normal’ outcome that is the limit of some process. This perspective has been generally discarded in favour of an alternative perspective of competition as a process:

Instead competition is a succession of events, a dynamic process, a voyage of exploration into the unknown in which successively superior products and production methods are introduced, and consumers discover who meets their particular needs and how. Neither producers nor consumers know in advance the outcome of the competitive process, for that can only be established by trial and error (Metcalfe, 1998:6).

VSRs. Variation, selection, retention and struggle (VSRS) can occur within and between organizations simultaneously. Thus Aldrich recognized variation at two levels: first, *within* the firm as change in current routines and competencies, and second, *between* firms as change in organizational form. In a departure from Campbell’s VSR, Aldrich proposed that variation can be intentional. Within an organization, people can actively attempt to generate alternatives and seek solutions. Between organizations, variations arise from introduction of new organizations or new populations.

Similarly, the process of selection is both external (market forces, competitive pressures, conformity to institutionalized norms) and internal (Henderson & Stern, 2004). Also, retention operates within organizations in the form of role specialization

and standardization that limits discretion, and between organizations in the form of institutionalization of beliefs and practices (Aldrich & Ruef, 2006).

Finally, struggle occurs within organizations in the pursuit of personal and organizational goals; struggle between organizations shapes capabilities which in turn shape competition (Henderson & Mitchell, 1997). Struggle is a multilevel “contest to obtain scarce resources because their supply is limited” (Aldrich & Ruef, 2006).

Relevance of VSRS to this study. The VSRS model of Aldrich (1999) makes several contributions that are important to this study. First, the notion that selection criteria are influenced by competitive struggle was introduced. Competition strengthens learning and selection, but strategic actions of managers attempt to reduce selection pressures (Durand, 2001) which may simultaneously reduce learning (Barnett et al., 1994). Second, agency is discussed in terms of relative importance of intentional variations. Freedom of action is separated from actions that change the environment because of the actor’s behaviour. “The evolutionary approach separates the issue of the conditions under which variations are produced from the issue of the conditions under which they are selected and retained” (Aldrich & Ruef, 2006:18). Selection of variations follows from their consequences, not from their degree of intentionality.

Finally, the VSRS approach suggests that many selection systems are “irrelevant or not tightly connected to environmental fitness” and “preserve organizational diversity that is not tied to current environmental conditions” (p.21). Collective action and cooperative alliances can blunt external selection pressures. Three types of internal selectors contribute to the loose coupling¹³ of internal selection and environmental fit. First, there are pressures that encourage stability and homogeneity (Campbell, 1969). Second is the persistence of irrelevant past selection criteria (Campbell, 1994) known as *competency traps*. Competency traps are specialist strategic positions that hamper adaptation, see e.g. Levitt & March (1988). Third, some owners are willing to accept a low performance threshold.

Dual Hierarchy Model (1994)

Baum & Singh (1994) developed a Dual Hierarchy Model that links organizational evolution and adaptation. Their model extended the Dual Inheritance Model of Boyd & Richerson (1985). Baum & Singh argued that organizational evolutionary theories should explain events that occur in the history of an organization as a result of various

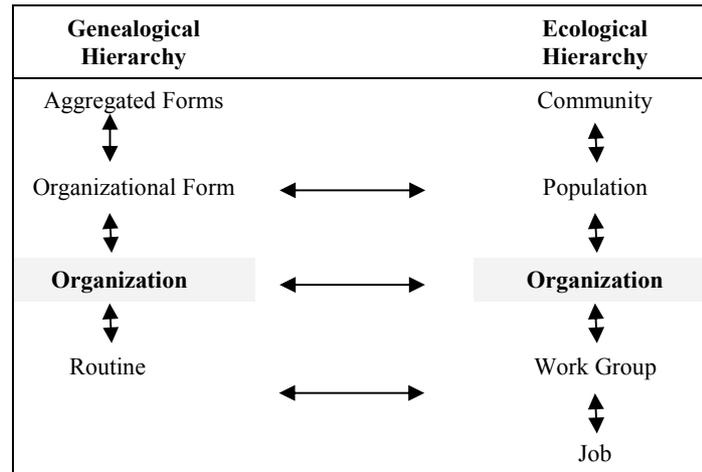
¹³ Loosely coupled entities have a low degree of connectedness: see e.g. Ethiraj & Levinthal (2004).

processes. Two broad processes are identified: replication of knowledge, and interaction with the environment. These processes are carried out by two distinct types of organizational entities: genealogical entities and ecological entities.

Genealogical entities. The function of organizational routines and procedures is to replicate and transfer information. Routines are thus ‘genealogical’ in the metaphorical sense. They provide a blueprint for future action. This perspective envisages specific entities maintaining and transmitting tacit and embedded information in a largely uncontaminated fashion. Without these components of institutional memory there would be no cohesive behaviour, and thus no organization. Baum and Singh proposed that such entities exist in a genealogical hierarchy. At the lowest level are routines. Successful reproduction of individual routines allows the next higher level, an organization (bundle of routines), to exist. Successful reproduction of different bundles of routines allows the next higher grouping of routines (organizational forms) to exist, and so on. Processes of replication, mutation and recombination are linked with the transmission and conservation of knowledge over time. Thus for the genealogical hierarchy, higher level memory is composed (in a non-aggregated sense) of lower level memories. This perspective constructs the organization in terms of persistence of routines.

Ecological entities. The function of ecological entities is to interact with the environment. These entities exchange and transform resources with other ecological entities, causing differential survival and growth, and exist in an ecological hierarchy. At the lowest level of this hierarchy are physical, tangible jobs. There is a dynamic process of interaction between these jobs which hold together the entities at the next higher level, which is that of work groups. These work groups interact and hold together the next higher level – the firm. Thus firms under this perspective are seen as a community of interacting workgroups and jobs (Boyd & Richerson, 1985; Levitt & March, 1988; Baum & Singh, 1994; Kogut & Zander, 1996; Jones, 2005). The overall framework is depicted in Figure 5.

Figure 5: The Dual-Hierarchy Framework



Source: Adapted from Baum & Singh (1994:15)

The left side of Figure 5 shows routines, organizations, organizational forms and aggregated forms¹⁴ are the entities of a genealogical hierarchy. These (intangible) entities are components of institutional memory. An organization is envisaged abstractly as a repository of knowledge with uniquely configured routines.

The right side of the framework shows the entities of an ecological hierarchy that exchange and transform resources. These entities are tangible, concrete manifestations of economic activity that interact more or less successfully with the environment. Jobs, workgroups, organizations, populations and communities were suggested by Baum & Singh as elements of an ecological hierarchy. Under this perspective, the organization is a concrete entity that interacts as a cohesive whole with its environment in such a way that this interaction causes differential survival (Jones, 2005).

It is clear from Figure 5 that organizations occupy a level in each of the hierarchies; firms are thus “transmitters of the routines, the bearers of adaptations, and the expressers of variation in populations” (Baum & Singh, 1994:9). The ‘dual nature’ of organizations proposed by this model is centrally important to the concept of organizational fitness adopted in this study. The dual-hierarchy framework accounts for historical evolutionary effects through the processes of a genealogical hierarchy, and current adaptive effects through the pressures acting on each level of an ecological hierarchy (Boyd & Richerson, 1985).

¹⁴ Organizational form: each member of the group possesses a minimal number of defining features, none of which are necessary or sufficient for membership. No member possesses all the features, but each feature is possessed by a large number of members (van Rijsbergen, 1999). Aggregated forms (polyphyletic groups) result when two lineages convergently evolve similar character states (Ridley, 2003).

The model emphasizes that interaction within and between the two hierarchies, regulates change and creates patterns of organizational evolution. For example, consider the organization as an entity in the ecological hierarchy. In this sense, the firm is the visible structural and behavioural expression of the genealogical entities (routines and procedures). In turn, firm survival determines the specific lineage of routines that persist over time (Baum & Singh, 1994).

In summary, the process of organizational evolution depends on the interplay between interacting and replicating entities. The use of a front stage, backstage metaphor is described by Jones (2005) as illustration:

While it is seen that interaction takes place on the front stage, the outcomes of such interaction is dependent upon the degree of rehearsed planning, design and implementation (completed backstage). The challenge remains to separate front stage from backstage, and to define what was visibly offered for consumption by the firm. Just as important is to establish which backstage processes (despite their invisibility) determined the nature of the performance (p.18)

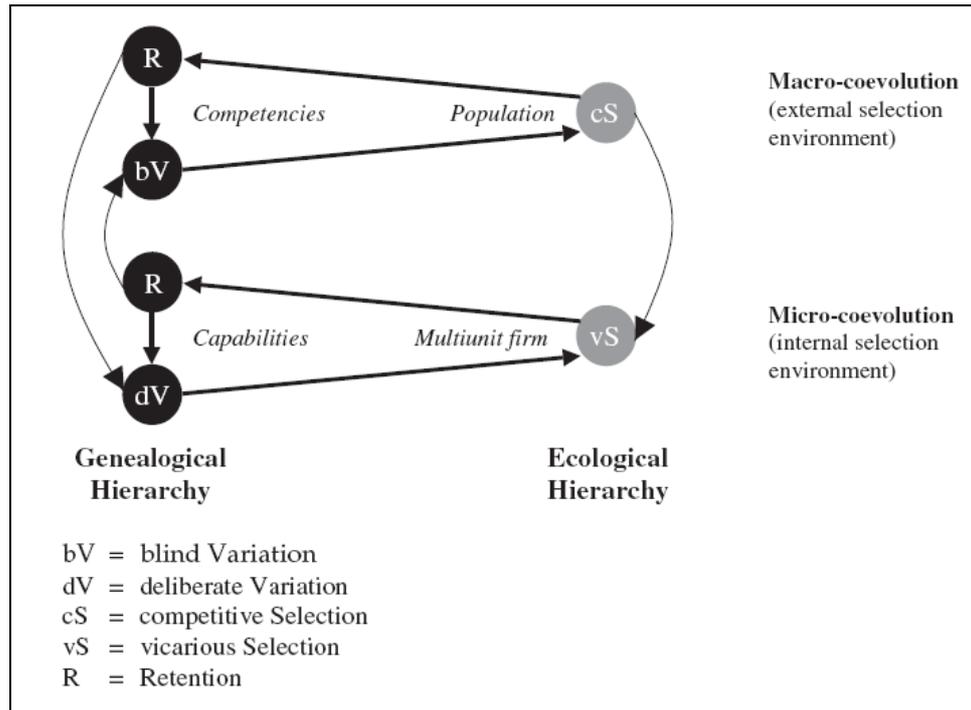
The dual-hierarchy framework was later modified to include a competence level (a configuration of routines) in the genealogical hierarchy, and by limiting interactions in the ecological hierarchy to downward causation only (Baum & Rao, 2004).

Managed Selection (2003)

Volberda & Lewin (2003) developed the Dual Hierarchy idea and proposed a Managed Selection model to explain co-evolving¹⁵, self-renewing organizations that manage internal rates of change, optimize self-organization, and balance concurrent exploration and exploitation. Compared to the baseline VSR model, a managed selection model allows limited managerial intentionality; emphasises a co-evolutionary renewal journey that is a mixture of market selection and managerial adaptation processes; and is micro evolutionary in the sense that it provides a role for managers who amplify variety, buffer direct selection and encourage bottom-up renewal initiatives. The resulting model recognizes deliberate variation, vicarious selection, and retention (Figure 6).

¹⁵ A co-evolutionary approach assumes change is driven by direct interactions between entities, and by feedback from the rest of the system (Volberda & Lewin, 2003) (p.2114).

Figure 6: The Managed Selection Model



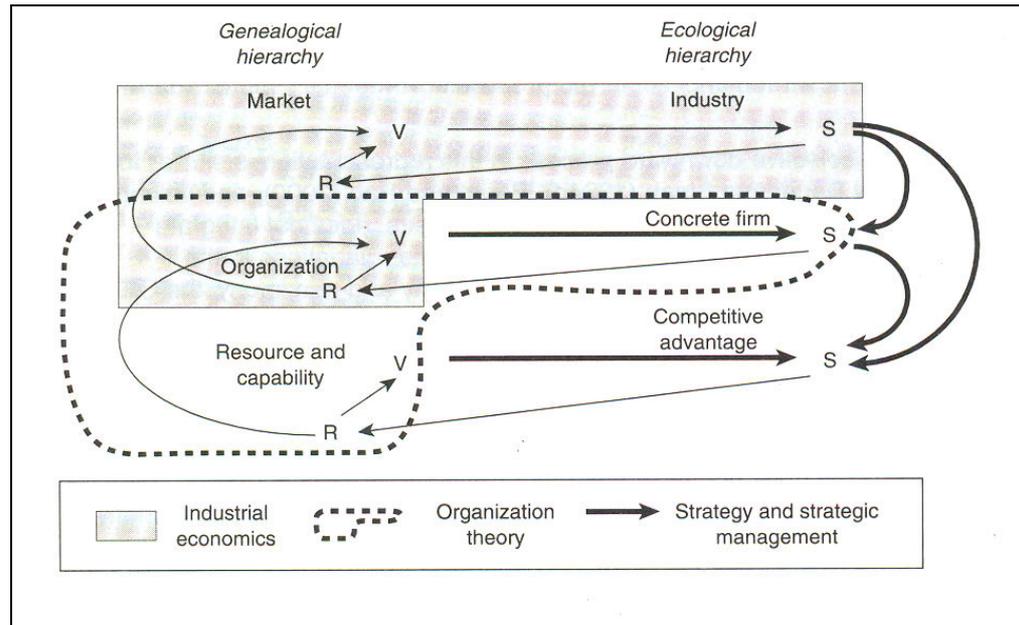
Source: Volberda & Lewin (2003: 2116)

The Managed Selection model of Figure 6 suggests that managers, especially those of large organizations, can take strategic action to buffer their organization from competitive forces by reducing competition. For example, they seek less competitive markets; merge or acquire; or seek alliance. This has the effect of weakening selection pressures, but leads to reduced learning. Management may develop “forms of anticipatory control system in which prior knowledge functions as a selector, vicariously anticipating selection by the competitive environment” (p. 2118). Thus managers of large firms block dangerous or inadequate actions before they are executed.

Organizational Evolution and Strategy (OES) Model (2006)

The OES Model (Durand, 2006) attempts to reconcile the study of organizational evolution and strategic management (Barnett & Burgelman, 1996). OES is an elaborated VSR approach. The organization is the central unit of analysis, utilizing resources and capabilities to perform a set of tasks. Organizations belong to markets which are overarching coordinating mechanisms of economic activity. The model and its location in the research fields of Industrial Economics, Organization Theory and Strategic Management is shown in Figure 7.

Figure 7: The OES Model: Positioning Research Fields



Source: Durand (2006: 128)

OES adopts a dual-hierarchy approach to relate organizational intention with behaviour. Genealogical and ecological hierarchies consist respectively of institutional memory and actual manifestations of different types of economic activity. The bottom left side of Figure 7 shows that Durand identifies resources and capabilities, rather than routines (cf. Dual Hierarchy model) as fundamental replicators that retain and transfer information through the passage of time. Resource and capability is nested within an organization, itself nested within the market. The right side of Figure 7 shows ecological entities that interact with the environment. These entities exchange and transform resources, causing differential survival. Durand identifies competitive advantage, the concrete firm, and industry as elements of this hierarchy. Thus at the lowest level shown in Figure 7, competitive advantage exists as the concrete manifestation of rent¹⁶ potential arising from resources and capabilities. At the middle level, the concrete firm in the ecological hierarchy represents a materialization of the organization viewed as a body of knowledge and information. At the highest hierarchical level of Figure 7, an industry entity that interacts with the environment is the realized form of a market entity that has memory and transfers information.

Variation, Selection, Retention. Variation and retention are positioned within the genealogical hierarchy. Variations¹⁷ arise from retention of positively selected variants

¹⁶ Sustainable excess returns are called *rents*, while excess returns that will soon be eroded away are called *profits* (Johnson & Van de Ven, 2002) (p.67).

¹⁷ Durand argued against the adjectival use of 'blind' in blind variation (cf. Campbell (1969); and did not distinguish between 'competitive' and 'deliberate' selection (cf. Volberda & Lewin, 2003).

at that level and from one level below (unlike Baum & Singh, 1994, who allow multi-level influences). Retention is an upward process that influences variation at the same or the next higher level. In contrast, selection is a multi-level downward process within the ecological hierarchy (see right side of Figure 7). Actual industries select firms, and also select the nature of competitive advantage (Henderson & Stern, 2004). At the organizational level, actual firms select organizational arrangements of available resources and capabilities to establish a demonstrated competitive advantage. Rent results from the conjunction of resources and capabilities of an organization that are selected by real firms in industrial contexts (Durand, 2002). It is the properties conferred on the ecological entities (e.g. concrete firm) by genealogical entities (the organization viewed as a body of knowledge) that are selected, not the entities themselves.

Strategic Management. Durand (2006) defined strategic management as a “set of concerted concrete actions that actualize (or not) the theorized competitive potentialities resulting from the combination of resources and modes of exchange” (p.30). An important implication of OES is that every firm’s action is a choice that influences the value of existing selection criteria. Thus the crux of strategic management is to induce favourable selection criteria changes. The environment is not fixed and ‘out there’ but can itself be manipulated (Penrose, 1959; Weick, 1995).

The OES model reconciles most issues raised by the coincident study of organizational evolution and strategic management¹⁸. In particular, life-cycle changes (Lambkin & Day, 1989) are not emphasized; selection does not remain constant; selection is not purely efficient (weak competitors can be strong survivors); vertical and horizontal relationships between entities are observable; and the model is compatible with multiple levels of analysis and interpretation (Durand, 2006)

Summary: Evolutionary Frameworks

Five important evolutionary models were reviewed in this section. Each evolutionary model includes perspectives from each of the four lenses discussed in Chapter 2 that are relevant to this study of organizational fitness. First, VSR (Campbell, 1969) identified three essentials for firm evolution, namely variation, retention and selection.

¹⁸ Two objections remain. First, the OES model ignores discontinuous change, however this may be incorporated in the form of radical variation. Second, organizational behaviour is underrepresented. The model subsumes personal and psychological considerations under organizational goals and orientations. Durand argued that the model can partially address this concern, but acknowledged that further effort was desirable in this area (p.140).

Importantly, Campbell argued that variation occurs across occasions and arises between social groups and internally within a group. Campbell also identified the importance of coding and recording information to the retention process. Both of these ideas are adopted here.

Second, VSRS (Aldrich, 1999) described social evolution as VSR plus a process of struggle. Aldrich introduced ideas that are relevant to this study: Selection criteria are influenced by competitive struggle, and selection of variations follows from their consequences, not from their degree of intentionality. Importantly, Aldrich argued that without the constraints on variation provided by retention, gains from selected variations would rapidly dissipate.

Third, Dual Hierarchy (Baum & Singh, 1994) hypothesizes that organizational evolution depends on the interplay between replicating entities (routines) and interacting entities (jobs). Replicating entities are linked with the transmission and conservation of knowledge over time; interacting entities exchange and transform resources with the environment, causing differential survival. Entities exist in two separate hierarchies, but the model emphasizes interaction within and between the two hierarchies, regulating change and creating patterns of organizational evolution.

Fourth, Managed Selection (Volberda & Lewin, 2003) introduced the notion of limited managerial intentionality. Importantly, this model provides a role for managers who amplify variety. This model is very relevant here because it implies that strategic action can influence (weaken) selection pressures that are felt by an organization.

Finally, OES (Durand, 2006) consolidates and develops these earlier models and adopts both a VSR and a dual-hierarchy approach to relate organizational intention with behaviour. Three levels of the genealogical (replication) hierarchy are proposed. At the lowest level are resources and capabilities; next is the organization viewed as a body of knowledge; above this is a market that has memory and transfers information. Three levels of the ecological (interactive) hierarchy are relevant here. At the lowest level is competitive advantage, which exists as a concrete manifestation of rent potential. Next is the concrete firm, and above this is an industry that interacts with the physical environment (Figure 7). Organizational evolution depends on the interplay between elements in these two hierarchies.

The OES model is centrally important to the concept of organizational fitness adopted in this study. OES includes elements of strategic perspectives of organizational fitness, and forms the basis of the proposed research model described in Chapter 5.

ORGANIZATIONAL CAPABILITIES

Evolutionary models consider how mutations of organizational entities occur, how these mutations are diffused, as well as the resulting industrial configurations, but they do not focus primarily on the source of an organization's competitive advantage. The resource-based view and its offshoot the knowledge-based view fill this gap. These theories examine a firm's internal capabilities, and attempt to assess its competitive potential (Durand, 2006).

The Resource-Based View of the Firm

A fundamental concern of strategic management is explanation of how a firm achieves competitive advantage in its industry (Peteraf, 1993; Sanchez, 2003). A resource-based view (RBV) of the firm is a model of firm competition (Penrose, 1952; 1953; 1959; Wernerfelt, 1984; Barney, 1991; Peteraf, 1993; Barney, 1995; Peteraf & Barney, 2003). Under RBV, a firm's resources are potential sources of sustained competitive advantage. Barney (1991) identified three types of firm resources: physical resources including technology, equipment, location and access to raw materials; human resources including training, intelligence, experience, relationships and judgement of individual managers and workers; and organizational resources including coordinating systems, formal reporting structure, planning systems and informal relationships (p.101). Prevailing assumptions in the 1980s were that a firm's competitive advantage arose from external environmental and structural considerations (Porter, 1980). RBV re-directed attention toward the internal heterogeneous resources of a firm that make a differentiated position within an industry possible (Cockburn, Henderson, & Stern, 2000).

Penrose (1959) had earlier argued that heterogeneity of productive services available from a firm's resources gives each firm its unique character (p.75). Her model of the firm is often described as the basis for all resource-based theories (Tallman, 2003). Penrose viewed firms as unique bundles of resources; firm growth arises from efficient employment of increasing assets rather than increase of market power or reduction of financial risks (Rumelt, 1991; Durand, 2006). Wernerfelt (1984) introduced the idea of 'attractive' resources for which 'resource position barriers' can be developed (p.173). Barney (1991) and Peteraf (1993) subsequently developed well-known models of resources and firm performance. Their models broadly identified fundamental antecedents of sustained competitive advantage, including resource heterogeneity,

imperfect imitability and nonsubstitutability, and imperfect mobility. *Heterogeneity* allows firms to earn rents; differentiable resources is a fundamental assumption of the RBV (Wernerfelt, 1995; Peteraf & Barney, 2003). *Inimitability*, which arises because of path dependence, causal ambiguity or social complexity (Barney, 1991), prevents rents from being competed away. *Imperfectly mobile* resources are contextual and less valuable to other users (Peteraf, 1993) thus ensuring sustainable advantage¹⁹.

Capabilities. RBV has increasingly recognized that firm capabilities are potential sources of competitive advantage (Henderson & Cockburn, 1994; Helfat & Peteraf, 2003). Helfat (2003) described a resource as an asset or input to production (tangible or intangible), whereas a capability requires utilization of resources in a coordinated manner to achieve a goal. Possession of some unobservable and unmatchable advantage based on organizational capabilities explains sustained advantage more convincingly than market competition (Hansen & Wernerfelt, 1989; Grant, 1991; Sanchez, 2003; Tallman, 2003).

Organizational capabilities were initially conceived in a static sense, embedded in the firm as collections of routines. Perspectives of capabilities and distinctive competencies were thus *functional* (Collis, 1994) or *operational* (Prahalad & Hamel, 1990; Helfat & Peteraf, 2003). However, a later conceptualization recognized that a set of resources and capabilities may not provide sustained rents in a changing environment. A dynamic aspect of capability adaptation is essential if capabilities are to play a role in long-term competitive advantage (Tallman, 2003). Thus, RBV literature has more recently explored the evolution of organizational capabilities, rather than simply examine which set of resources and capabilities should be chosen by management (Cockburn et al., 2000). Capabilities cannot be bought and must be built (Collis, 1994; Teece et al., 1997); this perspective has prompted the integration of evolutionary theory with a resource/capabilities-based view of the firm and aspects of organization theory (Alvarez & Barney, 2002; Tallman, 2003). A construct of *dynamic capability* has emerged from this integration.

Dynamic capabilities. Teece et al. (1997) define a dynamic capability as “the firm’s ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments” (p.516). Dynamic capabilities are related to performance indirectly via the alteration of the firm’s bundle of resources and routines

¹⁹ Dierickx & Cool (1989) suggested that time compression diseconomies, asset mass efficiencies, interconnectedness of asset stocks, and causal ambiguity all help to sustain a privileged asset position.

(Helfat & Peteraf, 2003). They are a set of specific and identifiable processes that have commonalities across firms. This suggests that dynamic capabilities are homogeneous, equifinal²⁰ and substitutable. In sum, dynamic capabilities are tools for manipulation of resource configurations²¹ that may be executed with differing levels of effectiveness (Teece et al., 1997; Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003; Zott, 2003; Ethiraj & Levinthal, 2004; Newbert, 2005).

A dynamic capabilities approach places less emphasis on resource inimitability and greater focus on “dynamic replenishment of quickly erodible advantages” (Wickham, 2004:38). In effect, it is the astute or lucky use of dynamic capabilities that provides a profitable resource configuration (Eisenhardt & Martin, 2000; Zott, 2003). The concept of dynamic capabilities has been criticized. For example, Winter (2003b) doubted that deliberate efforts to strengthen such capabilities (if they exist) are an option for managers, since they carry a cost burden over and above *ad hoc* problem solving.

The dynamic resource-based approach. A dynamic resource-based approach includes all organizational capabilities, dynamic or otherwise, in explanations of the evolution of capabilities over time. Helfat (2003) identified four concepts pertinent to a dynamic resource-based approach. First, firms are not inert and their resources and capabilities change over time. Second, evolution of organizational resources and capabilities is history dependent. Third, the evolution of heterogeneity in organizational resources and capabilities within an industry depends on both the initial degree of heterogeneity and on the particular paths or trajectories taken by firms as they evolve. Finally, although there are broad similarities in the resources and capabilities that firms within an industry possess, there is also persistent heterogeneity (Teece et al., 1997; Wernerfelt, 2003; Winter, 2003b). Strategic advantage is thus both inimitable and historical (Henderson & Cockburn, 1994).

Evolutionary implications of the RBV. Barney (2003a) argued that RBV is simply a special case of evolutionary theory. Thus capabilities and other intangible resources develop through an evolutionary process of variation, selection and retention within a realized environment. Variation is firm heterogeneity; under RBV, firm differences are stable over time if resources and capabilities are inimitable. The selection mechanism

²⁰ There are multiple development paths to the same dynamic capabilities (Eisenhardt & Martin, 2000)

²¹ Configuration is the degree to which a firm’s elements are orchestrated and connected by a single theme (Hamel & Prahalad, 1994; Miller, 1996; McCarthy, 2004).

corresponds to competition; and retention is equivalent to the assumption of imperfect mobility (p.270).

In summary, RBV provides a bridge between two contrasting viewpoints. One perspective is that competitive advantage results from fortunate foundational conditions that a firm can only advance by limited local adaptation. A second viewpoint suggests that competitive advantage is influenced by possession of unique organizational competencies: thus ‘managers matter’. Both extremes are problematic, implying respectively that all is luck, or that managers can see the future. The dynamic resource-based approach combines evolutionary and strategic management perspectives. The approach hypothesizes that both careful management of organizational dynamic capabilities and the environment influence competitive advantage. This approach is utilized in this study to develop theory relevant to organizational fitness.

Knowledge-Based View of the Firm

During the last two decades a knowledge-based view (KBV) of the firm has developed in parallel with RBV (Grant, 2003). KBV assumes that organizational knowledge is the most important strategic resource of the firm (Liebeskind, 1996; Spender, 1996). Important contributions to this literature have been Nonaka’s (1988) explanation of knowledge creation within the firm, Kogut & Zander’s (1992) notion of non-individual knowledge, Spender’s (1996) discussion of the firm as a dynamic knowledge-based activity system, and Brown & Duguid’s (1998) examination of the social production of knowledge.

Two broad reasons for an increased interest in knowledge and its management were identified by Grant (2003). A first and perhaps more important reason is the recognition (rediscovery) of knowledge as a productive resource. Second, a knowledge-based post-industrial economy emphasizes rapid change, digitalization, interconnectedness, virtualization, and intangible capabilities²². The two reasons have respectively spawned organizational knowledge (OK) and knowledge management (KM) perspectives.

OK and KM both emphasize knowledge as *content* in contrast to organizational learning that emphasizes the *process* of acquiring knowledge. OK seeks to understand and conceptualize knowledge that is contained within organizations. Important themes examine differences between individual and organizational knowledge (Spender, 1996),

²² Intangible firm outputs such as services are increasing over tangible goods; inputs such as brands and technology are increasing over physical and financial assets (Grant, 2003).

and tacit versus explicit²³ knowledge (Nelson & Winter, 1982). KM literature takes a more technical approach, exploring codification (Boisot, 1998; Hansen, Nohria, & Tierney, 1999; Zollo & Winter, 2002), dissemination (Szulanski, 1996), and leveraging knowledge (Koruna, 2004) to improve performance (Easterby-Smith & Lyles, 2003). Thus organizational knowledge evolves and is managed by means of codification, abstraction and diffusion. Witt (2000) viewed the knowledge coordination problem as this: How do agents learn what contribution they are supposed to make according to the entrepreneur's business conception?

Evolutionary implications of KBV. Zollo & Winter (2002) proposed a variation-selection-retention 'knowledge evolution cycle' (p.343). In the first phase of this cycle, knowledge variation involves external stimuli, feedback, scanning and recombination. Tacit ideas are then subject to internal selection by means of evaluation and legitimization in phase two. A third 'replication' phase occurs when knowledge sharing and transfer takes place within the firm. Learning is related to the percentage of the firm's agents that have access to relevant data in a useful time frame (Boisot & Child, 1999; Boisot, 2002). The replication phase is also the initiation of the next knowledge cycle. Finally, the external environment provides selection feedback on the organization's current behaviours, so that retention takes place by enactment and routinization. The evolutionary knowledge cycle thus proceeds from an exploration phase to one of exploitation. In addition, the nature of knowledge changes over the cycle from tacit to explicit. Zollo & Winter concluded that collective learning happens when opinions and beliefs are expressed, constructive confrontations occur, and viewpoints are challenged.

Summary: Organizational Capabilities

The notion of the firm as a social community that specializes in the transfer and recombination of knowledge is foundational to an evolutionary organizational theory (Kogut & Zander, 2003). RBV and KBV complement and enrich an evolutionary platform for modelling organizational fitness. An organizational capabilities perspective provides a platform in the search for constructs that are antecedents of organizational fitness (Zander & Kogut, 1995). "The transfer and recombinations of organizational capabilities are the foundation of an evolutionary theory of the firm" (p.76).

²³ *Tacitness* describes the extent to which knowledge is or is not codifiable (Galunic & Rodan, 1998). Explicit knowledge can be articulated and is easily communicated between individuals and organizations (Grant, 2003). Penrose (1959) distinguished between 'objective' knowledge (about things) and 'experience' (know-how) (p.53).

ORGANIZATIONAL PERFORMANCE

Strategy research generally views organizational performance as three successively broader constructs. The most narrow perspective of organizational performance is *financial performance* (Venkatraman & Ramanujam, 1986; Otley, 2002). However, financial measures focus on past events and short-term outlook (Ittner & Larcker, 1998; Rucci, Kirn, & Quinn, 1998; Industry, 2003). This limitation has prompted suggestions that financial measures be supplemented with drivers of future financial performance. For example, the well-known ‘Balanced Scorecard’ suggests customer satisfaction, internal business processes, and learning as examples of possible supplements to financial performance measures (Kaplan & Norton, 1992; 1993; 1996b; 1996a; 2001a; 2001b).

A second and broader perspective of organizational performance, *business performance*, includes both operational performance and financial performance. Business performance is evaluated or predicted using both financial and non-financial criteria (Zahra, 1993; Murphy, Trailer, & Hill, 1996; Ittner & Larcker, 2003; Stewart, 2003). Non-financial measures of technological efficiency such as market share, new product/service introduction, marketing effectiveness and quality are utilized (Venkatraman & Ramanujam, 1986). However, using non-financial measures as performance outcomes carries the risk that a firm over-invests in them; they are improved at a cost exceeding their economic benefit (Meyer, 2002). Ittner & Larcker (1998) warned that “studies investigating the link between non-financial measures and future financial performance have produced mixed results” (p.218).

A third and most broad view of organizational performance is *effectiveness*, which recognizes multiple organizational goals and the influence of external constituencies (Venkatraman & Ramanujam, 1986). Organizational effectiveness has been researched for at least fifty years, and there is ongoing debate of what is meant by this concept (Etzioni, 1960; Friedlander & Pickle, 1968; Steers, 1975; Kanter & Brinkerhoff, 1981; Robinson, 1983; Dollinger, 1984; Venkatraman & Ramanujam, 1986; Jennings & Beaver, 1997; Williamson, 2003; McCann, 2004; Walker & Brown, 2004). This study does not examine effectiveness; organizational performance is conceptualized here in terms of business performance.

SME Business Performance

The study of organizational performance for SMEs encompasses a very extensive literature and diverse theoretical perspectives, resulting from increased recognition of the contribution smaller firms make to an economy (Tilley & Tonge, 2003). Streams of research include competitive advantage (Ward & Stasch, 1988; Kuratko et al., 2001; Jones, 2003a; Taylor & Pandza, 2003); entrepreneurship (Carland, Hoy, Boulton, & Carland, 1984; Stewart, Watson, Carland, & Carland, 1998); decision-maker personality and performance (Miller & Toulouse, 1986; Owens, 2003; Feltham, Feltham, & Barnett, 2005); stages of development (Dodge & Robbins, 1992; Reid, 1998; Massey et al., 2004); franchising performance (Bates, 1998); sustainability of growth (O'Gorman & Doran, 1999; O'Gorman, 2001; Morrison, Breen, & Ali, 2003); niches (Cooper, Willard, & Woo, 1986; Carter, Williams, & Reynolds, 1997); success versus failure prediction (Bates & Nucci, 1989; Hall, 1995; Lussier, 1995; 1996); gender and small firm performance (Cromie, 1991; Kalleberg & Leicht, 1991; Watson, 2003), and start-up problems (Reid, 1993; Terpstra & Olson, 1993; Ness, 2004).

The empirical literature on SME business performance includes studies of determinants of performance (Hofer & Sandberg, 1987; Ibrahim & Goodwin, 1987; Hall, 1995; Yusuf, 1995; Hall & Silva, 2005; Wilson, 2005); effects of strategic tools on performance (Robinson & Pearce, 1984; Shuman & Seeger, 1986; Schwenk & Shrader, 1993; Peel & Bridge, 1998; Smith, 1998; Perry, 2001; Bianchi, 2002; Frost, 2003), and reasons for failure (Altman, 1983; Gaskill, VanAuken, & Manning, 1993; Watson & Everett, 1993; 1996; Tweed & McGregor, 2004).

Of particular relevance to this study is the choice of performance measures and their accurate measurement for understanding SME change (Eccles, 1991; Brush & Vanderwerf, 1992; Chandler & Hanks, 1993; Murphy et al., 1996; Delmar, 1997; Ittner & Larcker, 1998) and differences between SME and large firm performance measurement (Chen & Hambrick, 1995; Jarvis, Curran, Kitching, & Lightfoot, 2000).

Models of SME Business Performance.

A literature search of studies that integrate factors of SME performance, revealed several models that develop a diagnostic toolkit for owner-managers (Perren, 1999a; 1999b; Davidsson & Klofsten, 2003). Other models rely on existing literature and deductive logic with less emphasis on empirical underpinning (Keats & Bracker, 1988; Covin & Slevin, 1991; Naffziger, Hornsby, & Kuratko, 1994; Jennings & Beaver,

1997). Thirty existing SME performance models (Table 5) were selected and each was examined for five hypothesized performance factors: **E**=Entrepreneur; **I**=Industry Structure; **B**=Business Strategy; **R**=Resources; **O**=Organization Structure, Systems, and Processes (Chrisman et al., 1998).

Table 5: Models of SME Business Performance

Study	Model	E	I	B	R	O
(Chrisman et al., 1998)	New venture performance is two dimensional: survival and success. The level of a venture's tangible and intangible resources as well as formality of firm structure affects performance. Performance = f(E, I, B, R, O)	X	X	X	X	X
(Cooper et al., 1986)	A small firm can develop strategies of competing directly with much larger established companies. In order to maintain success they will need to manage their growth well, and to respond effectively to competitive retaliations.		X	X		
(Cooper, Woo, & Dunkelberg, 1989)	The initial size of a firm and the background of the founder may have a bearing on the capability of the firm to survive and grow. Initial size is related to the resources available, entrepreneurial competency, the process of start-up and performance.	X			X	
(Covin & Slevin, 1991)	Entrepreneurial behaviour linked to economic performance. The relationships of the entrepreneurial posture adopted with the competencies and resources of a firm are viewed in terms of external variables, strategic variables and internal variables.		X	X		X
(Cragg & King, 1988)	The market in which a firm operates as well as the firm's managerial practice directly affects economic performance, which is also indirectly related to the owner's characteristics and goals.	X			X	X
(Davidsson, 1991)	Actual growth of a small firm is directly affected by management's growth motivation, which in turn is determined by perceived need, perceived ability and perceived opportunity for a small firm. Influenced by their objective conditions.	X	X	X		
(Duchesneau & Gartner, 1990)	The direct effect of three types of factors on new firm success: the characteristics of the entrepreneur, the start-up processes and firm behaviours. This last factor is comprised of management practices and strategic behaviours.	X		X	X	X
(Randolph et al., 1991)	The dependent variable was self-reported five-year financial performance, which was deemed to be affected by the congruency of fit between the firm's structure and its level of technological innovativeness. This relationship was hypothesized as moderated by firm age classified in terms of three life stages, and sales growth rate in five categories.			X		X
(Sexton & VanAuken, 1985)	A limited model examining the relationship between strategic planning and small firm survival and growth. Mixed results. Low levels of planning linked with failure.			X		
(Smallbone, 1990)	Investigation of new firms focussed on internal characteristics of the firms and their founders. Push/pull factors of the founders, demand deficiency, lack of business training and lack of revenue were identified as possible factors affecting survival.	X	X		X	
(Stuart & Abetti, 1987)	Initial subjective success for small firms predicted by level of entrepreneurship, compatibility of experience and new business requirements, organizational environment (tighter control of firm improves probability of success), market factors (success achieved more easily in stable markets) and intensity of R&D (negative correlation).	X	X	X	X	X
(Cooper, 1993)	The likelihood of superior performance at start-up is influenced by entrepreneurs' characteristics, founding processes, environmental conditions and initial firm attributes. Founding processes and initial firm traits also moderate the other two constructs.	X	X		X	X
(Dubelaar, Bhargava, & Ferrarin, 2002)	Performance is linked with productivity which in turn is affected by resources as well as competitive factors.		X		X	
(Freeman & Hannan, 1983)	The survivability of small enterprises is dependent upon the degree of specialism of the population of enterprises in the form of niche width, as well as the variability and grain of the environment.		X	X		X

Study	Model	E	I	B	R	O
(Gadenne, 1998)	Financial performance is directly affected by the type of industry in which a firm operates and also its business strategies. These are in turn affected by personal attributes of the owner and enterprise objectives.	X	X	X		
(Gibb & Scott, 1985)	Achieving success in the marketplace depends on the how the process of development is affected by critical internal and external influences, and also in a dynamic fashion by the 'base potential for development' (p.612) and by the underlying performance base.	X	X	X	X	X
(Gupta & Govindarajan, 1984)	The effectiveness of strategic business units (SBU) is positively related to risk-taking propensity, tolerance for ambiguity, and marketing experience. The relationship is positively contingent on a 'build' strategy, and thus hampered under a 'harvest' strategy.	X		X		
(Herron & Robinson, 1993)	The effect of entrepreneurial behaviour on Value Creation Performance (VCP) is moderated by context and mediated by strategy and external environmental structure. In turn, entrepreneurial behaviours are affected by aptitude, training, skill, personality traits and motivation of the entrepreneur. Finally, VCP affects the entrepreneur's motivation.	X	X	X	X	
(Hoy & Hellriegel, 1982)	Organizational effectiveness criteria are related to the problem-solving style of the owner manager of a small firm (sensation-thinking, intuitive- thinking, sensation-feeling and intuitive -feeling).	X				
(Iakovleva & Kolvereid, 2005)	Firm performance is dependent upon the environment, the ability of the owner manager to adapt to this environment (strategy); the internal resources of the firm and their utilization through capabilities transformed into strategies and the motivation, attitude and self-efficacy of the entrepreneur.	X	X	X	X	
(Keats & Bracker, 1988)	Performance is directly affected by management strategic sophistication, in turn affected by 'entrepreneurial intensity' (via task motivation and perceived environmental control). Also moderating factors of cognitive strategic sophistication and task environment.	X		X		X
(Knuckey et al., 2002)	Financial performance is related to operational outcomes within a firm's control as well as external to it. These are affected by the firm conduct (leadership, planning activities, and current practices) and by the firm's strategy. Strategy is related in turn with structure (size, industry, age). Underlying all of these components is the competitive environment.	X	X	X	X	X
(Koufteros, Vonderembse, & Doll, 2002)	A framework suggests that firms set competitive priorities and develop action plans. If these are implemented effectively, competencies are fostered which enable a firm to build dynamic competitive capabilities (external dimensions of competition) leading to firm performance.			X	X	X
(Maes, Sels, & Roodhooft, 2003)	Small business profitability is both directly and indirectly affected by owner-manager human capital. This effect is mediated by certain management practices such as the use and capability of the accounting and finance system, the client service (quality control) and the level of equity and working capital.	X			X	
(Man, Lau, & Chan, 2002)	Firm performance is improved by its competitiveness, which depends on six entrepreneurial competencies: recognizing opportunities; relationships; organizing; conceptualization; strategic; and commitment. The entrepreneur must set goals that link scanned external factors with internal capabilities.	X	X	X		X
(Miller, 1988)	Complementarities of business strategy with both environment and structure are needed for good performance. The presence of any one of these in an inappropriate form would hinder success.		X	X		X
(Olson & Bokor, 1995)	The performance of small, rapid growth firms is related to the interaction of strategy process and strategy content. This relationship may be mediated by owner characteristics such as prior management experience and motivation for starting the firm.	X		X		
(Sadler-Smith, Hampson, Chaston, & Badger, 2003)	Firm type (high/low sales growth performance) is directly affected by generic management behaviours and positively affected by entrepreneurial style, which in turn is affected positively by entrepreneurial and negatively by non-entrepreneurial behaviours.	X				X
(Shrader, Mulford, & Blackburn, 1989)	Planning and performance are related. Operational planning (particularly market, budget and human resource) is found to be more important than strategic planning. Both forms of planning are positively correlated with environmental uncertainty.		X	X		
(Van Gelderen, Frese, & Thurik (2000)	Performance of start-ups (economic and personal success factors) is explained by strategies employed; forms of uncertainty encountered; and alternative determinants. There is a feedback from performance to strategy; and from uncertainty to strategy.	X	X	X		
TOTALS	(30 studies)	20	18	22	16	17

The first 11 studies in Table 5 were classified by Chrisman et al. (1998). The remaining 19 studies were classified by the author of this thesis. The totals for all 30 studies are reported at the bottom of Table 5. For example, 22 of the 30 models of SME business performance included consideration of business strategy. Table 5 thus corroborates Chrisman et al. (1998): SME performance is a function of five broad factors: entrepreneur (66%); industry structure (63%); business strategy (76%); resources (56%); and the organizational structure, processes and systems developed by the firm (60%). This study is concerned with the last three of these factors, as discussed in Chapter 1.

Measures of SME Business Performance.

A review of what has been accepted as appropriate organizational performance measures and how these measures were constructed (Devinney, Richard, Yip, & Johnson, 2005) is summarised in Table 39 (Appendix A). Table 39 contains 28 studies of SMEs that have business performance as a dependent variable. It is clear that each of these prior studies employed several measures of SME performance. There were 99 measures of performance discussed in the 28 studies, roughly three performance measures per study. Table 39 suggests that performance has multiple constructs, multiple dimensions and requires multiple measures.

Which performance dimensions and which performance measures are most common for SMEs? Murphy et al. (1996) examined 51 published studies (1987–1993) with performance as the dependent variable. Most of the studies (70 percent) measured fewer than four dimensions of performance. Table 6 shows that efficiency, growth, profit and firm size were the four most common dimensions of performance measured. For each of these dimensions, between two and four specific measures were commonly employed.

Table 6: Studies of SME Business Performance (1987-1993)

Dimension ^a	Measure	Frequency
Efficiency	ROI	13
	ROE	9
	ROA	9
	Return on Net Worth	6
Growth	Change in Sales	23
	Change in Employees	5
Profit	Return on Sales	11
	Net Profit Margin	8
	Gross Profit Margin	7
Size	Sales Level	13
	Cash Flow level	6
	Number of Employees	5

Source: Murphy et al.(1996: 17)

a. Other dimensions infrequently used: Market Share, Liquidity, and Success/Failure

Of the twelve measures listed in Table 6, only two non-financial measures were commonly used: employment and growth in employment. Cooper et al., (1994) noted that non-financial measures have the advantage of measuring economic contribution, are non-confidential, are not sensitive to owner's salaries (as are profits), and do not require estimation (as do annual sales).

Two dimensions of SME business performance relevant to the present study emerged from an examination of Table 6 and Table 39. First, a business performance dimension that may be termed success through *survival* is linked with profitability and efficiency. Measures of business performance included ROI, ROS, ROA, and Net Profit Margin. Second, a business performance dimension that may be termed success through *growth* is linked with changes to financial and business volume. Performance measures included Sales level, Cash Flow level, Number of employees, and their first-order changes. Concepts of survival and growth are both accommodated within an evolutionary framework.

Identification of these two broad business performance dimensions is supported by several meta-analyses in the business performance literature (Friedlander & Pickle, 1968; Schwenk & Shrader, 1993; Murphy et al., 1996; Delmar, 1997; Weinzimmer, Nystrom, & Freeman, 1998; Davidsson & Wiklund, 2000).

Survival and Growth. There are numerous references in the organizational literature that an organization needs to be fit to 'survive *and* prosper', see for example, McCarthy (2004) and Voelpel et al. (2004). The two concepts are often referred to as if they were

a single phenomenon. However, a firm survives when it is able to satisfy its financial obligations to creditors and meet the financial objectives of its owners (Cochran, 1981). Organizational *survival* implies that the business continues to operate as a self-sustaining activity, is effective in achieving profitability, effective in attracting resources, and is adapted appropriately to the environment. Chrisman et al. (1998) viewed survival as the opposite of failure (Koh & Killough, 1990). Surviving firms may simply be effective in convincing dominant components in their environment that they can attract resources. Thus their survival may be in some sense artificial, since they are being supported despite possible inefficiency in other areas (Kanter & Brinkerhoff, 1981).

In contrast, organizational *growth* (Churchill & Lewis, 1983; Scott & Bruce, 1987) inevitably involves an impact or “long term influence on the state of the environment surrounding the organization” (Kanter & Brinkerhoff, 1981:335). Growth may be unrelated or negatively related to survival, since competition increases with growth. There is a distinction between organic growth (expansion of current activities) and total growth that includes acquiring existing activities (Davidsson & Wiklund, 2000).

SUMMARY

Organizational fitness has been linked in the literature with the capability of an organization to transfer and integrate information, and with dynamic capabilities of knowledge management. Thus organizational fitness has been associated with capability to reconfigure knowledge. The two lenses (strategic management and evolutionary) described in this chapter provide broad, overlapping perspectives that recognize the goal-directed nature of SMEs, the intended rationality of SMEs, and the importance of internal capabilities of SMEs for achieving adequate performance in a competitive struggle.

An integrative approach to organizational fitness is suggested by the literature review. In particular, the OES model (Durand, 2006) appears to offer an appropriate foundation for development of an integrative model of organizational fitness. OES adopts a dual-hierarchy approach (Baum & Singh, 1994): organizational evolution depends on the interplay between replicating and interacting entities. Durand argues that replicating entities are central to variation and retention. Organizational variation arises from the retention of positively selected variants at that level and from the level below. That is, variation and retention are upward processes that influence variation at the next higher level. In contrast, selection (performance) results from an interactive downward

process within the ecological hierarchy. Actual industries select firms, and actual firms select organizational arrangements and available resources and capabilities to establish a demonstrated competitive advantage.

Two dimensions of performance are indicated by the literature as relevant to the present study of SME business performance. First, survival performance is linked with profitability. Second, organizational growth performance is linked with changes to financial and business volume.

Chapter Four: Background to Theoretical Framework

The literature review concludes with this chapter, in which additional background material relevant for specific theory generated in this study is summarized and discussed. Chapters Two and Three identified that existing studies have largely assumed organizational fitness is related to selection of organizational variations. However, there is also support for an alternative conceptualization: organizational fitness may be associated with capability to produce variation. That is, fitness is not associated with the quality of variations, but rather fitness is associated with the ability to vary. This study adopted that alternative conceptualization. Thus in section one, literature support for a conceptualization of organizational fitness in terms of ability to produce variation is presented and discussed.

Chapters Two and Three also identified that organizational fitness be considered from a viewpoint that integrates evolutionary and strategic management perspectives. Consequently, this study adopted such an integrative perspective, and section Two presents an integrative approach to organizational fitness. The integrative theory proposed leads to definitions of two aspects of organizational fitness: survival fitness and growth fitness. Section Two discusses how the OES model of Durand (2006) is adapted for the purposes of this study.

In sum, Chapter Four describes literature support for the notion that organizational fitness is capability to produce variation.

FITNESS AS CAPABILITY FOR VARIATION

Previous research (see Table 4) has largely conceptualized organizational fitness as related to the selection of preferred organizational variations. However, Aldrich & Ruef (2006) noted: “Management and business strategy writers usually focus on selection systems that improve fitness, whereas an evolutionary approach alerts us to the possibility that many selection systems are irrelevant” (p. 21). This comment was used as a springboard to examine support for an alternative conceptualization of organizational fitness related to organizational capability to produce variation.

Organizational Fitness and Blind Variation

Blind variations are not random variations, where all choices are equally likely (Barron, 2003). Blind variations learn from history and improve the likelihood of

avoiding previously experienced disasters. Further, blind variations are not distinguishable from deliberate variations (Durand, 2006). Ashby (1956) argued that ‘noise’ is not intrinsically distinguishable from other forms of variety. A distinction between noise and message is only possible when selection occurs. Thus an important element of associating fitness with capability for variation is the implicit acknowledgement that improved capability for variation may or may not lead to superior performance. Expressed differently, an organization has freedom to take autonomous actions, but the consequences of variations are not linked to their intention. In sum, environmental selection of variations follows from their consequences, not the intentions of those who generated the variations.

Theoretical support for a link between organizational fitness and organizational capability to produce blind variations is found in several literatures, including those of complex systems and RBV. For example, the concepts of *productive opportunity* (Penrose, 1959; Simon, 1991) and *knowledge management* (Boisot, 2002) resonate with a ‘fitness as capability to vary’ perspective. Examples of the support provided for a definition of organizational fitness in terms of capability to produce variation is now presented.

Social production. The ability to create variety is emphasized by systems theorists. For example, the law of Requisite Variety (Ashby, 1956) states: “Only variety can destroy variety”. Organizational control systems must include a repertoire of potential behaviour patterns on a par with those of the system to be controlled (Schwaninger, 1990; 2000). Organizational variety can be evaluated in terms of the number and types of capabilities, or the quality of capabilities an organization possesses (Volberda, 1996), and may be generated within the firm or at the firm level.

The idea of matching internal and external variety is relevant both at the within-firm level and at the firm level. Ruef (1997) discussed an organization’s fitness in terms of its position in a ‘social production space’ (p.840). Each organization possesses a group of production attributes which are a subset of the production attributes found in the entire population of organizations. For systems theory, organizational fitness is related to possession of a wide repertoire of capabilities and resources. “The higher the frequency of variations, whatever their source, the greater the opportunities for change” (Aldrich & Ruef, 2006:18).

Social possibility. Allen (2001) went further than Ruef (1997) and defined a ‘possibility space’ which is an open-ended view of different behaviours that could potentially arise from different organizational capabilities and routines²⁴. The ability to explore possibilities extended the law of Requisite Variety. The law of Excess Diversity (Weick, 1995; Allen, 2001) states that for a system to survive over the medium and long term, it requires more internal diversity than appears requisite at any time. Under this perspective, fitness is related more closely with microdiversity than with mechanical efficiency: a system must have within itself a capacity to respond to its environment in more than one way. This implies that it is not a mechanical system with a single trajectory; rather it has a variety of “internal possibilities of choice or response that it can bring into play” (Allen, 2001:150).

Strategic complexity. *Strategic complexity* is demonstrated when an organization simultaneously pursues a variety of strategic activities (Miller, 1992; Beinhocker, 1999; Ashmos et al., 2000). Strategic complexity is enhanced if cognitive effort is directed toward developing responsiveness, flexibility and an expanded action repertoire (Meredith & Francis, 2000; Kuratko et al., 2001; Koufteros et al., 2002). Also, *goal complexity* is demonstrated by an organization when it develops a number of different goals that match the variety of opportunities present in the environment. A range of goals keeps options open, allows an organization to pursue opportunities, and provides alternatives when competitors mount a direct attack on any goal (Mintzberg & Waters, 1985; Hart & Banbury, 1994; Barney, 1995; Ashmos et al., 2000; Eisenhardt & Sull, 2001). This stream of literature thus offers support for defining organizational fitness in terms of capability for offering variety.

Productive Opportunity. The conceptualization of organizational fitness as capability for variation finds further support from the concept of ‘productive opportunity’ (Penrose, 1959). Penrose defined productive opportunity as “the number (and range) of possible uses of the resources of the firm, calculated without reference to the opportunity cost of its resources” (p. iii). The latter part of her definition implies that opportunities may be more or less profitable than available alternatives (opportunities arise from changes in organizational productive services and knowledge).

Productive opportunity can be restricted in two ways: first, the firm does not see opportunities for expansion, and second, the firm is unable to act on perceived opportunities (this assumes the firm is willing to respond to opportunities) (Barth,

²⁴ Allen (2001) distinguished ‘possibility space’ from ‘search’. For Allen, a search tries new values of parameters within the known production space (p.154). Also see Winter (2003a).

2003). A capability for variation implies an increased level of productive services available from any resource; Penrose associated high levels of potential performance with increased productive possibilities. Increases in knowledge can always increase the range or amount of services available from any resource; thus the possibilities of using services alter with changes in knowledge.

Information management. Variety is a concept inseparable from information (Ashby, 1956). Information is centrally important for social systems, since they are more loosely coupled than natural systems and are more open to new combinations of elements. This is because interaction is primarily informational rather than energetic (Boisot & Child, 1999). Boisot (2002) argued that the capability of a firm to evolve its knowledge is related to the amount of information an organization can structure through codification and abstraction²⁵, as well as the amount of diffusion of knowledge among its members. Codification and abstraction are cognitive dimensions of information management, while knowledge diffusion refers to a relational or social dimension. Thus there are two aspects to organizational variety, namely *cognitive variety* (how well a firm can see an opportunity) and *social variety* (how much agreement that the firm can be restructured to take advantage of an opportunity), and the distinction is relevant here. Organizational fitness might be viewed as a capability to first, improve or create knowledge, and second, to share well-structured routines.

The discussion above suggests that organizational fitness may be conceptualized as a learned ability to generate blind variations. Variations are departures from present procedures. That is, variation is a dynamic, temporal concept. Blind variations learn from history and are thus associated with the retention process. Variation is constantly reducing and disappearing (Lewin et al., 2004). For example, successful routines that become dominant are copied at the firm level and at the industry level through an imitation mechanism. Similarly, successful organizational forms are copied at institutional level.

The ability to effectively generate blind variations (not to be confused with generating effective blind variations), is analogous to sampling without replacement. To pursue the analogy further, a firm that is fit is able to draw from a large population of possibilities; it can draw frequently; it is able to recognize what has been drawn and

²⁵ Codification is assigning phenomena to categories; abstraction involves reduction in the number of categories. Knowledge is well structured when it is easily assigned to an unambiguous, optimally minimal set of categories. Levinthal & March (1993) identified two similar mechanisms for learning – *simplification* and *specialization*.

discard duplicates; it is able to memorize previous draws and the actions that resulted as well as the consequences of those actions; and it is able to communicate this information to all its members. However, a fit firm still does not know which draws will ultimately prove to be successful.

Summary. In this study, organizational fitness is associated with the capability to produce variation. An implication of conceptualizing fitness in terms of capability to produce organizational variation is a diminished role for context. The influence of the external environment may initially be put to one side, concentrating on the internal resources and capabilities of the firm (Penrose, 1959). Under this conceptualization, external demand for existing products and services does not determine organizational fitness.

This section has identified literature supporting the notion that organizational fitness may be approached in terms of a variation process, and that multiple dimensions of organizational fitness may be distinguishable. Both of these approaches were adopted here: ability to produce blind variation at the capability level and at the firm level (Campbell, 1969; Aldrich, 1999) resonates with organizational fitness.

The adopted approach gave rise to the definition of two aspects of organizational fitness. First, an aspect of fitness that emphasizes organizational ability for variation within the firm. In this study, capability for variation within the firm was associated with organizational fitness for growth. Second, an aspect of fitness that emphasizes organizational ability for variation at the firm level. Variation at the firm level was associated with organizational fitness for survival.

Definitions of organizational growth fitness and organizational survival fitness are provided next in separate discussions.

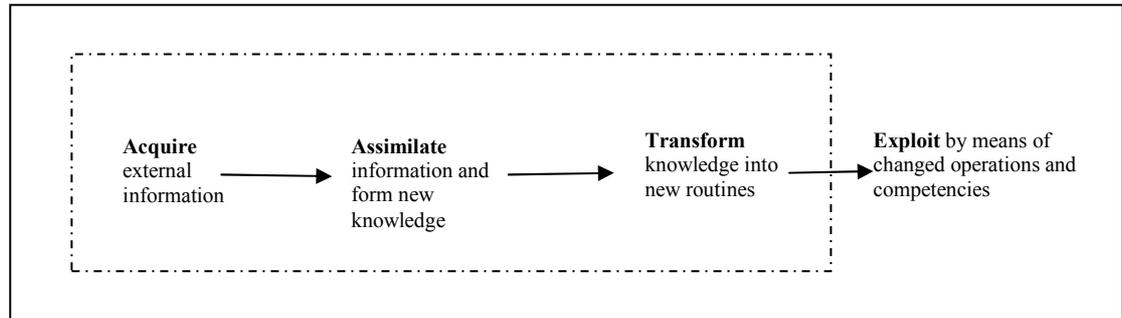
Definition of Organizational Growth Fitness

In this study, variation within the firm was associated with a learned collective capability to acquire information, assimilate it, and transform it into organizational knowledge. Knowledge is a critical source of competitive advantage (Kogut & Zander, 1992; Grant, 1996a; 2003; Teece, 2003). Information and knowledge management is linked in this study with organizational growth fitness as suggested by the literature review e.g. Beer (2003) and Dervitsiotis (2004).

Under this perspective, a lack of capability for variation of production/services within the firm will stunt growth of production/service possibilities (Penrose, 1959; Aldrich & Ruef, 2006). In evolutionary terms, internal variation and retention processes

can be distinguished from externally-focused exploitative processes that are subject to selection pressures. Within-firm knowledge management (Figure 8, dotted rectangle) focuses only on the improvement of organizational routines and procedures (Zollo & Winter, 2002), and does not focus on the external environment.

Figure 8: Internal and External Aspects of Knowledge Management



Source: adapted from Zahra & George (2002:192)

Figure 8 shows that Growth Fitness is distinguished from absorptive capacity, ACAP (Cohen & Levinthal, 1990). ACAP emphasizes not only the acquisition, but also the application of knowledge (Jones, 2005). Zahra & George (2002) proposed two distinct components of ACAP: *potential* ACAP (acquisition and assimilation) and *realized* ACAP (transformation and exploitation). These two distinct components are not relevant to this thesis, but as Figure 8 shows growth fitness is linked with capabilities to appreciate the environment and gain new insights to opportunities. Growth fitness does not imply a capability for exploitation of the environment. An organization cannot determine in advance which knowledge acquired, assimilated, and transformed will be more useful, nor which new competencies established will be profitable. Presupposing superior exploitation would open the concept of growth fitness to criticisms of circular reasoning.

A concrete example may serve to illustrate how knowledge acquisition, assimilation, and transformation are distinguishable. Consider a hypothetical SME (a bakery) that makes and sells breads and cakes. Table 7 shows a dotted rectangle enclosing relevant aspects of production of variation within the firm. Acquisition, assimilation, and transformation of knowledge enable capability for variation within the firm that is subject to firm level selection but not industry level selection. The three capabilities are clearly distinguishable. For example, Table 7 suggests that assimilation of new knowledge has different behavioural implications (imitate competitors' croissants) to the innovativeness linked with transformation (propose chocolate croissants). Transformation requires the ability to combine apparently incongruous sets of

knowledge and arrive at a new schema (for example, the low-fat croissant). Imperfect imitation triggers mutation, which together with recombination leads to innovation and change. Thus transformation “alters the way the firm sees itself and its competitive landscape” (Zahra & George, 2002:190).

Table 7: Within-Firm Knowledge Management

Growth Fitness?	Dimension	Capability	Comments
Yes	Acquire	The SME collects information from the environment (internal and external) through formal and informal means.	Become aware that competitors are selling croissants; that recipes for croissants exist; that some staff eat them for breakfast daily; that health authority is to introduce a fat rating on all pastries.
Yes	Assimilate	The SME recognizes a market shift (regulatory, demographic, and competitive); understands a new opportunity to serve clients; analyses changing market demands; codifies tacit knowledge.	Realize that croissants are potentially lucrative. Discuss possibility of staff training. Can time, space, machines be allocated? Experiment with acquired recipes; one is chosen; trial runs are begun.
Yes	Transform	Meetings are held re opportunities arising from combining new and existing knowledge. Practical experiences are shared. Modified routines proposed. New knowledge is stored for future reference.	The introduction of chocolate, low-fat and jumbo-sized croissants is proposed (these are not presently made anywhere). Two existing pastries to be deleted. New systems are documented.
No	Exploit	Extend and leverage existing competencies or create new ones (Zahra & George, 2002). Monitor progress.	Implementation of new lines. Develop recipes for a new croissant; design and sell a croissant machine. Open a croissant shop.

Growth fitness was not associated in this study with exploitation (Column 1 of Table 7), or the capability to leverage current knowledge (Koruna, 2004); nor is it perceived as the ability to identify and acquire knowledge that is useful. Growth fitness is thus clearly distinguished from ACAP (Cohen & Levinthal, 1990), in that the application of knowledge is not implied. Organizational growth fitness is related with a ‘blind’ capability of acquiring, assimilating and transforming knowledge (Jansen, Van den Bosch, & Volberda, 2003; 2005).

Growth fitness definition: “Organizational growth fitness is a function of the learned capability of an organization to generate business opportunity by systematically extracting or imposing structure on information.”

The above definition draws from the ideas of Boisot (2002), Boisot and Child (1999), Zollo and Winter (2002), and Durand (2006). Increased information structuring allows greater memorization with a resulting increase in possible variety of behaviour. The reference to a *learned capability* in the definition implies that improving growth fitness is a path-dependent process of cumulative improvements in internal information

management. A capability, as the term is used here, is the ability to perform an activity (Helfat et al., 2007). Capability does not imply outstanding ability, only potential for adequate performance. The word *systematically* implies a structured and deliberate approach; ad hoc opportunity generation is not indicative of growth fitness. The path-dependence of growth fitness is clarified: opportunity generation arises from learning. As emphasized by Huber (1991): “An entity learns if, through its processing of information, the range of its potential behaviours is changed” (p.89). A firm with low levels of growth fitness does not have the capability to produce variety to adapt or proactively transform its capabilities and resources in an uncertain environment. Poor fitness may result from unintentional suppression of variations within organizations, or from deliberate suppression by dominant groups (Aldrich & Ruef, 2006).

Definition of Organizational Survival Fitness

In this study, variation at the organization level was associated with fitness for survival. Thus firms that are able to “reinvent themselves a number of times within the bounds of their structural capabilities” (Campbell-Hunt et al., 2001: 173) are assumed to have achieved a high level of survival fitness. Several existing studies suggested that dynamic combinative capabilities are related to the production of variation at the organizational level, e.g. Voelpel, Leibold, & Tekie (2003) and Beer (2003). In particular, organizations differ in their abilities to coordinate and integrate individual knowledge and individual routines (Kogut & Zander, 1996). If the value of individual knowledge and routines is to be fully realized there has to be integration at a collective level so that new firm-level competencies are generated (Daft & Weick, 1984; Hitt & Tyler, 1991; Grant, 1996a; Brown & Eisenhardt, 1997; Pavlou & El Sawy, 2005).

Kogut & Zander (1992) defined *combinative capability* in terms of an organization’s ability to synthesize current and acquired knowledge. Combinative capability has been viewed from many different perspectives including coordination (Crowston, 1997); integration (Grant, 1996a; 1996b; Teece et al., 1997; Barki & Pinsonneault, 2005); configuration (Henderson & Clark, 1990; Miller, 1996; Pavlou & El Sawy, 2006); consolidation (Prahalad & Hamel, 1990); and synthesis (Galunic & Rodan, 1998). Examination of each perspective’s definition²⁶ suggests that under a combinative

²⁶ *Coordination*: process of bringing the different elements of a complex activity or organization into an efficient relationship. *Integration*: process of combining to form a whole. *Configuration*: process of arrangement of parts in a particular form. *Consolidation*: process of combining into a single unit. *Synthesis*: the combination of components to form a connected whole (*Concise Oxford English Dictionary*, 2004).

process, disjoint elements are linked effectively with each other so as to contribute towards a common goal.

Combinative capabilities (Kogut & Zander, 1996; Teece et al., 1997; Van den Bosch, Volberda, & Boer, 1999; Jansen et al., 2005) are related to knowledge coordination and within-firm transfer of knowledge²⁷. Combinative capabilities enable effective synthesis and dissemination of knowledge; they are stable patterns of collective activity that facilitate effective knowledge sharing between members of an organization. Lack of ability to vary organizational form may lead to the firm facing mounting selection pressures (Durand, 2001; 2006). Thus survival fitness was defined in this study in terms of ability to produce variation at the organization level.

Survival Fitness Definition: “Organizational survival fitness is a function of the learned capability of an organization to generate a variety of new configurations by systematic diffusion of individual and organizational knowledge.”

The generation of new configurations includes new structural arrangements (forms), new modes of exchange, and new competencies. Sanchez (2003) distinguished between competencies and capabilities. Capabilities are repeatable patterns of action that groups are able to perform in using resources and skills. Competencies are the abilities of an organization to coordinate its capabilities in pursuing its goals. A firm with a high survival fitness level has the capability to harmonise controllable internal routines²⁸. The reference to organizational knowledge in the above definition of survival fitness implies shared knowledge, that is, knowledge greater than the sum of individuals’ knowledges.

Comparison: Growth Fitness and Survival Fitness.

Both growth fitness and survival fitness are defined in terms of a capability for variation. However, this capability may be measured at different levels. Growth fitness is measured at a resource and capability level within the firm, while survival fitness is measured at the firm level. Growth fitness and survival fitness are reflected by different organizational capabilities. Capabilities of knowledge acquisition, assimilation and

²⁷ The difficulty of transferring knowledge within an organization, referred to as *internal stickiness*, is linked with lack of combinative capacity rather than motivational factors (Szulanski, 1996).

²⁸ Survival fitness is the *inclusive* fitness of the entrepreneurial team to survive against other entrepreneurs in the marketplace. Inclusive in the sense that an entrepreneur’s success in reproducing extends to those sharing the same cultural memes (Voelpel et al., 2005). This implies fitness directly through the entrepreneur’s own efforts and through group efforts (Campbell, 1994). “This cultural organized social group selection would make possible social norms and behaviour that lead individuals to override their own *individual* maximisation of inclusive fitness and rather tend to the maximisation of the *average* individual inclusive fitness’s of the members of the group” (p.28)

transformation reflect growth fitness; coordination, socialization and systems capabilities reflect survival fitness. How each dimension of fitness affects the firm resonates with the difference between visualization and visualizability (Boisot, 2002). Growth fitness resonates with *visualization*, the capability of imagining possible routines from information. The trajectory moves from image to code, that is, movement is from uncodified concrete information to codified abstract information. Survival fitness resonates more strongly with *visualizability*, the capability that takes advantage of code to generate possible images. The trajectory of diffusion is from code to images. Thus visualizability is different for an expert and a novice using the same code; the expert is likely more able to imagine possibilities for use of code.

A similar idea was expressed by March (1991) who distinguished between learning *by* the code and learning *from* the organizational code. The two types of learning occur simultaneously. Learning *by* the code refers to the accumulated knowledge of an organization that is learning from its members, that is the organizational code adapts to the knowledge of its members. Growth fitness is related to learning by the code. Learning *from* the code occurs when members of an organization are socialized to organizational routines. Survival fitness is related to learning from the code. Thus the two aspects of mutual learning identified by March resonate with the two aspects of fitness defined here.

In summary, growth fitness is related to capability of variety generation by structuring information, and is related to visualization and learning by the code. Survival fitness is related to capability of variety generation by identity renewal and reconfiguration of activities, and is related to visualizability and learning from the code (Durand, 2006; Siggelkow & Rivkin, 2006).

AN INTEGRATIVE APPROACH TO ORGANIZATIONAL FITNESS

The conclusion reached in Chapter Two was that a study of organizational fitness requires an integrative approach. That is, single-theme explanations of fitness appear to have reached their limit, and richer explanations of organizational change and organizational fitness are to be found in shared themes (Poole & Van de Ven, 2004). For example, a population ecology perspective holds that a firm cannot change itself or its environment. Organizational evolutionary theory agrees that firms are not able to change their environments, but hypothesizes firms are able to gradually adapt themselves to the environment (Johnson & Van de Ven, 2002). These two lenses see the

environment as exogenous to the firm, but under a complexity perspective the environment is endogenous, and organizations participate in changing the environment.

This study drew from multiple perspectives and adopted an integrative approach, primarily exploring organizational fitness in terms of an evolutionary framework that allows for a strategic management. An evolutionary approach facilitates broad explanations of how complex adaptive firms evolve and reinvent themselves over time (Durand, 2003). An evolutionary model that emphasizes variation, selection and retention, is able to provide an underlying structure linking selection perspectives with those of strategic management and complexity. An evolutionary metaphor is competitive survival (Van de Ven & Poole, 1995); for strategic management it is competitive advantage (Barney, 1995), for complexity it is emergence (Stacey, 1995).

By recognizing that business environments are complex and unpredictable, some limitations of strategic management as traditionally defined are implicitly acknowledged (Davenport et al., 2006). Evolutionary systems move into an open and changing range of possible futures (Stacey, 1995). Mintzberg & Waters (1985) contrasted the two themes succinctly:

...strategy formation walks on two feet, one deliberate, the other emergent. As noted earlier, managing requires a light, deft touch – to direct in order to realize intentions while at the same time responding to an unfolding pattern of action. The relative emphasis may shift from time to time, but not the requirement to attend to both sides of this phenomenon. (p.271)

The OES (Durand, 2006) and Managed Selection (Volberda & Lewin, 2003) models provided suitable theoretical underpinning for the adopted integrative approach. The Managed Selection model explains intelligent variation and vicarious selection processes by management of multi-unit, multi-market corporations. Because this study hypothesized blind variations and variable selection processes for SMEs, OES rather than Managed Selection was chosen as to model the adopted integrative approach.

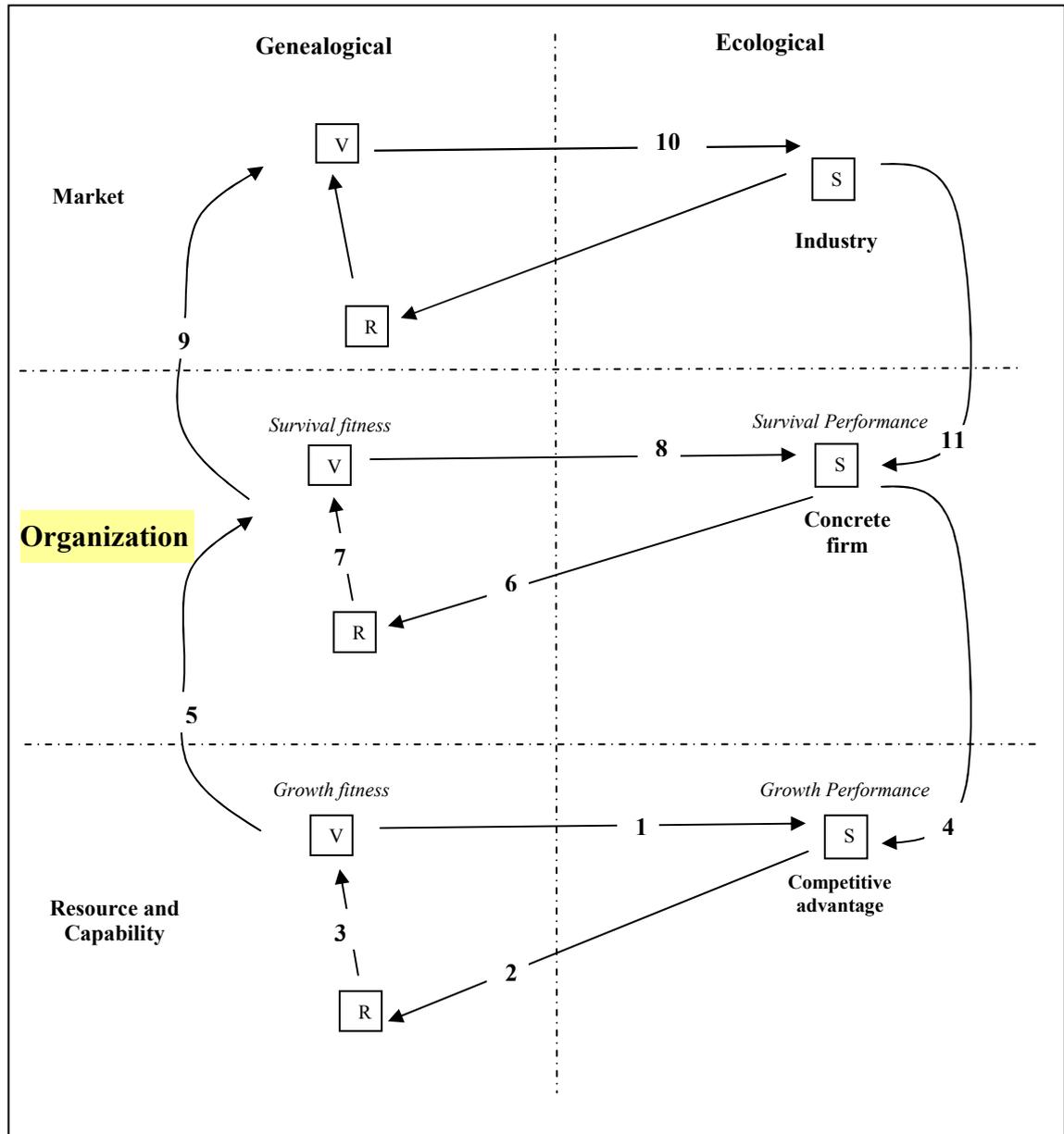
Proposed Research Model of Organizational Fitness

The OES model (Durand, 2006) was reviewed in Chapter 3. OES forms the basis for the research model proposed here, and was adapted to accommodate organizational fitness. The framework depicted in Figure 9 is segmented vertically in three levels and horizontally in two hierarchies. The highest evolutionary level is a level at which changes occur for markets and industries; the middle level concerns organizational change, and the lowest level is change that occurs within an organization. Each level constitutes a ‘node of selection’ at which organizational entities are either retained or eliminated (Campbell, 1994; Baum & Rao, 2004). Organizational entities exist

simultaneously in both hierarchies: on the left side of the framework are nested levels of replicating entities that transfer information across occasions. The levels shown in Figure 9 are relevant to the present study of SMEs, where there is unlikely to be an intra-firm level (between the capability level and the firm level). The right side of Figure 9 shows nested levels of tangible entities that interact with the environment, exchanging information and causing differential survival.

Campbell (1969) drew attention to the idea that variation, both within social groups, and between groups, arises across occasions (temporal variation). Since replicating entities retain and transfer information through time, this suggests that replicating entities are the key source of variation. Organizational fitness was defined in this study in terms of capability for producing variation, and thus arises from elements of organizational memory that preserve, assimilate and disseminate knowledge across occasions. That is, capability for variation (resulting from replication and recombination) is associated with organizational fitness. As per the notions of Boisot (2002) and March (1991) discussed in the previous section, it is ability to code images (not the images themselves) that underlies the generation of variety.

Figure 9: OES Process Model for Organizational Fitness



Source: Adapted from Durand (2006:136). Note: V= variation, S = selection, R = retention.

Organizational fitness is therefore linked with an *upward* variation and retention process on the left side of Figure 9. In contrast, performance results from a *downward* selection process shown on the right side of Figure 9. Higher order entities in the ecological hierarchy select lower order entities. Thus survival performance advantage corresponds to selection of a concrete firm that controls resources and capabilities (arrow 11). That is, higher levels of survival performance are a result of selection by the industrial environment of the organization²⁹. Higher levels of growth performance result from strategic management (arrow 4). That is, selection of specific capabilities and resources

²⁹ A partial external selection mechanism (Henderson & Stern, 2004) of competitive advantage by industry, where parts of a firm are selected but not the entire firm, was not considered here.

enables the organization to achieve competitive advantage. Variation at each of the genealogical levels in Figure 9 *conditions selection possibilities* that occur in the ecological hierarchy (Durand, 2006). It is proposed in this study that this is the mechanism by which organizational fitness and business performance are associated.

The process mechanism for each level of fitness is now explained in terms of the numbered processes of Figure 9.

Growth fitness process. Arrow 1 in Figure 9 reflects current strategy within the firm. Properties conferred by a unique configuration of capabilities and resources result in a theoretical competitive potentiality that may enable a firm to achieve competitive advantage according to its goals and competitive theories. Strategic management (arrow 4) is a set of purposeful concrete actions by the firm that may actualize its theoretical competitive potentialities, and lead to tangible competitive advantage. Strategic management thus plays a selective role that determines retained capabilities of the internal cycle (cf. Teece et al., 1997). The accumulation (arrow 2) of assimilated capabilities and resources retained from any realized concrete competitive advantage (called resource ‘sedimentation’ by Durand), is combined with acquired knowledge and assimilated and transformed (arrow 3). If this third process is inefficient, there is little variation introduced within the firm. Thus capability for variation within the firm (growth fitness) is associated with the ability to recombine and transform knowledge. Capability for variation by resource restructuring leads to opportunity generation. Growth fitness arises from the capability to “associate variants with existing elements in order to constitute a competitive advantage” (Durand, 2006: 137).

The lowest level of Figure 9 provides a within-firm evolutionary perspective on strategy (Burgelman, 1991). An organization is viewed as an ecology of strategic initiatives which emerge in patterned ways and compete for limited organizational resources so as to increase their relative importance within the organization. Strategy results, in part, from selection and retention operating on internal variation associated with strategic initiatives (Barnett & Burgelman, 1996).

Survival fitness process. What is offered at the organizational level for selection (arrow 8) reflects on the organization’s external strategy. Variation at the organizational level is the result of two influences. A first influence is cohesive integration of separate capabilities and resources that have been retained from cumulative and concrete competitive advantage. A coherent configuration of capabilities is a powerful competitive differentiator (Campbell-Hunt, 2001; Campbell-Hunt et al., 2001). Thus dynamic capabilities of coordination and socialization that allow individual resources

and capabilities to be deployed on the firm's behalf (arrow 5) are essential. A second contribution to organizational variation arises from retained variants of organizational form (arrow 6), and systemic capability for structural rearrangement (arrow 7). Systems capabilities include routinization and formalization of firm-level capabilities and decision structures. Thus capability for variation at the firm level, defined as survival fitness in this study, allows a variety of potential organizational forms to theoretically be offered (arrow 8) for selection by industry (arrow 11). Davenport et al. (2006) argued that an enterprise must continually rejuvenate itself with value innovation from multiple business models, some traditional, some new. They called this rejuvenation process 'poised strategic management' (p.183).

The evolutionary processes described above can be extended to hierarchical levels above and below the three depicted in Figure 9, but were not the focus of this study.

Summary. Theory was developed using the process model of Figure 9 as a platform. Organizational fitness was linked with retention of positively selected variants in an upward process that influences variation at the same or the next higher level. Business performance was considered as a single-level downward selection process within an ecological hierarchy. By separating the concepts of organizational fitness and business performance into two different hierarchical structures, theory linking the two concepts may be developed, and that development is discussed next.

PART 3: RESEARCH FRAMEWORK AND METHOD

Chapter Five: Theory Development

The level of analysis of a study refers to the degree of aggregation of data required to analyse the research question (Davidsson & Wiklund, 2001). Specification of the level of analysis is important, and Low & MacMillan (1988) identified five levels of analysis commonly described in management research. The identified levels are individual, group, organization, industry and society.

The research problem of this study was concerned with the relationship between organizational fitness and business performance for SMEs, which suggested that analysis at the organizational level was appropriate (Scandura & Williams, 2000). Organizational level analysis is dominant in the small business, strategic management, and entrepreneurship literature (Chandler & Lyon, 2001; Davidsson & Wiklund, 2001; Verreynne, 2005a). Davidsson & Wiklund noted that a firm level of analysis allows an external perspective on firm selection, integrated with an internal competencies perspective as two faces of the same coin. At the organizational level, the behaviour of the firm is manifested in measurable actions. These actions can be intervened with or controlled. Organizational level analysis is required to explain inter-firm variations in performance and heterogeneous behaviour of firms in the same industry. The principal hypotheses of this study were thus framed at the organizational level.

As described in Chapter One, the research problem R of this study was: *What relationship, if any, is there between organizational fitness and business performance for SMEs?* However, this study did not define organizational fitness as a single concept. Two distinguishable types of organizational fitness were defined, namely growth fitness and survival fitness. Thus in order to examine R, two specific research questions were subsequently formulated. The first research question explored relationships between *growth* fitness and business performance (R1), and the second research question explored relationships between *survival* fitness and business performance (R2).

Section One of this chapter describes how the two independent constructs, growth fitness and survival fitness, were developed and tested. Section Two describes how the dependent construct, business performance, was developed and tested. In section Three, theorized relationships between fitness and performance are developed. Three hypotheses proposed relationships between growth fitness and business performance to answer R1, and three hypotheses proposed relationships between survival fitness and business performance to answer R2.

DEVELOPMENT OF INDEPENDENT CONSTRUCTS

Growth Fitness

Organizational growth fitness was defined in the previous chapter in terms of a learned capability to generate opportunity from new and retained information. SMEs with a high level of growth fitness are able to induce cooperative evolution of the stakeholder knowledge base more rapidly than the evolution of the non-stakeholder knowledge base.

The process of learning that facilitates the evolution of a firm's routines has traditionally been measured by utilizing the construct of *absorptive capacity* (Cohen & Levinthal, 1990; 1994; Levinthal, 1994; Lane & Lubatkin, 1998; Zahra & George, 2002). Absorptive capacity is a firm-level construct that relates to the efficiency, scope and flexibility of knowledge absorption. An important feature of absorptive capacity is its cumulateness. Cohen and Levinthal (1990) argued that an organization learns by building on what it has learned before, and that more efficient learning takes place in subsequent periods. A learning process is thus self-reinforcing.

Mechanisms of knowledge acquisition, assimilation and internal transformation have been identified as dimensions of potential absorptive capacity for a SME (Zahra & George, 2002). The relevance of aspects of potential absorptive capacity as drivers of growth fitness is therefore logically intuitive. For a knowledge evolution cycle, knowledge variation involves external stimuli, feedback, scanning and recombination (Zollo & Winter, 2002). Thus constructs of knowledge acquisition, knowledge assimilation, and knowledge transformation were used here to operationalize organizational growth fitness.

Knowledge acquisition. Knowledge acquisition is defined as the capability to sense what routines are relevant and to acquire those (Zahra & George, 2002). SMEs have several different modes for knowledge acquisition. The approach may be passive or active, and may assume that the environment is analysable or is not analysable (Daft & Weick, 1984). Information (and knowledge) may be acquired through congenital learning (inherited at birth of the organization); experiential learning (self-appraisal, experiments, unintentional, experience-based); vicarious learning (imitation and second-hand experiences); searching (scanning, focused search, performance monitoring); or simply by grafting on new members (Huber, 1991). Whatever the mode, a firm's rate of growth is limited by the growth of knowledge within it (Penrose, 1959; Cohen & Levinthal, 1990). For SMEs, acquisition of new external knowledge is an essential

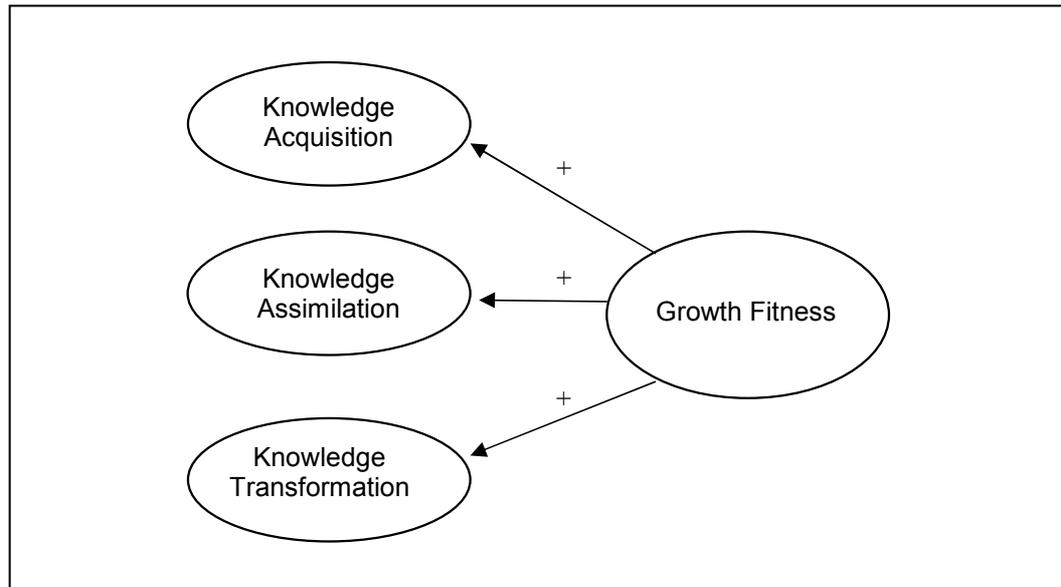
activity in the process of producing variety of services from existing resources (Gray, 2006). Hence knowledge acquisition is positively related to growth fitness.

Knowledge assimilation. Knowledge assimilation is defined as the capability to analyse, comprehend, and internalise routines (Zahra & George, 2002). Knowledge assimilation refers to the interpretation and understanding of information that adds to or alters the store of existing knowledge (Daft & Weick, 1984; Lane, Salk, & Lyles, 2001). Daft & Weick defined interpretation of information as "the process through which information is given meaning" (p.294). For managers to match or exceed the variety of the external environment, they must actively try to make sense of events that surround the organization (Daft & Weick, 1984). Assimilation of knowledge does not always imply commonality of interpretation, but only that learning has occurred in terms of the variety of interpretations held by an organization (Huber, 1991). Potentially articulable knowledge, when it is assimilated, becomes articulated statements which produce new action-performance links. These links may result in the adaptation of existing routines or enhanced recognition of the need for fundamental change (Zollo & Winter, 2002). Hence knowledge assimilation is positively related to growth fitness.

Knowledge transformation Knowledge transformation is defined as the capability to blend existing routines with newly acquired routines to develop new routines (Zahra & George, 2002). Knowledge transformation thus requires the proposal of new routines. Internal capabilities and resources may be recombined, or may be integrated with new knowledge. Simon (1991) argued that expertise in recombination of extant organizational knowledge enhances ability to acquire new knowledge created elsewhere. Importantly, transformation is related to knowledge codification and abstraction, requiring organization of information into rules and systems (Zander & Kogut, 1995; Boisot, 2002; Pavlou & El Sawy, 2005). Transformation has been linked with introduction of variety (Zott, 2003); generation of innovative thinking (Henderson & Cockburn, 1994); and multiple interpretations (Daft & Weick, 1984). Hence knowledge transformation is positively related to growth fitness.

The preceding discussion suggests there is a conceptual layer of a growth fitness construct that is not directly measured by observable phenomena. A *second-order* model (Bollen, 1989; Cheung, 2000; Byrne, 2001; Hair, Black, Babin, Anderson, & Tatham, 2006) contains two layers of latent constructs (Figure 10). Organizational growth fitness directly influences three first-order constructs of knowledge acquisition, knowledge assimilation and knowledge transformation.

Figure 10: Growth Fitness



Growth fitness of SMEs was hypothesized as a second-order construct for a number of reasons. First, there was theoretical reason to expect that conceptual layers of growth fitness existed (Hair et al., 2006). Second, growth fitness as a second-order factor is used to predict business performance, another construct of the same general level of abstraction. Third, there was less interest in this study to examine relationships between first-order fitness constructs.

Hypothesis 1: Organizational growth fitness is a second-order construct reflected by knowledge acquisition (+), assimilation (+), and transformation (+).

Survival Fitness

Organizational survival fitness was defined in the previous chapter in terms of a learned capability to generate a variety of new configurations by systematic diffusion of individual and organizational knowledge. In addition to academic and practitioner literature, exploratory interviews with SME owners supported the view that combinative capabilities are related to organizational survival fitness³⁰. Further, the relevance of combinative capabilities as drivers of survival fitness was logically intuitive. A SME aims to be an effective partner to a coevolutionary adaptation process between itself and its environment. The environment is typically constructed as a systematic knowledge environment and a variety of actors' perceived environments (Lawrence & Lorsch,

³⁰ Conceptual phenomena can be described using a literature review and expert opinion to provide a sound foundation (Churchill, 1979; Pavlou & El Sawy, 2005)

1967); thus a SME needs a high level of related knowledge and effective coordination of its agents so that its routines are effective in the environment. An ongoing, interactive process of adaptation between the SME and its environment continues despite the replacement of actors, which suggests that shared organizational knowledge embodied in existing routines enables organizational survival fitness.

Thus combinative constructs were used in this study to operationalize survival fitness. Coordination, socialization, formalization, and routinization are four combinative capabilities that have been identified in the literature (Van den Bosch et al., 1999; Jansen et al., 2006).

Coordination capabilities. Coordination involves allocating resources, assigning tasks, and synchronizing activities (Crowston, 1997). Coordination is thus the process of bringing the different elements of an activity or organization into an efficient relationship. In situations where delegation of authority is necessary, superior coordination capabilities are often linked with the degree of decentralization and with level of participation. First, *decentralization* refers to the amount of delegation of decision-making authority throughout an organization (Jaworski & Kohli, 1993) or the degree of hierarchical authority (Deshpande & Zaltman, 1982). If a SME is highly decentralized, high levels of knowledge sharing result (Prahalad & Hamel, 1990; Van den Bosch et al., 1999). Deshpande & Zaltman (1982) found that decentralized firms are more likely to make greater use of new knowledge and research³¹. Thus decentralization may encourage innovation for smaller firms (Siggelkow & Rivkin, 2006).

Coordination capabilities are also conceptualized in terms of the extent of *participation* by individuals in organizational decision making (Hage & Aiken, 1969; Hage & Dewar, 1973). Participation in decision making³² is a mechanism for increasing the exchange of information (Ashmos & McDaniel, 1996; Ashmos et al., 1998; Van den Bosch et al., 1999). Knowledge sharing between individuals, some of whom may be far removed from the original point of entry of the new knowledge, provides a rich internal network of diverse knowledge structures (Cohen & Levinthal, 1990; Jansen et al., 2003). This network provides a filtering and facilitation capability (Jansen et al., 2005). Thus increased participation ensures greater commitment to the results of

³¹ Deshpande & Zaltman (1982) explored the *instrumental* use of knowledge, which is the direct application of knowledge to make a decision, rather than a *conceptual* use of knowledge for general enlightenment.

³² The term *participation* is used in the sense outlined by Ashmos, Duchon, & McDaniel Jr. (1998), and includes the number of different types of people who participate, and how extensively they are involved. Thus the term indicates the firm's "comprehensive approach to involvement during a decision process" (p.27).

knowledge (Deshpande & Zaltman, 1982) and successful new ventures generally have a high degree of participation in operational and strategic decisions (Duchesneau & Gartner, 1990).

The level of coordination capabilities, in terms of participation and decentralization, has implications for organizational behaviours. For example, centralization facilitates detection of environmental signals whereas decentralization facilitates their interpretation; centralization improves system-wide error detection but decentralization makes diagnosis easier (Levinthal & March, 1993). In sum, although centralization may improve response implementation, high levels of decentralization lead to high levels of intelligence dissemination and response design (Jaworski and Kohli, 1993). It is potential for response design, rather than response implementation, that resonates with survival fitness. Thus it is proposed here that in order for a SME to generate variety by means of knowledge diffusion, high levels of participation and decentralization are beneficial. Hence for SMEs the level of coordination capabilities is expected to be positively related to survival fitness.

Socialization capability is defined as “the ability to produce a shared ideology that offers members an attractive identity as well as collective interpretations of reality” (Van den Bosch et al., 1999:557). Kogut and Zander (1996) noted that although a strongly shared identity may rule out interesting avenues of innovation and creativity, strong identity may also improve communication and shared learning. Shared identity lowers costs of communication and coordination among individuals with disparate expertise. Identity is important for creating a dialogue by which information is combined and solutions are discovered. That is, costs of discourse, coordination, and learning are influenced by the mental as well as the physical boundaries of the SME. A socialization perspective is associated with a dimension of social *capital* (Tsai & Ghoshal, 1998; Maurer & Ebers, 2006) that is embodied in shared understandings of common goals and ways of behaving in a social system. A climate of “trust, cooperation and shared language leads to knowledge creation and facilitates exchange and combination among knowledge workers” (Collins & Smith, 2006:557). Socialization capabilities are determined by tacitly understood path dependent routines that enhance contribution, representation and subordination to a group system. Contribution involves sharing individual knowledge with colleagues and managers; representation is global understanding of each other’s tasks and responsibilities; and subordination involves relying on the group system (Weick & Roberts, 1993; Pavlou & El Sawy, 2005).

Further, the existence of a collective mind (Weick & Roberts, 1993) enables competencies to be embedded at the group level. Collective mind is evident “when individuals construct mutually shared fields” (p.365); the more heedfully the individuals interrelate, the more developed is the collective mind. Organizational performance is enhanced when actors are able to envisage interactions of the social system, and contribute appropriately to the enterprise in a subordinated manner. Heedful interrelating between actors enables a SME to sense and manage uncertainty.

A socially shared cognitive frame³³ makes a difference to individual motivation, focusing attention away from pursuing separate opportunistic interests and short-term inclinations, and more towards solving problems in the interests of the firm’s goals (Witt, 2000). If “members of a firm share the entrepreneurial business conception as their own cognitive frame for firm-related activities ... individual endeavour can be coordinated most effectively” (p.737). Hence it was assumed here that for SMEs socialization capabilities are positively related to survival fitness.

Formalization. Formalization is defined as the degree to which rules are observed within an organization (Jaworski & Kohli, 1993). Henderson and Clark (1990) observed: “A reports to B” is a formal communication channel; while “I always call Fred because he knows about X” is an informal communication channel” (p.15).

Several studies have examined the effect of formalization on the financial performance of large corporations. These studies suggest that formalization lowers knowledge dissemination and organizational responsiveness (Jaworski & Kohli, 1993) and increases the risk of organizational failure (Sine, Mitsuhashi, & Kirsch, 2006). Desphande & Zaltman (1982) found that highly formalized firms are less likely to make use of new knowledge. Rules and role formalization may constrain the search for new configurations. That is, formalized structures may constrain managers to be less cognizant of the ‘business realities’ facing their firms, and may also inhibit reciprocal knowledge interaction.

In contrast, other research suggests formalization encourages integration and coordination, with improved retrieval of knowledge (Weick, 1979; Zander & Kogut, 1995; Galunic & Rodan, 1998; Zollo & Winter, 2002; Jansen et al., 2005). For example, Weick argued that rules and procedures reduce the likelihood of individuals deviating from recently established behaviour. These studies present an alternative viewpoint: formalization can enhance knowledge sharing, particularly in the case of SMEs.

³³ Discriminative attention processes in humans operate by means of cognitive cues which help to memorize patterns and are themselves organized into cognitive frames which allow for knowledge classification (Witt, 2000).

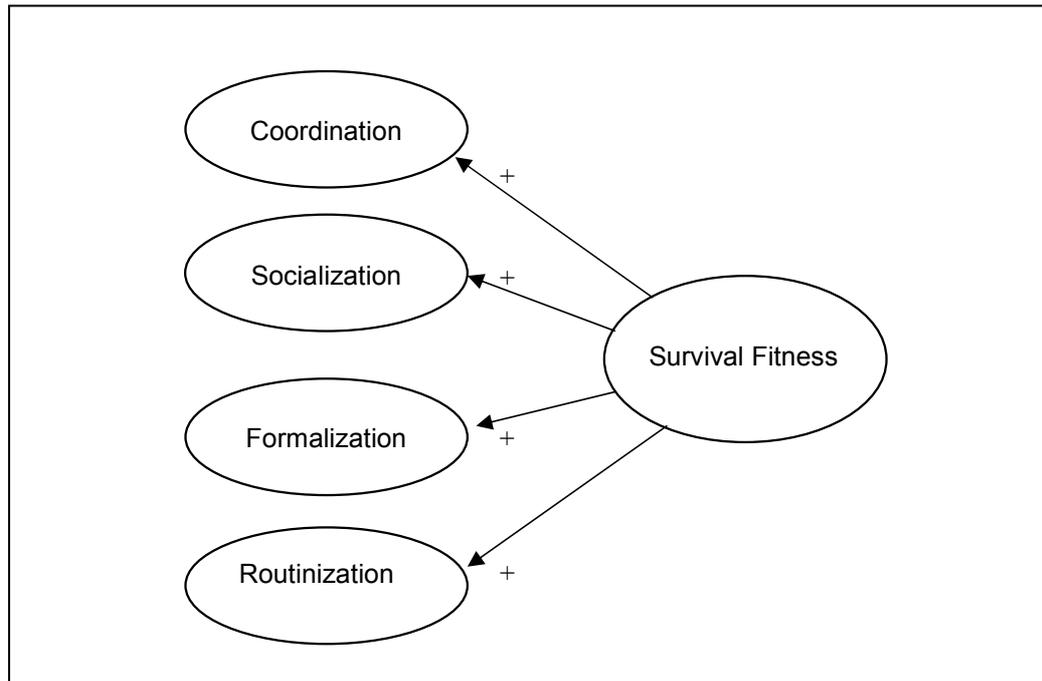
Individual employees in SMEs do not always work in units or specialist teams, which means there are fewer inter-departmental checks and balances. For SMEs, individual employees with similar knowledge are not as readily replaceable as they are in larger corporations. Formalization enhances the likelihood that members share more information than they might normally choose to; best practices are codified so that knowledge is easier to retain and diffuse. Thus explicit knowledge is retained even though tacit information is lost. Formalization in SMEs may result in lower coordination costs and increased decision-making speed. Finally, resource providers of a SME often seek symbolic signals of competence; thus formalization may increase a SME's credibility with suppliers of financial resources, external marketing partners, suppliers and distributors (Aldrich, 1999; Sine et al., 2006). Hence for SMEs formalization is assumed here to be positively related to survival fitness.

Routinization enables an organization to offer rationally-based performance that is reliable and accountable (Hannan & Freeman, 1984). The ability of a SME to reliably reproduce outcomes and perform basic functional business activities more efficiently than competitors is an essential capability for survival (Hannan & Freeman, 1977; Nelson & Winter, 1982; Hannan & Freeman, 1984; Astley, 1985; Lambkin & Day, 1989; Haveman, 1992; Collis, 1994; Stacey, 1995; Beer, 2001). Operational routines of an SME exist so that it may carry out existing, repetitive day-to-day procedures and activities as efficiently as possible (Stacey, 1995).

The relationship between routinization and change capability is non-recursive (Ullman & Bentler, 2004); thus routinization predicts change capability while change capability also predicts routinization. Nelson and Winter (1982) stated that "routinization reflects the achievement of coordination and the establishment of an organizational memory that sustains such coordination". Routinization assists flexibility, since skills are maintained by frequent exercise. Thus "coordination is preserved and memory refreshed" by routinization (p.107). Hence for SMEs routinization is positively related to survival fitness.

A second-order model (Bollen, 1989; Byrne, 2001; Hair et al., 2006) for survival fitness was assumed here (Figure 11). Organizational survival fitness is manifested by four first-order concepts of coordination, socialization, formalization and routinization.

Figure 11: Survival Fitness



Hypothesis 2: Organizational survival fitness is a second-order construct reflected by coordination (+), socialisation (+), formalization (+) and routinization (+).

DEVELOPMENT OF DEPENDENT CONSTRUCTS

SME Business Performance

The literature review of Chapter 3 revealed that two dimensions of business performance measurement are relevant for SMEs (Murphy et al., 1996).

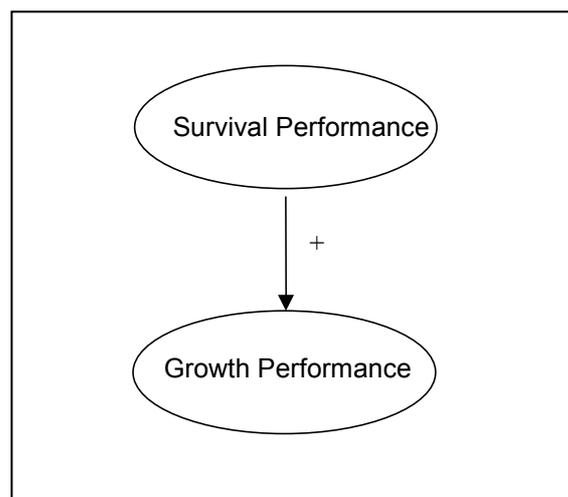
Survival Performance. First, a performance dimension of survival is linked with efficiency and profit (Table 6). Typical measures of survival performance include ROI, ROS, ROA, and Net Profit Margin. Thus *Survival Performance* was defined as a measure of progress toward a set of financial goals linked to efficiency and profit dimensions of business performance

Growth Performance. Second, a growth dimension (Table 6) is linked with financial and business volume (Chandler & Jansen, 1992; Chandler & Hanks, 1993; Chandler & Lyon, 2001). Growth performance measures include Sales level, Cash Flow level, Number of employees, and their first-order changes. *Growth Performance* was defined as a measure of progress toward a business performance dimension of growth (both financial and business volume).

The literature is not clear whether the relationship between survival performance and growth performance is positive or negative. For example, Davidsson (1991) assumed a negative correlation: higher profitability reduced the need for growth, which in turn reduced growth performance. However, McPherson (1992) monitored survival rates of 8500 small firms in a longitudinal study and found probability of survival was positively related to growth rate. Wolff & Pett (2006) noted: “with respect to SMEs in the general case, there is likelihood that growth is positively associated with the profitability of an SME” (p.271).

Further, the literature is not clear whether the relationship is described more accurately as dependency, rather than simple correlation. Reynolds (1987) found that high absolute job growth had no significant impact on survival performance. Thus the impact of growth performance on survival performance was not considered in this study. However, there is support for the view that survival performance influences growth performance. Chrisman et al. (1998) argued that survival is antecedent to relative success in terms of growth versus competitors. Churchill & Lewis (1983) identified survival as the major strategy of SMEs that continued until the business had a divisional management style; growth was attempted once sufficient prosperity had been established. SMEs that grow usually do so from a position of stable or increasing profits (Dodge & Robbins, 1992; Jarvis et al., 2000). In this study, it was hypothesized that survival performance positively impacts growth performance (Figure 12).

Figure 12: Business Performance



Hypothesis 3: Growth Performance will have a positive dependence relationship with Survival Performance.

H3 thus hypothesized that business performance is constructed as two related first-order constructs, survival performance and growth performance. Figure 12 shows that this study evaluated the influence of adequate levels of profitability and efficiency on increases of SME financial and business volume.

FITNESS AND PERFORMANCE

This section begins with the development of three hypotheses H4 – H6 that examined R1: what is the relationship between *growth* fitness and business performance?

Thereafter, three hypotheses H7 – H9 were developed to examine R2: what is the relationship between *survival* fitness and business performance?

Growth Fitness and Performance

How business performance arises can be characterized by the contrasting positions of Alchian (1950) and Penrose (1952). Alchian hypothesized a world where luck dictates superior firm performance; Penrose highlighted the importance of managerial choice and motivation (Durand, 2006). More recently, Barney (1986) developed Alchian's theme, and argued that superior performance only arises if resources can be acquired below their net present value. Thus profits accrue from luck or superior (insider) information. Supporting the Penrose theme that strategic choice provides profits, Keats and Hitt (1988) argued that an organization "selects and interprets its environment, respond to those elements it considers fixed, and attempts to shape the remaining elements to its advantage" (p.574).

However, a position between these two perspectives is adopted by Denrell, Fang & Winter (2003): industry correctly values actualized resources for existing users, but not untraded resources (unactualized possibilities). Denrell et al. argued that idiosyncratic information and capabilities of an individual firm shapes its view of the environment, and its ability to gauge the resources of rival firms. "The more distinctive the view, the more likely that such a view can encompass valuable opportunities not similarly visible to other firms – implying at least a temporary advantage" (p. 978).

That theme is adopted in this study. Serendipitous (lucky) discovery occurs for alert, flexible firms with a relative abundance of variant possibilities. Alertness is required to recognize the fortuitous appearance of new possibilities; flexibility is required to redirect the firm effort. Inwardly, effort that is directed to expansion of unrealized possibilities will improve performance. Outwardly, a capability for variation within the

firm allows a firm to gain a distinctive viewpoint on the information frontier to perceive strategic opportunity. Thus the theme adopted here is that a deliberate choice to develop capabilities for variation will likely influence selection pressures (performance). In sum, Growth Fitness, defined as the capability for variation within the organization, can indirectly influence business performance.

The hypothesized mechanisms of the research model (Figure 9) that link organizational growth fitness with business performance are described next. There are two dimensions of business performance: growth performance and survival performance (H3). The link between growth fitness and growth performance is described first, followed by growth fitness linked with survival performance.

Growth Fitness and Growth Performance. Growth fitness is conceptualized in this study as the dynamic capability for variation within the organization. In contrast, growth performance is the result of successful organizational strategic management. The selection by the firm of a combination of capabilities, resources and routines results in a theoretical competitive potentiality that may enable the firm to achieve a competitive advantage.

It is suggested here that SME growth fitness can influence growth performance by conditioning selection possibilities at the firm level. How growth fitness is related to growth performance is now described in terms of an evolutionary cycle (arrows 5, 8, and 4 in Figure 9). First, growth fitness contributes to survival fitness. That is, capability for variation within an organization contributes to capability for variation at the organizational level, which potentially allows an increased number of organizational forms to be offered for selection by industry. Industry selection of a firm influences its strategic management. Strategic management is the selection of retained capabilities which may lead to competitive advantage. To complete the cycle, a realized competitive advantage influences which resources and capabilities persist over time (Baum & Singh, 1994). Thus growth fitness is positively linked with growth performance.

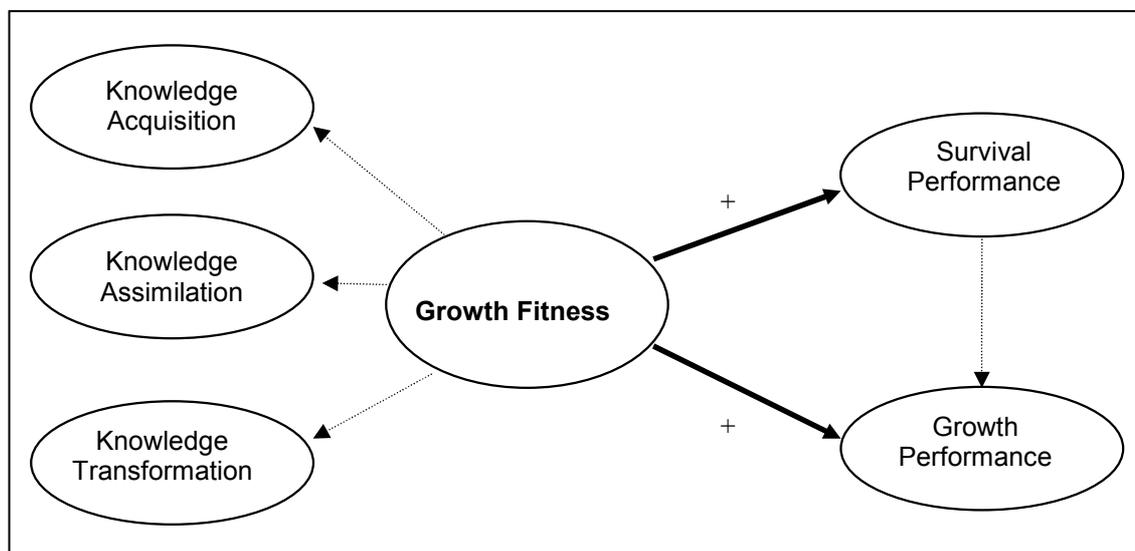
Growth Fitness and Survival Performance. An evolutionary cycle (arrows 5, 9, 10, 11, 4, 2 in Figure 9) suggests SME growth fitness may also influence its survival performance. First, growth fitness contributes to survival fitness, which in turn contributes to capability for variation at a market level. Selected expressions of market variations (Durand, 2006) result in concrete industries, which in turn select organizations. Survival performance corresponds to selection of the SME by industry. Thus there is a mechanism that links growth fitness and survival performance. To complete the cycle, industry selection of a SME influences its strategic management,

which may lead to a realized competitive advantage that influences which resources and capabilities are retained over time. Thus growth fitness is positively linked with survival performance. Hence:

Hypothesis 4: The growth fitness of an SME is related to its growth performance (+), and is also related to its survival performance (+).

Figure 13 below shows the hypothesized model linking growth fitness with growth performance and survival performance (refer Figures 10 and 12).

Figure 13: SME Growth Fitness and Business Performance



The acquisition, assimilation, and transformation of knowledge (growth fitness) does not by itself improve an organization's likelihood of growth or survival performance (Lane et al., 2001). However, an increase in growth fitness does have repercussions that ripple through an evolutionary hierarchical network and influence selection pressures. A stream of new ideas and possible choices ultimately leads to competitive advantage (Beinhocker, 1999). Organizational literature posits knowledge management as a critical source of competitive advantage (Kogut & Zander, 1992; Grant, 1996a; 2003; Teece, 2003), which may in turn lead to firm performance (Porter, 1985; Barney 1991; Jennings & Beaver 1997).

Further, the model illustrated in Figure 13 implicitly hypothesizes that three dynamic capabilities (dimensions of growth fitness) exhibit common core features across SMEs regardless of context or characteristics (Eisenhardt & Martin, 2000). In order to test this assumption, performance contingency variables were incorporated into the model. That

is, whether the relationship between growth fitness and business performance is contingent on environmental and SME characteristics was examined. Five control variables that might be expected to affect organizational fitness and business performance were considered as potential moderators: contextual ambidexterity (Gibson & Birkinshaw, 2004), administrative intensity (Sine, Mitsuhashi, & Kirsch, 2006), ownership structure (Birley & Westhead, 1990), firm age, and firm size (Hall, 1995). There probably are additional contingencies but these were chosen because they have been specifically identified as performance contingencies in the literature review (Corner, Kinicki, & Keats, 1994). Each of the five variables and their effects on the business performance are briefly described now.

Managers encourage *contextual ambidexterity* (reviewed Chapter 2) by building organizational systems and processes that orient behaviour toward dual capacities. Managing multiple business models with ambidexterity increases business performance (Davenport et al., 2006). Gibson & Birkinshaw (2004) found that higher levels of contextual ambidexterity were associated with higher levels of business performance.

Sine, Mitsuhashi, & Kirsch (2006) used *administrative intensity* as a measure of decentralization, and reported that new ventures with greater administrative intensity have higher performance than rivals with lower administrative intensity.

Ownership structure has been found to affect performance in SMEs, both in terms of profitability and growth of employees (Birley & Westhead, 1990). That is, firms with a diluted ownership structure will perform differently to those that have few private owners with the same concept of the business. This idea is related to the concept of entrepreneurial intensity (Keats & Bracker, 1988; Cooper et al., 1989).

Finally, the effects of two SME characteristics, firm *age* and firm *size*, on business performance, have been widely studied with mixed results. See for example, Cragg & King (1988) and Davidsson (1991). Empirical evidence suggests that survival performance increases positively with size and age (Reynolds, 1987; Hall & Young, 1991; Hall, 1994; 1995; Hall & Silva, 2005); however this relation has not been found in other studies (Randolph et al., 1991). Birley & Westhead (1990), who stated that size and business performance were not correlated, found in a study of small firms that firm age was correlated significantly with both growth and with survival; whereas administrative intensity was not. As the size of a SME increased, its dependency on contextual ambidexterity rather than structural ambidexterity decreased (Gibson & Birkinshaw, 2004), and as firm age increased, reliance on administrative intensity decreased (Sine et al., 2006).

In sum, the effect that each of these five firm-level controls might have on the relationship between growth fitness and business performance is not well understood. Implicit in Figure 13 is the assumption that key commonalities of a dynamic capability can differ in form and detail and remain effective across a range of contexts and industries. “Commonalities in key features of effective dynamic capabilities imply that the routines are more substitutable and mutually interchangeable across different contexts than current theory suggests” (Eisenhardt & Martin, 2000:1110).

Hypothesis 5: The relationship between SME growth fitness and both growth performance and survival performance is not moderated by ambidexterity, administrative intensity, ownership structure, firm age, or firm size.

The evolutionary cycle represented in Figure 9 by arrows 5, 9, 10, 11, 4, implies that there is a mediated relationship between growth fitness and growth performance. That is, growth fitness influences survival performance which in turn influences growth performance. Thus H4 proposed a positive relationship exists between growth fitness and survival performance; however, H3 proposed a positive dependent relation between survival performance and growth performance. Therefore, taking the two hypotheses H4 and H3 together, an indirect effect of growth fitness on growth performance exists (see Figure 13). That is, it was anticipated that survival performance partially mediates³⁴ the effect of growth fitness on growth performance.

Hypothesis 6: The relationship between SME growth fitness and growth performance is partially mediated by survival performance (+).

Survival Fitness and Performance

Three hypotheses H7 – H9 were developed to examine R2: what is the relationship between *survival* fitness and business performance? The association between survival fitness and survival performance is examined first.

Survival Fitness and Survival Performance. An evolutionary cycle (arrows 9, 10, 11 and 6 from Figure 9 on page 76) explains how the survival fitness of a SME can influence its survival performance. Organizational survival fitness was defined in this study as a learned capability to generate a variety of new organizational configurations. Variation at the organizational level upwardly influences variation at the market level.

³⁴ H1 hypothesized a direct link between growth fitness and growth performance, so only *partial* mediation was hypothesized for H6.

Selected expressions of market variations are concrete industries, which in turn select organizations. To complete the cycle, firm survival determines which unique configuration of resources and capabilities persist over time (Baum & Singh, 1994).

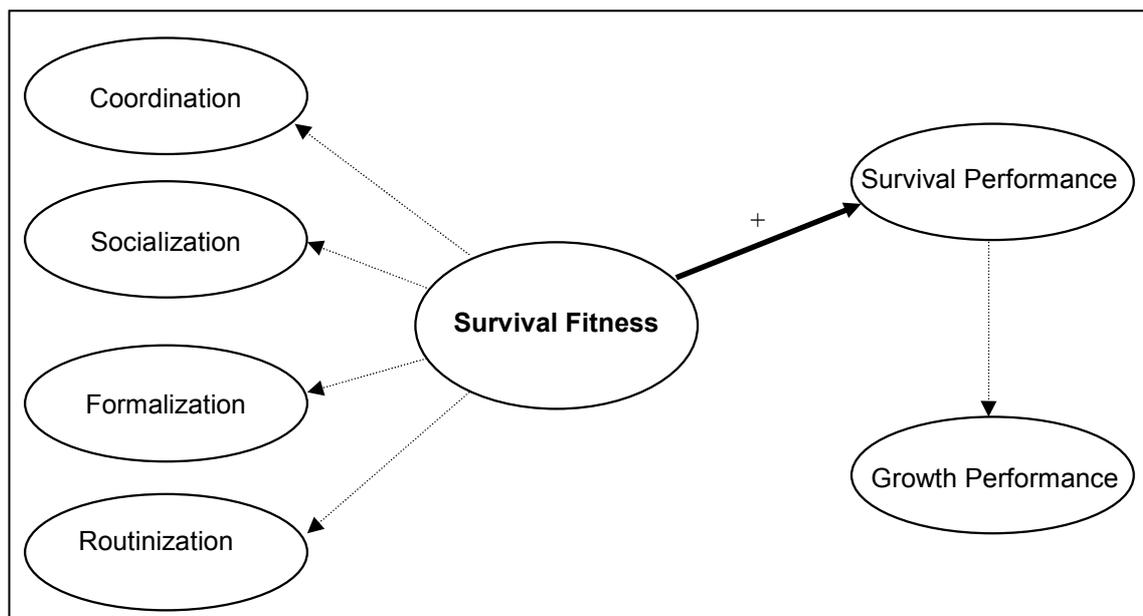
Thus it was hypothesized in this study that organizational capability for variation (survival fitness) can exert an influence on external selection pressures. If an organization's capability for structural rearrangement is low, it has little capability to influence market variation which ultimately implies that selection pressures are greatest for properties that it cannot adopt. The importance of the capability to change the organization structure of a SME (temporal variation) has been noted in several studies (Dodge & Robbins, 1992; Chandler & Hanks, 1993; Barth, 2003). In sum, it was hypothesized here that SME survival fitness can condition selection pressures at the industry level.

Survival Fitness and Growth Performance. Importantly, Figure 9 does not anticipate a direct evolutionary cycle between survival fitness and growth performance. Thus it was expected that no direct effect exists between these two constructs. Hence:

Hypothesis 7: The survival fitness of a SME is positively related to its survival performance, but is not directly related to its growth performance.

Figure 14 shows the hypothesized variance model linking survival fitness with survival performance and growth performance.

Figure 14: SME Survival Fitness and Business Performance



Survival fitness was defined in this study in terms of capability for variation at the organizational level. This definition implies that survival fitness is a generic and

relatively context-free organizational capability. The four first-order constructs that manifest survival fitness are dynamic capabilities that can differ in form and detail and remain effective across a range of contexts and industries. Thus an invariant association between survival fitness and survival performance was expected.

Hypothesis 8: The relationships between SME survival fitness and business performance are not moderated by contextual ambidexterity, administrative intensity, ownership structure, firm age, or firm size.

Figure 14 does not hypothesize a direct relationship between survival fitness and growth performance, but H7 proposed that survival fitness influences survival performance and H3 proposed that survival performance has a positive relationship with growth performance. Thus considering H7 and H3 together, survival fitness can exert an indirect influence on growth performance through an intervening construct of survival performance.

Hypothesis 9: The relationship between SME survival fitness and growth performance is fully mediated by survival performance (+).

SUMMARY

The research problem R was: *What relationship, if any, is there between organizational fitness and business performance for SMEs?*

Because two distinguishable types of organizational fitness were defined here, namely growth fitness and survival fitness, R was examined in terms of two research questions. The first question explored relationships between *growth* fitness and business performance (R1) and the second question explored relationships between *survival* fitness and business performance (R2).

First, two hypotheses for SME survival fitness and growth fitness (independent constructs) were developed. Next a hypothesis for business performance (dependent construct) was developed. Then three hypotheses that linked SME growth fitness with business performance were developed to answer R1. Finally, three hypotheses that linked SME survival fitness with business performance were developed to answer R2.

Two second-order structural models that specified links between SME organizational fitness and business performance (Figures 13 and 14) were hypothesized *a priori* to the empirical part of the thesis. These models were developed from a number of studies including Durand (2006), Poole & Van den Ven (2004), Baum & Rao (2004), Gibson & Birkinshaw (2004), Van den Bosch et al. (1999), Zahra & George (2002), Barth (2003),

Jansen et al. (2005), Boisot & Child (1999), and Voelpel et al. (2004). In sum, the nine hypotheses developed in this chapter were tied into two research questions, R1 and R2, which explore SME business performance by means of two organizational fitness constructs.

The development of proposed relationships between the dimensions of fitness and the fitness constructs was consistent with guidelines suggested for developing second-order models (Diamantopoulos & Winklhofer, 2001; Pavlou & El Sawy, 2005; 2006). Relationships and distinctions between the dimensions of fitness have been specified, and the domains of the theoretical fitness concepts have been described. The consequences of the impact of fitness on other variables were hypothesized. The research models are thus theoretically amenable (the organizational fitness constructs have strategic implications on competitive advantage and business performance) and managerially relevant (the dimensions of organizational fitness can be readily influenced by managers) (Pavlou & El Sawy, 2005). Table 8 summarizes the hypotheses that were developed and tested in this study, as well as how these hypotheses are linked with the four objectives listed in Chapter 1 and the two research questions R1 and R2.

Table 8: Research Hypotheses

Hypothesis		
O1 O2	H1	Growth Fitness is a second-order construct reflected by knowledge acquisition (+), assimilation (+), and transformation (+).
O1 O2	H2*	Survival Fitness is a second-order construct reflected by coordination (+), socialization (+), formalization (+) and routinization (+)*.
O1 O2	H3	Growth Performance will have a positive dependence relationship with Survival Performance
O3	R1 H4	Growth Fitness is related to Growth Performance (+) and to Survival Performance (+).
O4	R1 H5	The relationships between Growth Fitness and business performance are not moderated by contextual ambidexterity, administrative intensity, ownership structure, firm age, or firm size.
O4	R1 H6	The relationship between Growth Fitness and Growth Performance is partially mediated by Survival Performance (+).
O3	R2 H7	Survival Fitness is related to Survival Performance (+), but is not related to Growth Performance.
O4	R2 H8	The relationships between survival fitness and business performance are not moderated by contextual ambidexterity, administrative intensity, ownership structure, firm age, or firm size.
O4	R2 H9	The relationship between Survival Fitness and Growth Performance is fully mediated by Survival Performance (+).

* H2 was modified after measurement model development (described Chapter 7): Survival Fitness is a second-order construct reflected by coordination (+), socialization (+), and systems capabilities (+).

It can be seen from Table 8 (column 1) that H1, H2, and H3 are linked with achieving the first and second objectives (operationalize organizational fitness in terms of an evolutionary framework that allows for managerial control; investigate the

dimensionality and measurement of organizational fitness and business performance for SMEs).

Similarly, H4 and H7 are linked with the third objective (assess the extent to which organizational fitness is related to business performance for SMEs). H5, H6, H8, H9 are linked with the fourth objective (provide explanations of links between organizational fitness and business performance for SMEs).

Also it can be seen from Table 8 (column 2) that R1 is answered by means of H4, H5, H6, while R2 is evaluated by H7, H8, and H9. While there is no overall hypothesis to test the research problem R directly, a synthesis of the findings from the nine hypotheses in Table 8 provides evidence in this regard.

Chapter Six: Research Methodology

The chapter begins with a description of the paradigm under which this research was conducted. That is, in Section One, the broad research methodology is described. Section Two contains a description of how different components of validity were assessed in this study. Section Three summarises how statistical assumptions required for multivariate analysis, for example normality and linearity, were evaluated. Next, a description of the primary analytical technique utilized here, Structural Equation Modeling, is presented in Section Four. Section Five describes the modelling strategy that was used to develop and specify appropriate measurement and structural models. In the final section of the chapter, steps that were taken to protect against measurement error are described.

METHODOLOGY

Approaches to social sciences research are “based on interrelated sets of assumptions regarding ontology, human nature, and epistemology” (Morgan & Smircich, 1980:491). Assumptions that were made in this study regarding the nature of reality, how knowledge of that reality may be acquired, and the appropriateness of methodology, are described next.

Research Paradigm

A research paradigm provides a framework that links theory and methodology (Seth & Thomas, 1994). For this study, a *functionalist* paradigm was adopted. Functionalist and interpretive paradigms (objectivist and subjectivist approaches respectively) are regarded as two extremes of a continuum of social thought (Morgan & Smircich, 1980; Hussey & Hussey, 1997). Functionalist perspectives propose that reality is objective and singular to some degree, and exists apart from the observer who responds to this reality. Toward the other end of the continuum, *interpretivists* view that reality is dependent on the observer to some degree. “There is no reality independent of the mind; therefore, what is researched cannot be unaffected by the process of the research” (Hussey & Hussey, 1997: 53). Within the continuum of paradigms that characterize the objective-subjective (quantitative-qualitative) debate, core assumptions about ontology and human nature were made.

Ontological assumptions about reality. The assumption was made that social reality is “derived from the transmission of information which leads to ever-changing form and activity” (Hussey & Hussey, 1997:51). Relationships are assumed to have a probabilistic nature, and a change in one part of the firm reverberates throughout the whole firm and can change the firm as well as its environment in fundamental ways. Further, “relationships are relative rather than fixed and real” (Morgan & Smircich, 1980:495). Humans are adaptive agents who exist in an interactive relationship with their (essentially competitive) environment. Thus there are opportunities for firms with appropriate capabilities to influence how contexts evolve in accordance with their interests. As evolutionary systems, SMEs move into an open range of possible futures.

Epistemology. Epistemology is concerned with the study of knowledge and what is accepted as being valid knowledge (Hussey & Hussey, 1997). Different assumptions of social reality suggest different grounds for knowledge of that reality. For example, a subjectivist tradition might emphasize the importance of understanding how humans experience reality. Knowledge is constructed via our senses, so reality (if it exists beyond our impressions) remains unknown. At the other end of a continuum, a strongly positivist epistemology would emphasize empirical analysis of deterministic relationships in a reality that is independent of the observer.

In this study, a positivist epistemological stance is adopted, consistent with the ontological assumptions described above. Knowledge is acquired for the purpose of this research through the study of systems, process, and change, as well as attempts to explore contexts (Morgan & Smircich, 1980). The role of individual actors and their relational interdependencies was not explicitly the focus of this study. While the importance and desirability of understanding how individuals negotiate their social reality is acknowledged, emphasis was not placed in this study on researching the inner nature of social situations. The adopted epistemological stance resonates with the perspective of organizations defined as goal-directed, socially constructed, and boundary-maintaining activity systems.

Methodology

The research method chosen to investigate the research problem R embodied the underlying assumptions discussed above. Different assumptions require different methodologies for obtaining knowledge of the phenomena under study. In broad terms, a quantitative research methodology (Leedy & Ormrod, 2001) was adopted here. A quantitative methodology was considered to be consistent with the research paradigm.

The method of theorizing was deductive and utilized a set of assumptions to build a model. Generalizations were deduced from the model by testing hypotheses.

The process of theory development was positivistic rather than normative. That is, the aim was to describe what is being done in contrast to assessing what managers ought to do (Seth & Thomas, 1994). The positivistic approach of the study was most pronounced at a technical level (Hussey & Hussey, 1997). For example, analysis was conducted at an organizational rather than individual level, numerical data were gathered, and the study was statistical-analytical in nature. At a social level it was recognized that the world is better understood by also examining the perceptions of human actors. This recognition influenced the research method: subjective perceptions were measured rather than objective data. At a philosophical level, it is acknowledged that humans orient their actions in ways that are meaningful to them, and that social affairs are actively constructed and sustained. However, questions that may be considered under a phenomenological/interpretive paradigm such as how or why relationships arise were not the focus of this study.

A quantitative research method was adopted for a number of reasons. First, a quantitative approach is aligned with construction of structural models that explain independent and dependent constructs. The current study was considered to be exploratory in nature, in light of limited literature on organizational fitness of SMEs. It was anticipated that general capabilities and relationships within and among firms were to be examined, rather than the more in-depth 'how' and 'why' answers that qualitative research may provide (Verreynne, 2005a).

Second, a quantitative research methodology resonated with empirical studies relevant to this thesis, e.g. (Barki & Hartwick, 2001; Davidsson & Klofsten, 2003; Jansen et al., 2003; Gibson & Birkinshaw, 2004). These studies collected survey data from organizations with the use of questionnaires and analysed the data on firm performance by means of multivariate statistical techniques.

Third, because of the smaller size of SMEs, many organizational variables are likely to be consistent throughout the firm. This effect is exaggerated because SMEs are often focused on a single industry³⁵, and because of the homogeneity of products and services provided by SMEs (Campbell-Hunt et al., 2001).

Finally, a quantitative research method may be more easily replicated and allows for direct comparison of results in different settings as described in Chapter 1. That is, the

³⁵ The survey results (Chapter 8) supported this view: from 381 usable responses, fewer than 3% of SMEs identified multiple industry categories.

possibility of data warehousing is enhanced, so that practitioners can make more use in practical terms of quantitative research outcomes. A quantitative approach may facilitate comparison of fitness and performance data of New Zealand SMEs with each other and with SMEs from other countries.

Survey Design

The target population for this study is profit-seeking SMEs that operate primarily in NZ and are not branches of a larger corporation. A SME was defined as an independent profit-oriented business of 6-99 employees registered on the Statistics NZ Business Frame in 2006 (Pettigrew, 2003). Following Verreyne (2005a), not-for-profit and quasi-governmental institutions such as public educational, health and charitable organizations, government administration and defence organizations were excluded. This was because performance measurement of these firms requires a different approach to that adopted here. The minimum size of six full-time employees meant that many 'husband and wife' microfirms, including farming operations and small retail store owners were excluded. Cafes and restaurants were excluded because of their high ratio of part-time to full-time employees.

The organization was the level of analysis identified for this study. The level of analysis is determined by the level at which the main research questions are posed and analyses carried out rather than the level at which data are collected (Davidsson & Wiklund, 2001). Information was collected from individual owners and managers, and the data was hypothesized to represent aggregated measurements at the organizational level. The assumption is made that owners and managers are in the position to judge firm-level attributes for (tightly coupled) SMEs. This assumption was tested by Gibson & Birkinshaw (2004), who found that data gathered from senior managers was strongly correlated with ratings from employees at four hierarchical levels in the business. Several prior studies have adopted this approach as reasonable, for example, Cragg & King (1988), Gadenne (1998), Davidsson & Klofsten (2003), Kara et al. (2005), and Verreyne (2005b). Verreyne argues that SME owners have "sufficient information about and understanding of the firm" (p.129).

The two independent constructs were *growth fitness* and *survival fitness*; the dependent construct was *business performance*. Primary data were collected by means of a cross-sectional survey that measured the subjective and self-reported perceptions of the owners of SMEs using Likert scales.

Design. A cross-sectional survey design was utilized in this study. Cross-sectional surveys which measure both explanatory and dependent variables assume that organizational performance will continue, or that the measured values of the explanatory variables have not changed in the last few years. Both of these assumptions are problematic. It is not optimal to collect present measures of explanatory variables and use them to explain present performance.

A longitudinal research design is theoretically desirable if it is desired to show that an association is causal, since cause should temporally precede effect. However, Chandler & Lyon (2001) found that very few studies involving small firms utilized longitudinal designs. The delay in response is not normally known, and temporal priority between variables is not always clear (Bollen, 1989). Further, problems can arise in a longitudinal study with regard to the level of analysis (Venkatraman & Ramanujam, 1986; Davidsson & Wiklund, 2000). At the firm level, the ownership, structure, or primary activities may change (Davidsson & Wiklund, 2000). These issues should not be a problem for the current study. However, longitudinal designs require greater time and resources than cross-sectional designs, and there are questions as to how long the time interval between cause and effect must be. Because of these practical constraints and the exploratory nature of this study, it was decided to utilize a cross-sectional design.

Source and Type of Data. Two important issues for performance measurement are the source and type of data that is collected (Venkatraman & Ramanujam, 1986; 1987). Performance data are either *primary*, collected first hand by the researcher, or *secondary*, collected from publicly available sources (Sapienza, Smith, & Gannon, 1988; Chandler & Jansen, 1992). Data may be factual or perceptual, giving rise to a two-dimensional, four-cell classification scheme as shown in Table 9.

Table 9: Measurement of Business Performance

Classification Scheme		
	Primary Data	Secondary Data
Objective Systems	1. Factual reports of business performance	2. Reports compiled by and for external authorities / agencies
Perceptual Judgements	3. Perceptual assessments and evaluations by owner/managers	4. Perceptual assessments of performance by external industry observers or advisers

Source: Adapted from Venkatraman & Ramanujam (1987)

The approach adopted here was a self-reporting perceptual judgement of performance (Table 9, cell 3). Data was collected by means of a mail survey of randomly sampled owner-managers of SMEs. Each respondent's level of agreement with a carefully selected variety of measurement items was recorded and used for inferential statistical analysis. Subjective self-reported measures of SME performance were collected rather than objective data for several reasons.

First, SMEs are often unwilling or unable to provide desired financial or operational information (Covin & Slevin, 1989; Chandler & Lyon, 2001). There is frequent refusal of owners to provide objective data, and frequent manipulation of reported objective outcomes such as profitability (Sapienza et al., 1988).

Second, comparison of objective financial and operating data for SMEs in different industries appears to be problematic. Absolute scores on performance criteria are affected by industry-related factors (Miller & Toulouse, 1986; Covin & Slevin, 1989; Miller, 1996). Also, objective measures may be one-dimensional and prone to reporting defects (Clark, 2002). Available objective data has often been collected using different methods, with different quality control, over different time frames, and is of variable currency. Checking the accuracy of reported financial data is thus problematic. Further, interpreting a subset of reported objective data without reference to a mix of profitability and growth objectives may inflate or mask underlying performance.

Third, there is evidence that owner-reported performance data have acceptable levels of reliability and accuracy. Managers' perceptions, although open to retrospective bias (Miller, Cardinal, & Glick, 1997), are positively correlated with independent, objective measures (Dess & Robinson, 1984; Venkatraman & Ramanujam, 1987; Chandler & Hanks, 1993; Campbell, 1994)³⁶. Self-reports achieve validity dependent on a hierarchy of response motivations: there is more likelihood of accurate responses if nothing is at stake for the respondent (Campbell, 1994).

Finally, subjective measures are readily available. Many SMEs are not legally bound to report performance data, so only self-report data is available for these organizations. Self-report mail surveys are the most common method of data collection for SMEs, and most studies rely on a single source of information, namely, owner/managers (Deshpande & Zaltman, 1982; Avolio, Yammarino, & Bass, 1991; Brush & Vanderwerf, 1992). In this study, data was collected at an ordinal level using Likert

³⁶ A contrary view is given by Sapienza, Smith, & Gannon (1988).

scales. In the case of ordinal scales, responses can be compared within and between respondents for 'greater than' and 'less than' relationships (Hair et al., 2006).

In sum, the approach taken in this study comparing primary subjective responses of owner-managers has a number of advantages. Subjective and self-reported measures are frequently positively correlated with independent, objective measures and are the "most appropriate surrogates of performance when objective data is not available" (Sarapaivanich & Kotey, 2006:5). In addition, latent performance constructs can be directly addressed (Devinney et al., 2005).

VALIDITY

The aim of this research was to make valid generalizations (Clark & Watson, 1995; Messick, 1995; Shadish, Cook, & Campbell, 2001) relating organizational fitness and business performance for SMEs. Validity is an overall evaluative judgement of the degree of truth contained in an inference (Messick, 1995: 741).

A typology described in Shadish, Cook, & Campbell (2001) differentiates between four related components of validity: construct validity, external validity, internal validity and statistical conclusion validity. The typology was developed by Cook and Campbell in 1979 and is widely used in the organizational sciences (Austin, Boyle, & Lualhati, 1998; Scandura & Williams, 2000; Shadish et al., 2001). The first two aspects of validity, construct and external validity, emphasize the generalizability of research inferences. Internal and statistical conclusion validity support inferences about covariation and causality (Austin et al., 1998). Both "the target of measurement and measurement of the target" are important for adequate model development (Clark & Watson, 1995:318). The four different aspects of validity were monitored and assessed in this study.

Assessment of Validity

Following Shadish, Cook & Campbell (2001), four underlying validity issues were identified as pertinent to the research problem R:

- 1. Which constructs are involved? (Construct validity)*
- 2. How generalizable is the observed relationship (if any) between organizational fitness and business performance over varied conditions? (External Validity)*
- 3. Is the covariation between organizational fitness and business performance causal? (Internal validity)*

4. How large and reliable is the covariation (if any) between organizational fitness and business performance? (Statistical Conclusion Validity)

The analytical procedures employed for testing the research hypotheses addressed these validity issues to variable degrees.

Construct validity explores how well the measured variables represent the theorized constructs (Hair et al., 2006). Constructs are the central means for connecting operationalizations to theory and to language that practitioners use to inform practical action. Establishing construct validity is a critical part of model development (Carmines & Zeller, 1979; Venkatraman & Grant, 1986; Bagozzi, Yi, & Phillips, 1991; Sekaran, 2003). In this study construct validity was enhanced by starting with clear descriptions of respondents, units, setting, and outcomes of interest. Further, to enhance the construct validity of measured variables response anonymity was guaranteed, since accurate responses are produced only if nothing is at stake for the respondent (Campbell, 1994).

In the initial stages of measurement model development, it was important to ensure that the *content* of each construct was appropriate. Two threats to construct validity are construct under-representation (the operationalization is too narrow and fails to include important dimensions or facets), and construct irrelevance (too broad, contains excess variance associated with other distinct constructs). Thus there is a content aspect of construct validity which requires evidence of relevance, representativeness and technical quality (Messick, 1995). Measures should represent the essence of the construct upon which they are focused, and a construct should not easily be confused with other constructs (Gerbing & Anderson, 1988; Scandura & Williams, 2000; Straub, Boudreau, & Gefen, 2004). Content appropriateness was monitored here by carefully matching indicators with constructs in the context of the study.

Internal validity assesses whether the covariation between independent and dependent variables resulted from a causal relationship. Internal validity is threatened by incorrect inferences of a causal relationship that may arise for a variety of reasons. For example, causal relations are difficult to establish in non-experimental and cross-sectional studies, because of the difficulty of establishing temporal precedence. The direction of causal inference in correlational studies such as the current study relies on plausibility and theory. Lack of clarity about which variable occurred first may yield confusion about cause and effect. To provide evidence of internal validity, this study relied on a suitable modelling strategy to show that alternative explanations for the relationship were less plausible (Shadish, Cook & Campbell, 2001).

For internal validity, causal conclusions are limited to the context of the particular respondents and settings studied. For example, did organizational fitness make some significant difference to business performance in this specific instance? However, *external validity* refers to whether a causal relationship holds over a variation in units and settings. Invariant relationships across a different setting for units (moderated relationships) and across different units in the same setting (cross-validation) were both examined in this study. However, external validity with regard to both units and settings outside this cross-sectional study was not assessed.

Importantly, the issues involved in knowing whether causal relationships hold outside the observed study are independent of those involved in naming the constructs (construct validity).

Finally, *statistical conclusion validity* is an assessment of the degree to which the analytical procedure utilized might incorrectly conclude fitness and performance do covary (Type I error), or incorrectly conclude they do not (Type II error). That is, does the statistical procedure have sufficient power to correctly conclude the constructs do covary? Null hypothesis testing is useful for understanding the role that chance plays in the findings, but tells us little about the size of the effect. Thus a second issue is how strongly the constructs covary, that is a consideration of *effect size*. Statistical conclusion validity prevents over- or under-estimation of the size of covariation, and provides a degree of confidence in the estimate. Statistical conclusion validity (Austin et al., 1998; Scandura & Williams, 2000; Shadish et al., 2001; Milligan & McFillen, 2002; Straub et al., 2004) thus refers to the ability to draw conclusions on the basis of the statistical evidence presented. For example, if underlying assumptions limit the applicability of the analytical procedure, then statistical conclusion validity is threatened. Neglecting consideration of statistical conclusion validity “may limit the ability to base conclusions on the research conducted” (Scandura & Williams, 2000: 1253).

This study enhanced statistical conclusion validity by integrating the evaluation of statistical power, significance testing, sample size, and data analysis. Power analysis was conducted before the research commenced, so as to ensure that a sufficiently large sample size was analysed. Further, a powerful analytical procedure was utilized, and the use of multiple-item measurement decreased error variability (cf. Bollen, 1989). Type I errors were reduced by using substantive theory to guide tests, and by minimizing the number of significance tests. Confidence intervals were used to guide the assessment of model significance (Austin et al., 1998).

Relationship Specification

The relationship between a measure and a construct is expressed by a correspondence rule (Bagozzi & Phillips, 1982). A *reflective* correspondence rule assumes that measures confirm whether a construct possesses a theoretical property. A *formative* correspondence rule assumes the degree to which a construct possesses a property is a function of measures. The difference between the two rules lies in the causal priority between measures and constructs. The two alternative correspondence rules specify a formative indicator model (Diamantopoulos & Winklhofer, 2001), and a reflective indicator model (Chin, 1998b).

For this study, constructs were defined in a reflective rather than formative specification. For example, survival fitness was conceptualised as an underlying factor giving rise to observable measures, rather than a combination of indicators that are components of an index (Fornell & Bookstein, 1987; Bollen & Lennox, 1991; Davidsson, 1991; Fornell & Cha, 1994; Diamantopoulos & Winklhofer, 2001). Consideration of construct validity is especially important with reflective indicators. Individual items are interchangeable and any single item may be omitted without changing the construct, so long as at least three items are specified to avoid identification problems (discussed later this chapter) and indicators vary together (Hair et al., 2006).

Narrow Homogenous Domains of Content

A further issue that is related to both content validity and measurement specification is that of content domain. Multiple-item reflective indicators were measured in this study. That is, summated scales were not used to develop constructs. Many studies of SME performance aggregate the items that form a measurement scale and use the total or mean score in the hypothesized model. This simplification may result in a “loss of rigor and meaning, as the relations of the individual items with each other and the latent variables are ignored” (Gerbing, Hamilton, & Freeman, 1994:860).

However, as Gerbing et al. observed, a more rigorous multiple-item reflective approach has the disadvantage that “constraints for individual items yield factors operationalized by narrow homogenous content domains” (p. 862). That is, in order to satisfy statistical assumptions of a multiple-indicator measurement model, a researcher is forced to measure a narrow domain of content, which “limits the explanatory power and theoretical usefulness of the underlying model” (p.862). There is a trade-off

between more substantively interesting scales that provide broader content (but which would not achieve satisfactory fit when analysed as a multiple-indicator model), and an individual item analysis that achieves model fit (but factors are less interesting because of their narrow content).

The problem stems from two interrelated streams of research in SME performance: *measurement* and *substantive*. Measurement studies develop and validate instruments designed to measure constructs for use in subsequent theoretical models; substantive studies examine the nature of theoretical relationships between variables (Chau, 1997). Performance studies lie on this continuum of *model* versus *theory*, and the trade-off between multiple-indicators and summated scales is one of the determinants of where a study is positioned on the continuum.

This study attempts to reconcile the two (conflicting) goals (broadly defined constructs of interest vs. rigorous multiple-item analysis) by constructing second-order factors. That is, a first-order factor defined by a multiple-indicator measurement model is modelled as a constituent *facet* of a broader construct of interest. Each facet's contribution to the second-order construct is assessed by path coefficients or loadings, instead of the arbitrary dimensionality and number of items that happen to operationalize the facet. In this way, narrowly defined content domains of multiple-indicator measurement models can be used as a basis for increasing the substantiveness of the construct. Rather than blending multiple domains of content onto a single scale, a second-order approach allows diverse content, and respective domains are explicitly delineated (Gerbing et al., 1994).

Gerbing and Anderson (1988) stated that a second order model is useful when first-order unidimensional constructs are "not of general interest because the resulting content domain from which the items were sampled is too restrictive" (p.191). First-order constructs are thus embedded as indicators within a second-order factor structure (cf. Byrne, 2001) in this study. The level of analysis shifts so that a more broadly-defined construct is investigated by using first-order constructs as measurement items rather than less reliable individual items.

MULTIVARIATE ANALYSIS

The relationship between theory and a testing scheme is strengthened when there is good correspondence between a concept and its statistical formulation (Baron & Kenny, 1986; Hughes, Price, & Marrs, 1986; Venkatraman, 1989; Hofer & Bygrave, 1992;

Weinzimmer et al., 1998). The linking of verbalization of relationships with empirical tests is important, and some appropriate schemes are shown in Table 10.

Table 10: Six Perspectives of Relationships between Variables

Characteristics of the Conceptualization	Typical Verbalization	Analytical Schemes for testing relationship
1. Moderation Interaction	The effect of survival fitness on business performance is moderated by firm size	<ul style="list-style-type: none"> • ANOVA • Regression analysis • Subgroup analysis
2. Mediation Intervention	Survival performance is an intervening variable between growth fitness and growth performance	<ul style="list-style-type: none"> • Path Analysis
3. Matching Matching	The match between variables SF and GF differ for performance level.	<ul style="list-style-type: none"> • Deviation scores • Residual Analysis
4. Gestalts Internal congruence	Internal coherence among a set of variables differs for High/Low firms	<ul style="list-style-type: none"> • Cluster analysis
5. Profile Deviation Adherence	The level of adherence to a specified profile affects performance	<ul style="list-style-type: none"> • Multiple dimensional scaling
6. Covariation Internal consistency	The degree of internal consistency for a set of variables is high. This set of variables affects performance.	<ul style="list-style-type: none"> • Structural Equation Modeling

Source: Adapted from Venkatraman (1989)

The primary focus of this study was to examine relationships between latent (unobservable) constructs. The research hypotheses involved covariation, mediation, and moderation; relationships that are well explored by means of Structural Equation Modeling (SEM), see Row 6 in Table 10). SEM combines multiple regression with factor analysis. The research hypotheses were focused on structure, rather than prediction of group membership or group differences. Further, performance was treated here as a dependent construct, so cluster analysis (Row 4) and matching (Row 3) were not considered as suitable techniques for this study. Also, because a positivistic rather than normative methodology was adopted, level of adherence to a specified profile (Row 5) was not considered appropriate here. The goal of the analysis was to create linear combinations of observed and latent independent variables to explain linear combinations of dependent variables (Tabachnick & Fidell, 2007). Thus SEM was chosen as the primary analytical technique for multivariate data analysis.

Testing the Assumptions that Underlie Multivariate Analysis

Statistical assumptions required for multivariate analysis, such as outliers, normality, linearity, and homoscedasticity require careful testing to ensure that basic data assumptions are met for statistical conclusion validity (Scandura & Williams, 2000).

First, outliers lead to both Type I and Type II errors and weaken inference tests, thus an effort was made to detect outliers and ascertain their influence (Hair et al., 2006; Tabachnick & Fidell, 2007). An outlier is a case that has an extreme value on one variable or has an unusual combination on several variables such that overall statistics are distorted. The possibility of outliers was explored in this study from univariate, bivariate and multivariate perspectives.

Univariate detection proceeded by examining standardised (z) scores for each variable. Hair et al. (2006) suggested (p.75) that for larger samples, $z > 4$ is evidence of an extreme observation. Bivariate detection involved drawing scatterplots of pairs of variables and identifying isolated points in the scatterplot. Detection of multivariate outliers is important in multivariate analysis, and involves searching for cases that are assessed across a set of variables. The analysis evaluates the position of each observation compared with the centre of all observations on the set of study variables. Outlier detection was facilitated here by means of the Mahalanobis D^2 distance of each case. In most data sets, cases form a swarm around the centroid (which is the intersection of the variable means) in multivariate space. A case that is a multivariate outlier lies outside the swarm. Mahalanobis D^2 measures the distance of a case from the centroid of the remaining cases. If outliers are detected, the decision must be made whether to retain the outliers, reduce their impact or whether to delete them (Hair et al., 2006, Tabachnick & Fidell, 2007). It was expected that outliers would not be a problem since Likert scales were used.

Normality. Care was taken in this study to evaluate underlying normality assumptions (Sharma, 1996), because when nonnormality is indicated this generally contributes to other assumption violations. Each individual variable and each variate (linear combination of variables) was examined for normality. Skewness and normalized kurtosis are close to zero in normal distributions. A *skewed* variable is a variable whose mean is not central; *kurtosis* measures whether a distribution is too peaked or too flat. The presence of univariate normality was indicated by absence of non-linearity in a normal probability plot, and by non-significant skewness and kurtosis values that are less than one in size. Further, the Kolmogorov-Smirnov statistic was examined to test the hypothesis that the data are normally distributed. A low significance value (generally less than 0.05) indicated that the distribution of the data differed significantly from a normal distribution.

Multivariate normality was initially assessed in this study by examining the linearity of a graph of ordered Mahalanobis D^2 distances versus the chi-square values of their

percentiles. Deviation from linearity indicates multivariate nonnormality, and the correlation coefficient of the plot can be tested for significance (Sharma, 1996). It was important here to check for multivariate normality because SEM estimates parameters using the default method of maximum likelihood (ML). The use of ML estimation assumes the distribution of observed variables is multivariate normal (Bollen, 1989; Byrne, 1998; 2001).

Linearity. Most multivariate techniques (including covariance structure modelling employed in this study) implicitly assume that relationships between variables are linear. Departures from linearity affect calculated correlations between variables. Testing for linear relationships between the variates is important, and was conducted here by means of scatterplots that can reveal nonlinear relationships.

Homoscedasticity. Homoscedasticity means that dependent variables should exhibit similar variance across the range of values of each predictor variable. This desirable attribute is called *homogeneity of variance* if the predictor variable is categorical (grouped). If the dispersion of the dependent variable is not relatively similar at each level of the independent variable, the heteroscedastic relationship affects the sensitivity of hypothesis tests. Homoscedasticity was assessed in this study by examining scatterplots. Homogeneity of variance was measured in two ways: first, a univariate approach examined the Levene test of business performance across groups. Second, a multivariate approach makes use of a Box's M test³⁷. This is a test of the homogeneity of variance-covariance matrices; it is frequently found to be overly strict with large sample sizes (Tabachnick & Fidell, 2007).

Exploratory Factor Analysis (EFA)

EFA can be a useful technique prior to SEM (Anderson & Gerbing, 1988; Kinicki, Prussia, Wu, & McKee-Ryan, 2004). Generally, EFA is used either for data reduction or data summarization (Hair et al., 2006). Data *reduction* minimizes the number of variables in the dataset for subsequent simplified use in further multivariate techniques. Data *summarization* identifies underlying dimensions or structure in the data. EFA was used in this study to identify an initial parsimonious set of measured variables that competently represent the constructs while still retaining their character and scope. Thus

³⁷ Box's M is the most widely used test statistic for assessing equality of covariance matrices when more than one metric variable is being tested (Sharma, 1996).

EFA was used here for measurement model refinement and also for confirmation of feasibility of theoretical structure prior to SEM.

In this study, principal component analysis (PCA) was chosen as the factor extraction method instead of common factor analysis. PCA emphasizes parsimonious prediction of factors, whereas FA emphasizes their identification. A varimax rotation, which allows easier identification of uncorrelated factors, was specified. For a predetermined number of factors based on the proposed measurement models, the approach taken was to check that eigenvalues are greater than 1.0, that a scree test confirmed the number of factors, and that the percentage of variance explained is very close to 60% as a minimum. Factor loadings greater than 0.5 are generally considered desirable for practical significance; also, cross-loadings are not desirable. Further, communalities lower than 0.5 indicate that less than half of the variance of the measured variable is accounted for by the factor solution.

If the factor model required respecification, two approaches were taken here. First, items with low communalities, insignificant loadings, or with cross-loadings, were deleted unless deemed of major importance to the research objectives. Second, the number of factors was increased/decreased by one to see whether a different factor structure alleviated problematic results; however this step was only taken if the resulting structure had both empirical and theoretical support (Sharma, 1996; Hair et al., 2006; Tabachnick & Fidell, 2007).

STRUCTURAL EQUATION MODELING

SEM comprises a family of models which have emerged as an integral tool for managerial, academic and non-experimental research (Bentler & Chou, 1987; Bollen, 1989; Sharma, 1996; Byrne, 1998; Maruyama, 1998; Byrne, 2001; Schumacker & Lomax, 2004; Hair et al., 2006). A survey of 1200 articles published in academic journals between 1994 and 2001 led Hershberger (2003) to conclude that SEM is the pre-eminent method of multivariate data analysis.

SEM is used in research studies which attempt to use correlational data to model hypothesized causal processes (Maruyama, 1998). Applications of SEM include market research (MacLean & Gray, 1998), investigation of Porter's and Mintzberg's typologies of generic strategies in manufacturing (Kotha & Vadlamani, 1995), organizational citizenship behaviours (Netemeyer, Boles, McKee, & McMurrian, 1997), competitive capabilities of firms (Koufteros et al., 2002), measurement of retail productivity

(Dubelaar et al., 2002), and management of interpersonal conflict (Barki & Hartwick, 2001).

The SEM approach subsumes many techniques as special cases, including regression analysis, analysis of variance, path analysis (Wolfe, 2003) and both exploratory and confirmatory factor analysis (Cattell, 1965a; 1965b; Sharma, 1996). The methodology has an advantage that it can represent and test latent construct and measurement linkages (Hughes, Price, & Marrs, 1986). In summary, SEM methodology has been found to be useful in the behavioural and social sciences where many of the constructs are unobservable (Jöreskog & Sörbom, 1982; Sharma, 1996).

Basic Concepts. SEM (also known as covariance structure modelling and latent variable analysis) examines the structure of multiple interrelationships between variables. Hair et al. (2006) noted that “SEM estimates a series of separate, but interdependent, multiple regression equations simultaneously by specifying the structural models used by the statistical program” (p.711). The technique is also referred to by the name of the statistical program used for analysis e.g. LISREL, AMOS or EQS.

A number of aspects of SEM distinguish it from earlier generations of multivariate procedures. First, a confirmatory rather than exploratory approach to data analysis is taken. Thus an SEM analysis proceeds from a strong theoretical basis allowing inferences and hypothesis testing to occur. Second, SEM allows assessment and correction for measurement error in the variables. Third, SEM procedures can incorporate both observed variables (also called measured variables, manifest variables, or indicators) and unobserved (latent) variables. A latent variable (also called a latent construct) is not measured directly. Rather it is an unobserved concept that is hypothesized to be represented by a variate (a linear combination of measured variables). The advantages of using latent constructs rather than single measured items include a more rounded representation of theoretical concepts and improved estimation of measurement error (Hair et al., 2006).

The Path Diagram. Structural equation models are visually portrayed using four symbols. Constructs and unobserved variables are represented by ovals; measured variables by rectangles; single-headed arrows represent dependence relationships; and double-headed arrows represent covariances or correlations between pairs of variables. Exogenous constructs are determined by factors outside of the model and are analogous to independent variables; they have no single-headed arrows pointing toward them. Endogenous constructs are the latent, multi-item equivalent of dependent variables. That is, endogenous constructs are hypothesized to be determined by factors within the

model and have single-headed arrows pointing toward them. Relationships that are presumed to exist between variables are represented visually by a path diagram which is a pictorial description of the underlying structural (regression) equations.

The General SEM Model. The general SEM model can be decomposed into two sub-models: the measurement model, that defines relations between the measured variables and the constructs, and the structural model which shows how the constructs are related to each other. In the *measurement* model, latent factors are related to measured variables with a dependence relationship. In this study measured variables are assumed to be dependent on the construct (reflective indicators), and are thought of as indicators of the construct. Factors directly linked to measured variables are termed first-order factors; if the measurement theory calls for some higher level factor that accounts for the first order factors the model is termed a second-order model. Thus the measurement model provides a theoretically justified link between scores on a measuring instrument and the underlying constructs they are hypothesized to measure. In contrast, the *structural* model specifies structural relationships between latent constructs. The relationship may not exist; may be a dependence relationship (which determines whether a construct is exogenous or endogenous); or may be a correlational (covariance) relationship between exogenous constructs.

The measurement model typically contains all the constructs with noncausal relationships among them, and the structural model specifies the nature and presence of relationships between constructs. Anderson & Gerbing (1988) recommended that separate estimation of the measurement model take place prior to the simultaneous estimation of the measurement and structural submodels; this approach enhances construct validity.

SEM Estimation. A frequently used covariance-based approach uses software such as LISREL and AMOS to minimize the difference between the sample covariances and those predicted by the theoretical model using a maximum-likelihood (ML) function. A covariance-based estimation approach (hereafter referred to as SEM) was employed in this study, using AMOS version 7.0 as a software package for analysis. The focus of this approach is on two covariance matrices. First, the observed sample covariance matrix S contains empirical data: the covariances of the p measured variables as well as their variances in the diagonal. There are $\frac{1}{2} p(p+1)$ unique values in the matrix. For example, five measured variables give rise to $\frac{1}{2}(5)(6) = 15$ observed variances and covariances. Second, the model with its specified relationships produces an estimated population covariance matrix, Σ . Model parameters (path coefficients, variances and

covariances) are estimated prior to the estimated covariance matrix Σ . Estimates of parameters are fundamental to SEM analysis and allow the researcher to assess the practical and statistical significance of the impact of one construct on another, the relative importance of various paths, and to examine both direct and indirect effects. However, the major question asked by SEM is “Does the model produce an estimated population covariance matrix that is consistent with the sample (observed) covariance matrix?” (Tabachnick & Fidell, 2007:680). That is, differences between the observed and estimated covariance matrices, $S - \Sigma$, become the key focus in assessing the overall fit of the SEM Model.

Assessment of Goodness of Fit. There is a considerable literature on the assessment of the goodness of fit of covariance structure models, with a wide variety of fit indices e.g. (Bentler & Bonett, 1980; Bollen, 1989; Gefen, Straub, & Boudreau, 2000). The fundamental measure of fit, a chi-square statistic, quantifies the difference between S and Σ . Traditionally, the null hypothesis of SEM is that $S - \Sigma = 0$, implying that the model fits perfectly. With SEM, a statistically significant chi-square value is not desired, since this indicates clear differences between S and Σ . Rather, a small chi-square value (with corresponding large p-value) indicates no statistically significant differences are inferred between S and Σ . Unfortunately, the chi-square statistic is sensitive to sample size and to *df*, the model degrees of freedom³⁸. That is, a significant chi-square is a frequent occurrence especially with large sample sizes (Barki & Hartwick, 2001). Hair et al. (p.753) indicated that for sample sizes over 250, significant p-values for chi-square can be expected regardless of model fit.

Alternative perspectives on model fit are provided by three types of goodness-of-fit measures: absolute fit, incremental fit and parsimony fit. *Absolute fit* measures assess the model overall but do not penalise overfitting; *incremental fit* measures assess relative fit compared to some baseline model; and *parsimony fit* measures provide information about which model among a set of competing models is best, while adjusting for complexity of the model. Following recommendations from Bollen (1989), Gefen (2005), Hair et al. (2006), Tabachnick & Fidell (2007), Maruyama (1998), and Byrne (2001), five fit measures were reported in this study: normed chi-square; Goodness-of-Fit Index (GFI); Comparative Fit Index (CFI); Root Mean Square Error of Approximation (RMSEA); and Expected Cross-Validation Index (ECVI). These five

³⁸ Degrees of freedom represent the amount of mathematical information available to estimate model parameters (Hair et al., 2006). For a covariance structure, $df = \frac{1}{2}p(p+1) - k$, where k is the number of parameters to be estimated.

measures each provide different evidence of model fit and are useful in different circumstances.

A normed chi-square ratio is generally reported for all SEM studies, and this tradition is continued here. The normed chi-square is an absolute fit measure, and is a simple ratio of chi-square to the degrees of freedom for a model. An observed value greater than three indicates questionable fit (Arbuckle, 1995; Hair et al. 2006). GFI is a widely reported measure of absolute fit which calculates a weighted proportion of variance in S accounted for by Σ , analogous to R^2 in multiple regression (Tabachnick & Fidell, 2007). GFI is normed so that values range from zero to one; higher values indicate better fit. The CFI and RMSEA are perhaps the most frequently reported fit indices (Hair et al., 2006; Tabachnick & Fidell, 2007). The CFI is an incremental fit index that uses the null model as a baseline model for comparison, that is a model which assumes all observed variables are uncorrelated. Values range from zero to one; higher values indicate better fit. An RMSEA statistic (Steiger, 1990; 2000) estimates the lack of fit in a model compared to a perfect (saturated) model. Byrne (2001) notes that RMSEA has “recently been recognized as one of the most informative criteria in covariance structure modelling” (p.84). Low values close to zero indicate better fit³⁹. Finally, the ECVI is useful for comparing the performance of one model with another; it is not normed. ECVI is also parsimony adjusted, so that complex models are penalised.

Although fit indices yield information about a model’s goodness-of-fit, they cannot measure the extent to which the model is plausible. Assessment of model adequacy must be based on multiple criteria that take into account theoretical, statistical and practical considerations (Byrne, 2001). Each measure is discussed further in the section on analytical procedures later in this chapter.

MODELLING ISSUES AND STRATEGY

Identification. In SEM, models must be overidentified⁴⁰. The number of estimable parameters (path coefficients, covariances and variances) must be less than the number of observed covariances and variances. This results in excess degrees of freedom, and it is possible to make inferences about how well the model fits in the population. A further issue linked to identification is the requirement that every latent construct has its

³⁹ In a sense RMSEA measures ‘badness of fit’.

⁴⁰ Structural models may be underidentified, just-identified, or overidentified. For an *underidentified* model there is not sufficient information in the sample covariance matrix, S , to estimate the model parameters. A *just-identified* model is one where there is a unique solution; chi-square = 0 and the fit of the model cannot be tested (Byrne, 2001).

scale determined. An unobservable latent construct does not have a natural metric scale, so relative scaling is accomplished by constraining construct variance to unity (Anderson & Gerbing, 1988), or constraining one of the indicator variables factor loading parameter to unity (this fixed parameter is termed a reference variable). For identification of second-order models that were hypothesized in this study, an additional constraint was placed on one of the regression paths leading from the second-order factor to the first order factors (Byrne, 2001).

Data Considerations. Ordinary least squares regression techniques were initially used by researchers in early attempts at complex model estimation. Recently, most estimation is performed using maximum likelihood estimation (ML), which is more efficient and unbiased when the assumption of multivariate normality is met (Hair et al., 2006) and when data is measured at a continuous level. Since most SEM applications involve likert-type scales with ordinal data, there are potential risks that ML underestimates factor loadings and correlations. However, if the likert scale has at least five categories that are reasonably normally distributed, the risks are negligible (Bollen, 1989). The risk is further decreased if the covariance matrix rather than the correlation matrix is utilized for estimation (Byrne, 2001). In this study, Likert scales all have at least six categories and ML estimation of the covariance matrix was used.

Modelling Strategy. The modelling strategy adopted in this study lies in the middle of an exploratory-confirmatory continuum. An exploratory model development strategy aims to improve the basic model framework through modification of the measurement or structural model (Schumacker, 2000; Schumacker & Lomax, 2004). Aspects of a *model development* strategy were thus deployed in this study. Model respecification was only considered if there was theoretical support and not merely empirical justification. Better fitting models can always be achieved at the expense of generalisability, validity and unidimensionality.

Aspects of a *confirmatory* modelling strategy were also utilized here. That is, a theoretical model was specified and then SEM was performed to assess how well the model fits available data (Bentler, 2000; Bollen, 2000). Further, use was made of a *competing models* strategy that tests alternative models suggested by competing theories. In this study, a competing models strategy is evidenced in two ways: the equality of models across groups was examined, and nested models were compared for fit. Nested models are subsets of one another; a model is nested within another model if it contains the same variables but has added or deleted paths (Hair et al., 2006;

Tabachnick & Fidell, 2007). Competing nested SEM models were compared based on a chi-square difference statistic⁴¹.

Nested models. Modelling strategies proposed in SEM literature generally suggest that model testing should proceed via several nested models. This approach allows identification of both structural and measurement reasons for model failure. However, there is considerable ongoing debate regarding whether modelling should proceed in one step (Hayduk & Glaser, 2000); two steps (Anderson & Gerbing, 1988); four steps (Mulaik & Millsap, 2000); or some variant of these approaches. Most proposed strategies advocate evaluating goodness-of-fit of increasingly constrained or increasingly unconstrained nested models. For example, Mulaik & Millsap (2000) suggested that testing begin with the proposed research model (called the base model). For any base model, a less restricted model replaces the directed effects between the concepts with a full set of free correlations. An even less restricted model is next specified by adding connections between all concepts and all indicators. Finally a fourth step begins with the base model and adds planned constraints. This approach lies toward the confirmatory end of an exploratory-confirmatory continuum of modelling strategies.

In this study, models were constructed in layers, beginning with a first-order measurement analysis, then specifying a second-order internal structure, and finally moving to a causal structural model. That is, relationships were progressively constrained (in contrast to Mulaik & Millsap) and followed more closely the two-step approach of Anderson & Gerbing (1988). There was no pure confirmatory test of the final model – new data is required for this. However, each model was tested to examine whether it fitted under a variety of planned constraints

Summary. Structural Equation Modeling requires a sound theoretical foundation because definition of the measurement and structural models is under the control of the researcher. Theoretical support is especially critical for cross-sectional data as used in this study. SEM is well-suited to a ‘theory-driven’ approach, encourages visual portrayal of relationships (Arbuckle & Wothke, 1995), provides a transition from exploratory to confirmatory analysis and allows examination of direct and indirect effects (Hair et al., 2006). There has been much written of the misuse and limitations of SEM, e.g. Maruyama (1998) and Shook, Ketchen, Hult, & Kacmar (2004), including unease that a confirmatory technique is increasingly used for model development with a

⁴¹ The difference between chi-square distributed values is itself chi-square distributed (with degrees of freedom = $df_1 - df_2$) which can be tested for significance to see whether the alternative model is a significantly better fit.

single set of data. Testing a SEM model and analysing its results does not establish causality, but rather provides evidence of systematic covariation.

MEASUREMENT ERROR

Any measure of a theoretical concept includes measurement error, which can be partitioned into systematic error and random (sampling) error (Bagozzi et al., 1991).

Nonsampling Error

Self-report research is utilized in this study to solicit SME owners' perceptions of the state of their business. Some of the data gathered was demographic (for example, size of the business), and although the respondent may have reported incorrect information, the convenience and economy of collecting such data by self-reports outweighed the use of archival sources for such data. This was especially true since the commitment had already been made to use self-reports for other variables. Self-report measures that required higher order cognitive assessments were not verifiable by other means.

Common method variance bias. There was a danger that measures collected from the same respondent were correlated because of the problem of *common method variance* (Podsakoff & Organ, 1986; Avolio et al., 1991; Williams & Anderson, 1994; Matthews & Scott, 1995; Netemeyer et al., 1997; Maruyama, 1998; Podsakoff, Mackenzie, Lee, & Podsakoff, 2003; Pavlou & El Sawy, 2006). Bagozzi et al. (1991) defined *method variance* as "variance attributable to the measurement method rather than the construct of interest" (p.421).

Single-source bias is a special case of common methods variance (Avolio et al., 1991). When two measures arise from the same source, any defect in that source may contaminate both measures in the same fashion (Chandler & Lyon, 2001). Thus a correlation between two self-report measures may be due to other causes than a real underlying relationship. For example, Podsakoff & Organ (1986) discussed the *consistency motif*, where respondents have an urge to maintain a consistent line in a series of answers; there is also the *social desirability* problem which prompts respondents to ascribe reasons for success or failure that present themselves in the best light. Research for smaller organizations has shown that common method bias is more serious for concepts that are external to the respondent. For example, Matthews and Scott (1995) noted that measurement of organizational structure and job scope were not seriously affected by common method bias in contrast to personal internal attributes.

A number of statistical procedures were used in this study to isolate the covariance due to artefactual reasons. First, if the correlation matrix contained highly correlated variables this suggests evidence of common method bias (Bagozzi et al., 1991; Pavlou & El Sawy, 2006). Second, Harman's *one-factor test* was used to examine the variance extracted in an unrotated factor solution. A single factor that accounts for most of the variance between the independent and dependent variables may indicate substantial common method variance (Matthews & Scott, 1995). Third, a *partial correlation procedure* (Podsakoff & Organ, 1986) tested whether relationships between constructs of interest still existed after controlling for the principal factor.

These related procedures to assess common methods variance bias have limitations. The one-factor test becomes less informative as the number of variables increases, because a factor analysis with many variables invariably extracts more than one factor. It is not clear how many additional factors are required, or how much variance the first factor extracts before it is identified as a general factor (Podsakoff & Organ, 1986). For the partial correlation procedure, spurious negative correlations may result (Kemery & Dunlap, 1986). For both tests, a valid functional relationship is confounded with potential common method bias; at best the first factor only provides a conservative upper bound estimate of bias (Kemery & Dunlap, 1986).

Sampling Error

Sampling error always occurs when a population is sampled and inference is based on this sample. The severity of sampling error can be assessed by means of calculating confidence intervals rather than point estimates, and controlled by regulating the sample size. An important issue in research design involves the calculation of a sample size necessary to achieve adequate statistical power to test planned hypotheses (Cohen, 1988; MacCallum, Browne, & Sugawara, 1996; McQuitty, 2004).

Statistical power is the probability of correctly rejecting a false null hypothesis (Cohen, 1988). "If the power of the [statistical] test is low, the null hypothesis will seldom be rejected and the researcher using structural equation models may accept a false theory, thus making a Type II error" (Fornell & Larcker, 1981:40). However, too much power may result in the rejection of an otherwise tenable model. Power levels of 0.8 – 0.9 are deemed most desirable (Cohen, 1988). McQuitty (2004) found in a survey of 366 articles from leading business journals (1994-1999) that only four percent of published SEM models had power in this ideal range.

It was important for this research that sample size was sufficient for detecting when hypotheses are false. The calculation of sample size was thus driven by considerations of power.

Power Analysis. For SEM performed in this study, a major aspect was to assess goodness-of-fit of theoretical models to sample data. MacCallum et al. (1996) suggested a method to estimate the power associated with the test of an entire covariance structure. This method employs the root-mean-square error of approximation (RMSEA). As described earlier this chapter, the RMSEA statistic (ϵ) is a measure of model discrepancy (Browne & Cudeck, 1992). $\epsilon < 0.05$ is indicative of close fit; 0.05 to 0.08 indicates fair fit; 0.08 to 1.0 indicates mediocre fit; values above 1.0 for ϵ suggest a poor fit (Arbuckle & Wothke, 1995; MacCallum et al., 1996). AMOS produces a 90% confidence interval for ϵ , which can be used in the following tests:

(1) if the confidence interval about ϵ has zero as a lower bound, this is a test of *exact* model fit, $H_0: \epsilon = 0$

(2) if the confidence interval about ϵ straddles 0.05, this is a significance test of *close* model fit, $H_0: \epsilon < 0.05$

(3) if the entire confidence interval about ϵ is greater than 0.05, this provides a test of *not-close* fit, $H_0: \epsilon > 0.05$.

Both (2) and (3) are directly relevant and useful for this study. Testing a hypothesis of *close fit* was deemed to be more practical and realistic for this exploratory research than testing a conventional null hypothesis of *exact* fit. However, non-rejection of *close* fit, does not imply clear support for the model, rather that there is an absence of evidence against it. Further, if a test of *not-close* fit is rejected, this supports the conclusion that the fit of the model is *close*. That is, rejection of (3) together with non-rejection of (2) provides strong evidence for $\epsilon < 0.05$, *close* fit. In sum, tests (2) and (3) provide appropriate roles for the null and alternative hypotheses in the context of model evaluation (MacCallum et al., 1996) and they were used in this study.

Calculation of Sample Size. The problem was to determine a sample size N assuming alpha of 0.05 (probability of a Type I error, a false rejection of the null hypothesis) and desired power = 0.80. N is affected by the number of degrees of freedom (df) in the model, as well as the anticipated effect size. The minimum df of the covariance structures to be tested was conservatively estimated as $df = 30$. Effect size may be conceptualized as the degree to which H_0 is incorrect. For example, if the true value of $\epsilon = 0.08$ (the fit of the model is actually mediocre) when testing $H_0:$

$\varepsilon < 0.05$ (*close fit*), the effect size is indicated by the difference between 0.08 and 0.05. The minimum sample size to achieve power of 0.80 under this scenario is 314 to test *close fit*, and 366 to test *not-close fit* (MacCallum et al., 1996) (Table 4, p.144). Since it was desired in this study to conduct both tests, a sample size of 366 was required.

In sum, a minimum sample size of 366 allowed testing for both *close fit* and *not-close fit* with power of at least 0.80 assuming alpha of 0.05 and models with at least 30 *df*. The test for *close fit* ensured that a mediocre fit was unlikely to be accepted as close; and the test for *not-close fit* ensured that a close fit was unlikely to be accepted as a mediocre.

Summary.

This research was conducted under a functionalist research paradigm. The positivist epistemological stance adopted was suitable for the study of organizations as systems, and change that is based on information flows. Accordingly, a quantitative research methodology was utilized to explore relationships between constructs of organizational fitness and business performance. The survey was a large sample, multi-industry, single time period design. A mail survey gathered self-reported perceptual judgements of owners of profit-seeking SMEs with between 6 and 99 FTEs. Four components of validity, namely construct, internal, external, and SCV were assessed in this study. Relationships between constructs were specified in a reflective mode, and second order models were utilized to maintain broadly defined constructs of interest. Assumptions required for multivariate analysis, for example normality and linearity, were carefully evaluated. The primary analytical technique utilized in the study, Structural Equation Modeling, is described. SEM yields information about a model's goodness-of-fit, but cannot measure the extent to which a model is plausible. The modelling strategy that was used to specify appropriate measurement and structural models utilized development, competing, and confirmatory strategies. It is noted that there was no pure confirmatory test of the final model, new data being required for this. Finally, steps that were taken to protect against measurement error including common method variance bias and power analysis are described. A calculation of sample size revealed that at least 366 firms were required to test for *close fit* and *not-close fit* with 0.8 power.

The next chapter begins with a discussion of how the data was collected from SMEs and subsequently screened. This discussion is followed by a detailed description of the research methods employed in the study, including issues of sample bias, measurement specification, and construct operationalization.

Chapter Seven: Research Methods

This chapter begins with a description the procedure adopted for data collection. The characteristics of the realized sample of 381 SMEs are summarised. A check for nonresponse bias and representativeness did not reveal any problems, and results are reported in this first section. Section two describes how the measures were developed and specified. The development began with existing relevant scales which are summarised and presented. Details are given of how the constructs of Growth Fitness, Survival Fitness, Business Performance, and Ambidexterity were subsequently operationalized. A discussion is provided of three criterion variables that were utilized following the method of Barki & Hartwick (2001).

In Section Three, the results of an exploratory factor analysis of the data are presented. EFA was used to create construct indicators for the baseline measurement models, and allowed initial testing of construct validity, reliability, common method variance bias, and external consistency. In the final Section Four of this chapter, the primary analytical procedure SEM is described. The discussion includes how various covariance models were assessed for fit and validity, and a summary table of validity heuristics is provided. The section concludes with a description of how testing was implemented for both direct and indirect effects.

SETTING AND DATA COLLECTION

The initial sampling frame was a list of 3000 NZ SMEs procured from a commercial database maintained by Kompass International. The list was a simple random sample of the 9014 SMEs with fewer than 100 employees on the database as at November, 2006. The Kompass database was suitable for the study since it provided a comprehensive source of SME contact details that was readily accessible by the public. The NZ Employers and Manufacturers Association required membership of the association, while the NZ Telecom Yellow Pages databases did not provide details of firm size. The frame was acquired in electronic form (Excel spreadsheet) and contained firm activity, firm size, personal contact details, and the function of the contact person. The frame was then further refined by removing entries that were branches, or subsidiaries of corporations, had five or fewer employees, or had a primary activity which precluded them from the target population. This left a final list of 2850 sampling units.

Procedure

Anticipating a 17.5 per cent response rate (conservative estimate), postal questionnaires were sent to 2100 owners, CEOs, or managing directors of SMEs throughout New Zealand in order to achieve a sample size of at least 366 firms, as calculated in the previous chapter. The 2100 firms were selected randomly from the final sampling frame. The expected response rate of 17.5 - 20 per cent was based on previous SME studies. A literature search revealed that response rate of data gathered by postal survey using self-administered questionnaires addressed to business owners varied considerably. For example, Aragón-Sánchez & Sánchez-Marín (2005) reported a response rate of only 5.1 per cent in a study of Spanish SMEs. A survey of small Australian firms achieved an effective response rate of 12.1 per cent (Morrison et al., 2003). Chandler & Hanks (1993) and Covin & Slevin (1988) reported 15 per cent and 15.8 per cent respectively. Matthews and Scott (1995) reported that 17 per cent of small firms were respondents for their study. Longenecker et al. (2006) reported response rates to three surveys of 12.3 per cent, 18.8 per cent and 22.7 per cent. Johnson, Newby, & Watson (2005) reported a 19.6 per cent response rate of SME owner-operators in Western Australia. Verreynne (2005b) reported a 25.2 per cent response from SME owners or managers of SMEs in New Zealand. In light of these reported response rates, a rate between 17.5 and 20 per cent was anticipated for the current survey.

The questionnaire was addressed personally to the CEO or owner of each firm. Forty two letters were returned marked “undeliverable”. In the first six weeks, 421 SMEs responded without any prompting, a rate of 20.46 per cent⁴². Seven SMEs indicated a policy of not participating in any surveys. From the remaining 414 answered questionnaires, twenty cases were discarded because firm size was outside the targeted range of 6-99 employees. The surveys were then screened for missing data. The procedure is described in the next section. This resulted in the elimination of a further thirteen cases. Finally there were 381 usable questionnaires available for analysis, which was 19.81 per cent of the corrected sample frame. The response rate was consistent with previous results for this type of survey; further the required sample size of at least 366 responses was achieved.

⁴² An additional forty one responses were collected for prediction and validation purposes, as described in the next section. This resulted in a gross response rate of 21.93 per cent. However, these additional responses were not used to specify the research model.

Data Entry

Each business owner was required to make 79 responses on the questionnaire, which were coded and manually entered into SPSS version 15.0. Seven items were reverse-coded. Accuracy of the data file was ensured by careful proofreading of the original data against the computerized data file, as well as examination of descriptive statistics and graphic representations of the variables (Tabachnick & Fidell, 2007). Out-of-range values were corrected, and the plausibility of variable means and standard deviations was confirmed.

The pattern of missing data was scrutinized using SPSS MVA (Missing Value Analysis). As reported above, thirteen cases that had either multiple or confused responses (five), or more than five per cent non-response (eight), were removed leaving 381 usable responses. Twenty six cases had one or two missing items; no variables had more than four missing values over the entire set of 381 cases. Further, MVA revealed the missing data were MCAR (missing completely at random). It was decided to substitute the mean of each variable to estimate each missing value. This is a conservative procedure: the mean for the variable does not change, the variance of the variable is reduced, and correlations with other variables are reduced (Tabachnick & Fidell, 2007). However, only 34 item responses were missing over a total response set of 30480 item responses, an extremely small proportion of missing data. Thus imputation likely had no influence on the overall analysis. In summary, a cleaned data set of 381 cases with no missing values was subjected to analysis.

Sample

A total of 381 owners of New Zealand SMEs were included in the model development process. The median *size* of respondent SMEs was 17 FTEs. Approximately 20% of SMEs had 6-9 employees; 30% had 10-19 employees; 35% had 20-49 employees; and 15% of SMEs that responded had 50-99 employees.

The median *age* of the sampled SMEs was 20 years. One in 20 respondents owned SMEs that had been operating for less than five years. Approximately 15% of the SMEs were aged 5-9 years; 30% were 10-19 years, and 50% were over 20 years in age. That is, 80% of the respondents worked in SMEs over ten years old. It was clear that this was not a sample of start-up firms.

Slightly more than 40% of the respondents indicated that they *owned* the SME; a smaller percentage owned the business with family members (25%), or with other

owners/investors (20%). Nearly two thirds of the respondents indicated that their SME had either one or two owners that were *active members* of the executive team. A frequency histogram showing the number of active owners is provided in Appendix F.

Almost one in four of the SMEs were manufacturers, and a similar proportion was in the wholesale/retail sector. Roughly one third of the respondents identified 'other' as their *industry* sector. That is, none of the ten ANZSIC codes described their main activity closely. In summary, the typical respondent SME had 17 full-time equivalent employees, was 20 years old, was managed by one or two personally motivated owners and was in the manufacturing or wholesale/retail sectors.

Sample Bias

This study utilized a questionnaire, so the potential for *nonsampling error* such as nontruthful responses and voluntary response bias (Albright, Winston, & Zappe, 2006) was high. An attempt was made to reduce nonsampling error by guaranteeing response anonymity (Podsakoff et al., 2003) and by having both positive and negative items in the questionnaire (Kemery & Dunlap, 1986).

To check whether the role of the respondent had any systematic effect, mean responses across six dependent variables were compared for four groups: owners, family owners, owner investors, and managers. The dependent variables were factor scores for knowledge acquisition, assimilation, and transformation, coordination, socialization and systems capabilities. No significant differences at the 5% level were found by ANOVA, providing some evidence that single respondents provided organizational level responses.

Nonresponse bias. A bias that might threaten the validity of a mail survey is nonresponse bias (Tse, Sin, Yau, Lee, & Chow, 2003). Two methods were used in this study to test for nonresponse bias (Armstrong & Overton, 1977).

First, tests for non-response bias were conducted by the usual proxy (Johnson et al., 2005) of comparing early responses with late responses. That is, nonresponse bias was assessed by verifying that early and late respondents did not differ significantly on their demographic characteristics and responses on the principal constructs. *Early* respondents (285) were identified as those that responded in the first two weeks (Verreynne, 2005a; Pavlou & El Sawy, 2006); the remaining 96 respondents were identified as *late*.

In addition, a third set of responses was obtained from owners that did not originally reply to the survey and who had to be re-contacted. Because the surveys were

completed anonymously, the identity of respondents was not known. Thus owners listed in the sample frame were randomly contacted individually by telephone until one hundred original nonrespondents were found who now agreed to participate (Matthews & Scott, 1995). These SME owners, who had not replied to the original mailout, were re-sent the survey; 41 completed surveys were received from original nonrespondents. This third sample of original nonrespondents was then compared with both early and late respondents.

In sum, three groups - early respondents (N = 285), late respondents (N = 96) and original nonrespondents (N = 41) - were compared using ANOVA and a Kruskal Wallis test. ANOVA is a parametric test of whether samples are from populations with different means. The test assumes normally distributed variables, but violations of this assumption have diminishing impact with increasing sample size. The smallest group size here was 41 (nonrespondents) so the test was reasonably robust. The Kruskal Wallis nonparametric test was also conducted. Kruskal Wallis assesses whether samples are from the same distribution, and assumes only that variables have underlying continuous distributions. No significant differences between group averages were detected by either procedure (Table 11).

Table 11: Testing for Nonresponse Bias

	ANOVA F (2, 419) (all ns)	Kruskal Wallis Chi-square (all ns)
Size	0.830	3.759
Age	2.060	3.459
Ownership	0.912	1.889
Active Owners	0.026	0.027
Cashflow	0.424	0.931
Profit	0.442	0.578
ROI	2.169	4.077
Owners Earnings	0.157	0.105
Sales	0.289	0.546
Net Worth	0.369	0.745
Market Share	0.582	1.340
Repeat Sales	0.148	0.200
Total Growth Fitness	0.491	1.253
Total Survival fitness	0.532	1.565

There is little evidence shown by Table 11 that early respondents, late respondents and nonrespondents differed in terms of SME age, SME size or ownership type. Further,

on a broad range of business performance and organizational fitness measurement items, typical responses were similar from all three groups. There was no evidence that nonrespondents provided different responses from either early or late respondents; this in turn provides evidence that the responses of those surveyed were typical of the target population.

Representativeness. A second evaluation of nonresponse bias examined the representativeness of the sample by comparing demographical variables between the sample and the target population of New Zealand SMEs. A low response rate is less problematic if the sample is representative of the population on major attributes (Armstrong & Overton, 1977). Two demographical variables, *firm size* and *industry*, were compared between the respondent sample (N=381) and the target population of New Zealand SMEs that employed between 6-99 FTEs (Table 12).

Table 12: Size and Industry Representativeness of the Sample

	New Zealand SMEs (6-99 employees)	Sample (381 SMEs)	
<i>Firm Size</i>			
6 - 9 employees (FTE)	47.8%	22.3%	chi-square = 214.9 df = 3 P = 0.000
10 - 19	31.2%	30.7%	
20 - 49	15.9%	33.3%	
50 - 99	4.1%	13.6%	
	37923	381	
<i>Industry</i>			
Wholesale/ Retail Trade	28.7%	21.5%	chi-square = 21.7 df = 6 P = 0.002
Manufacture	18.2%	24.4%	
Construction	10.8%	8.7%	
Agriculture/forestry/fishing	4.2%	5%	
Personal Services	4.1%	4.5%	
Transport/Storage	5.0%	3.4%	
Other Services	29.0%	32.5%	
	31512	381	

Source: Table 1: Enterprises, Geographic Units and FTE Engaged by ANZSIC: February 2002 (MEDNZ, 2004).

Chi-square was significant for both variables, suggesting that the sample distribution was different from that of the target population in terms of *firm size* and *industry*. For *firm size*, smaller firms were underrepresented at the expense of larger SMEs. For example, the second column of Table 12 shows that for all NZ SMEs that employ from 6-99 people, almost 48 percent have less than ten FTEs, whereas only 22 percent of the surveyed sample were in this size category. For *industry*, SMEs that manufacture goods

are overrepresented at the expense of wholesale/retail trade by about six percent; however both industries still had over twenty percent representation. Other industries were fairly represented. The sample was thus slightly biased in favour of larger firms and manufacturing firms, as has been found in previous surveys of SMEs e.g. Verreynne (2005a).

MEASURES

The research problem R examined whether organizational fitness is related to business performance. A literature search to identify scales that measure conceptually similar concepts to those under study was performed.

Scales from Prior Research

A number of published and validated scales were selected as starting points for the process of construct development (Table 13). The right column of the table lists the reliability of each scale. Reliability is an assessment of the degree of internal consistency between multiple measurements of a variable, often assessed with Cronbach's Alpha reliability coefficient (Hair et al., 2006).

Table 13: Reliabilities for Existing Scales

Scale	Study	Comments	Alpha
Acquisition	(Jansen et al., 2005)	6 item adapted scale	0.79
Assimilation	(Jansen et al., 2005)	3 item adapted scale	0.76
Transformation	(Jansen et al., 2005)	6 item adapted scale	0.72
Reconfigurability	(Pavlou & El Sawy, 2005; 2006)	3 item scale	0.87
Coordination	(Jansen et al., 2005)	4 item scale	0.79
	(Jaworski & Kohli, 1993)	5 item scale	0.88
Socialization	(Jaworski & Kohli, 1993)	7 item new scale	0.80
	(Jansen et al., 2005)	4 item scale	0.74
Formalization	(Deshpande & Zaltman, 1982)	15 item new scale	0.76
	(Jansen et al., 2005)	5 item scale	0.73
	(Jaworski & Kohli, 1993)	7 item scale	0.76
Routinization	(Jansen et al., 2005)	5 item adapted scale	0.73
Ambidexterity	(Gibson & Birkinshaw, 2004)	3 item scale – alignment	0.73
		3 item scale - adaptability	0.80

The scales listed in Table 13 all have Alpha greater than the recommended minimum value of 0.7 (Nunnally & Bernstein, 1994), and provided 76 foundational items.

Developing and Specifying Measures

The search of academic literature for items from existing scales (Table 13) was followed by a search of business advisory literature. Table 40 (Appendix B) lists ten commercially available practitioner-oriented organizational performance evaluation systems. These are mostly used by larger organizations, although some, for example Klofsten's Business Platform, are used by SMEs. Altogether, this process resulted in a pool of 114 items. A number of different groups were then asked to assess the content of survival fitness, growth fitness and business performance constructs.

The initial pool of items was independently evaluated by four faculty members of a university business school. The evaluation resulted in a reduced and modified set of 102 items which was then evaluated by three business owners: a manufacturing business (thirty employees); a service business (fifteen employees); and a software developer of business assessment systems (eleven employees). Interviews with each owner resulted in a refined 90 item questionnaire which was trialled in a pilot study of 18 SMEs ranging in size from 6-99 employees. Each SME owner was asked to evaluate wording, content, and relevance. Comments from the 14 written responses were used to modify the instrument. Scale modifications were made bearing in mind that a construct is ideally reflected by a minimum of three items (Hair et al., 2006). Finally, the questionnaire was evaluated during three workshops with a panel of business advisors to ensure language and concepts were acceptable. The process resulted in the final instrument of 79 items. The use of judges from these different groups indicates that the content of the items was likely to be representative and not biased or idiosyncratic.

Operationalizing Constructs

Measures for the constructs in this study were responses of SME owners to questionnaire items. The responses were thus considered to represent observable phenomena. All items were measured on a six-point Likert scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) as anchors. A six-point scale was preferred to the more common five- or seven-point scales, since responses were subjective and it was desired to force a positive or negative opinion (Sekaran, 2003).

Growth Fitness. Five items were selected and modified from a scale used by Jansen, Van den Bosch, & Volberda (2005) to measure *knowledge acquisition*. The scale used by Jansen et al. was partially based on existing items measuring potential absorptive

capacity (Szulanski, 1996) and market orientation (Jaworski & Kohli, 1993).

Modification of the scale was necessary here to adapt the items for use with SMEs.

Five items were used to measure *knowledge assimilation*. Jansen et al. (2005) used a three-item scale that gauges the extent organizational units are able to analyze and understand new knowledge. Two items were added in this study to the existing scale: an item measuring use of feedback (Kennerley & Neely, 2003) and another of refinement (Eisenhardt & Martin, 2000).

Knowledge transformation was assessed with six indicators proposed by Jansen et al. (2005). The items assessed the level at which units are able to recognize the opportunities and consequences of new external knowledge for existing operations, structures and strategies (Zahra & George, 2002). Since the reliability of the scale was found by Jansen et al. to be satisfactory ($\alpha = 0.72$), all six items were used with minor contextual modification. One of the items that was originally reverse-coded was positively coded to simplify language comprehension.

Survival Fitness. Six items were selected from the centralization scale of Hage & Aiken (1967) to measure *coordination*. The scale measured aspects of participation in organizational decision making and hierarchy of authority. Modified sets of the items have been validated and used by Dewar, Whetton & Boje (1980), Jaworski & Kohli (1993), Dess et. al (1997), Deshpande & Zaltman (1982), and Jansen et al. (2005).

To measure a level of *socialization* in SMEs, a seven-item connectedness scale proposed by Jaworski & Kohli (1993) and used (with modifications) by Jansen et al. (2005) was selected. The items measured the extent to which individuals in one area are networked to various levels of the hierarchy in other areas of an organization. Six items were chosen and modified.

Systems capabilities were measured in this study by *formalization* and *routinization*. As noted in Chapter 5, formalization involves the degree to which rules are observed within the firm (Jaworski & Kohli, 1993). To measure formalization, six items were chosen from Deshpande & Zaltman (1982). Jansen et al. (2005) found satisfactory reliability ($\alpha = .73$) for a five-item subset of the original 15-item scale. The original scale was directed towards large firms, so some rewording was necessary here.

Routinization is a systems capability which enables an organization to offer rationally-based performance that is reliable and accountable (Hannan & Freeman, 1984). In Chapter 5 it was emphasized that routinization referred in this study to the development of a sequence of organizational actions that required relatively little attention, so that task execution becomes reliable and easily reproducible (Nelson and

Winter, 1982). Six items were used to measure the extent to which novel events occur each day, as inputs are converted into outputs (Withey, Daft, & Cooper, 1983). Withey et al.'s exceptions scale was found by Jansen et al. to be reliable ($\alpha = .73$) and formed the basis of the routinization construct used here. Two further items suggested by Van den Bosch et al. (1999) and supported by practitioners were added that measured the level of systemic self promotion, and degree of staff training.

Business Performance. Business performance was measured with a modified instrument originally developed by Gupta & Govindarajan (1984). Respondents were asked to indicate the importance of nine performance aspects on a three-point Likert-type scale (not so important, important, and very important). The scores were normalized to minimize the impact of individual bias. Respondents were also asked to rate their firm's business performance for each of the same nine aspects using a five-point Likert-type scale. Allowable responses on this scale ranged from 'decreasing significantly' to 'increasing significantly' (Chandler & Jansen, 1992; Chandler & Hanks, 1993). Each aspect of firm performance was then evaluated by the product of performance rating and its respective importance rating. Weighting performance scores by means of importance has been widely used in the context of small firm performance measurement (Gupta & Govindarajan, 1984; Covin & Slevin, 1989; Naman & Slevin, 1993; Verreynne, 2005b; Sarapaivanich & Kotey, 2006).

Survival performance was initially assessed by aggregating the first four business performance measures that assessed efficiency and profitability. *Growth performance* was initially assessed by aggregating the remaining five items that assessed growth in financial and business volume (Gupta & Govindarajan, 1984; Chandler & Jansen, 1992; Chandler & Hanks, 1993; Hall, 1994; Murphy et al., 1996; Delmar, 1997; Barth, 2003).

Ambidexterity. Organizational *ambidexterity* was assessed with six indicators taken from Gibson & Birkinshaw (2004). Gibson & Birkinshaw assessed contextual ambidexterity by means of the product of three alignment indicators with three adaptability indicators. Contextual ambidexterity is the behavioural capacity to simultaneously demonstrate alignment and adaptability across the entire firm. Minor wording changes were made to the scale items of Gibson & Birkinshaw since the original study was at business-unit level.

In this study, ambidexterity was also computed as a function of alignment and adaptability. First, EFA was used to assign factor scores to *alignment* and *adaptability*, which were created by factoring the ambidexterity scale. Factor scores are based directly on factor loadings, so that each measured variable contributes to the construct

score in proportion to the size of its loading. This approach is different to the use of summated scales, where all items are given the same weight and a simple sum or average of the items is the new score. Although summated scales are easier to compute, factor scores are orthogonal (uncorrelated) which offers an advantage if the variates are to be used in subsequent analyses (Hair et al., 2006). Factor scores were normalized to a mean of zero and standard deviation of one. Second, *ambidexterity* was calculated by summation of factor scores for *alignment* and *adaptability*. This procedure penalized firms that had negative (low) alignment and negative (low) adaptability scores; the resulting ambidexterity index was strongly negative (low). If alignment and ambidexterity were opposite in sign (indicating a firm that emphasized one behaviour at the expense of the other) ambidexterity near zero resulted. Only firms that had positive alignment and adaptability were thus scored with high ambidexterity.

Criterion Variables. Criterion validity is the degree of correlation between a measure and a criterion variable, ideally a ‘gold standard’ against which measurement may be judged. In this study, use was made of three criterion variables following the method of Barki & Hartwick (2001). More detail regarding their use is provided in the next section.

Perceived growth fitness was assessed with four items. The items assessed the overall degree to which respondents perceived that their firms were able to generate business opportunities more effectively than competitors (Boisot, 1998; Hansen et al., 1999; Jang, Hong, Bock, & Kim, 2002; Zollo & Winter, 2002).

Perceived survival fitness was assessed with three items. That is, to what degree did respondents perceive overall that their firm had the capability to rearrange structure, identity and strategy so as to remain profitable (Campbell, 1969; Gibb & Scott, 1985; Campbell, 1994; Lane & Lubatkin, 1998). The construct was developed from a reconfigurability scale (Pavlou & El Sawy, 2005; 2006). *Reconfigurability* is the ability to deploy superior new configurations of functional competencies that better match the environment (p.6). Reconfigurability also refers to the timeliness (Zott, 2003) and efficiency (Kogut and Zander, 1996) by which existing resources can be reconfigured (Galunic and Rodan, 1998).

Perceived business performance was assessed by three items that measured the overall perception of business performance by respondents. Items were chosen that assessed the degree to which the firm is currently maintaining satisfaction of its customers and stakeholders, obtaining positive profits from its actions, and successfully competing in the marketplace (Davidsson, 1991; Hall, 1994; 1995).

Demographic variables. The remaining items of the survey instrument were demographic indicators. Number of full-time employees was used to measure the *size* of the SME. Part-time workers were proportionally included in this score. SME *age* was measured in four broad categories: under 5 years; 5-9 years; 10-19 years; and over 20 years (Covin & Slevin, 1989). The number of *active owners* in the executive team was measured. *Ownership type* was recorded in four categories: Single owner, family owned, investor-owned and trust ownership. Industry *sector* was also measured, using ten categories drawn from the Australia and New Zealand Standard Industrial Classification (ANZSIC)⁴³ categories.

The raw data thus consisted of 79 individual measured variables: three were categorical (firm age; ownership type; industry), two were measured at a metric level (firm size; active owners) and 74 were measured at the ordinal level⁴⁴.

Finally, for anticipated testing of moderated relationships (discussed next chapter) the demographic data described above was grouped into five new categorical variables, each with only two categories. That is, a *low* group had values less than the median, and a *high* group had values above the median. For firm *size*, the low group had 17 or fewer FTE employees; the high group of SMEs had more than 17 FTE employees. The low group for SME *age* consisted of SMEs were less than 20 years old. For administrative *intensity*, the low group all had scores of less than or equal to 0.10. For *ambidexterity* the low group had negative factor scores, while the high group had positive scores (the median ambidexterity score was zero). Finally, for *ownership* structure, the high group consisted of those respondents that indicated they were the sole private owner of the SME (168 SMEs). The low group were those SMEs that were investor, trust, or family-owned (213 SMEs). In summary, the five new categorical variables were: *Size2* (employees ≤ 17 ; > 17); *Age 2* (≤ 20 years; > 20 years); *Ownsr2* (owners ≤ 1 ; > 1); *Intensity2* (administrative intensity $\leq 10\%$; $> 10\%$); *Ambi2* (ambidexterity ≤ 0 ; > 0). In addition, a new firm level variable, *administrative intensity*, was calculated as the ratio of the number of owners to the number of full-time employees (Sine et al., 2006).

Table 14 summarizes the literature support for the measurement items that were chosen. The full questionnaire is reproduced in Appendix C. Note that the items in the questionnaire follow exactly the same order as the constructs listed in Table 14. For

⁴³ Excluded Government Administration and Defense, and Accommodation, Cafes and Restaurants.

⁴⁴ Some authors, e.g. Sekaran (2003), refer to ordinal data as an *interval* level of measurement.

example, the first four items in the questionnaire (enclosed in a border) measure *Perceived Growth Fitness* (see Table 14), the next five items (bordered) measure *Knowledge Acquisition* and so on.

Table 14: Constructs Measured by the Survey Instrument

Questionnaire	Items	Study	Construct of Interest	Basis of Scale
Items 1-4	4		<i>Perceived Growth Fitness</i>	Growth fitness definition.
Items 5-9	5	Jansen, Van den Bosch, & Volberda, (2005)	<i>Knowledge Acquisition</i>	Existing items measuring potential absorptive capacity (Szulanski, 1996; Zahra & George, 2002) and market orientation (Jaworski & Kohli, 1993).
Items 10-14	5	Added Jansen, Van den Bosch, & Volberda, (2005)	<i>Knowledge Assimilation</i>	Partially based on existing items measuring potential absorptive capacity (Szulanski, 1996; Zahra & George, 2002). Two items added from Kennerley & Neely (2003) Eisenhardt & Martin (2000).
Items 15-20	6	Jansen, Van den Bosch, & Volberda, (2005)	<i>Knowledge Transformation</i>	Partially based on existing items measuring realized absorptive capacity (Szulanski, 1996; Zahra & George, 2002).
Items 21-23	3	Adapted	<i>Perceived Survival Fitness</i>	Reconfigurability (Pavlou & El Sawy, 2005; 2006); survival fitness definition.
Items 24-29	6	Modified Scale	<i>Coordination</i>	Participation in decision making and hierarchy of authority: Jansen, Van den Bosch, & Volberda (2005); Hage & Aiken (1969); Dewar, Whetton, & Boje (1980); Jaworski & Kohli, 1993; Dess et. al (1997) and Desphande & Zaltman (1982).
Items 30-35	6	Modified Scale	<i>Socialization</i>	Connectedness: Jansen, Van den Bosch, & Volberda (2005); Jaworski & Kohli (1993).
Items 36-41	6	Modified Scale	<i>Formalization</i>	Jansen, Van den Bosch, & Volberda (2005); Desphande & Zaltman (1982); Jaworski & Kohli (1993).
Items 42-47	6	New Scale	<i>Routinization</i>	Jansen, Van den Bosch, & Volberda (2005); Withey, Daft, & Cooper (1983); Hage & Aiken (1969); Daft & Macintosh (1981).
Items 48-53	6	Gibson & Birkinshaw (2004)	<i>Contextual Ambidexterity</i>	New Scale
Items 54-56	3	New Scale	<i>Perceived Business Performance</i>	Definition of business performance.
Items 57-74	18	Adapted Scale	<i>Business Performance</i>	(Gupta & Govindarajan, 1984; Covin & Slevin, 1989; Naman & Slevin, 1993; Verreynne, 2005b; Sarapaivanich & Kotey, 2006).
Items 75-79	5		Demographic Variables	

Note: Constructs are listed in the same order as items in the questionnaire (Appendix C).

EXPLORATORY FACTOR ANALYSIS

There was limited evidence to support the validity of the various measures proposed in the previous section. For this reason, and because covariance structure analysts recommend measurement model refinement prior to SEM (e.g. Anderson & Gerbing,

1988), the empirical investigation began with EFA (Kinicki et al., 2004). Analysis was conducted on the sample of respondents (N = 381) and was used to create potential factors for the baseline measurement models.

PCA was performed with SPSS on the three central theoretical constructs: *survival fitness* (24 items); *growth fitness* (16 items); *business performance* (18 items), and also on the construct *ambidexterity* (6 items). In addition, *perceived survival fitness*, *perceived growth fitness* and *perceived business performance* (each with 3 items) were subjected to PCA to see if their measured variables loaded onto a single factor. The dataset contained 381 cases, which means there were at least 15 observations for each measured variable of the largest construct. This exceeded the generally recommended 10:1 ratio (Hair et al., 2006).

An important assumption for EFA is that measured variables are sufficiently inter-correlated to produce representative factors. Three criteria were used to assess whether this assumption was met by the data. First, the Bartlett test of sphericity was used to assess whether the correlation matrix was an identity matrix. A significant value would indicate that there were significant correlations among at least some of the variables. Second, the Kaiser-Meyer-Olkin (Kaiser, 1974) overall *measure of sampling adequacy* (MSA) should exceed 0.5 before proceeding with factor analysis. Third, MSA values for each individual variable should be above 0.5 (Sharma, 1996; Hair et al., 2006).

The results for these tests are summarized in Table 15; original tables showing details of the rotated loadings are displayed in Appendix E (Table 43 - Table 46).

Table 15: Principal Components Analysis

Construct	Overall MSA	Minimum individual MSA	Bartlett Sphericity (p value)	Number of Factors Indicated	Percentage of Variance	Number of Eigenvalues above 1	Scree Plot results
Perceived growth fitness	0.639	0.598	.000	1	65.6	1	1
Growth fitness	0.865	0.766	.000	3	58.4	2	3
Perceived survival fitness	0.621	0.585	.000	1	64.2	1	1
Survival fitness	0.809	0.772	.000	3	59.2	3	3
Contextual ambidexterity	0.633	0.570	.000	2	71.2	2	2
Perceived bus performance	0.659	0.625	.000	1	65.4	1	1
Business performance	0.879	0.854	.000	2	59.2	2	2

All seven constructs achieved satisfactory results for overall MSA and individual MSA, and explained around 60% variance or better. Scree plots and Eigenvalues > 1 all suggested the extraction of the proposed number of factors, except in the case of survival fitness as discussed next.

Construct Validity and Reliability

The items associated with *survival fitness* were combinative capabilities that loaded onto three factors instead of the hypothesized four factors (Table 43, Appendix E). *Coordination* ($\alpha = 0.673$) and *socialization* ($\alpha = 0.825$) were each measured by four items; however the expected factors of *formalization* and *routinization* had several cross-loadings and nonsignificant loadings. After a process of inspecting low individual MSA values and low factor loadings, a single factor, tentatively labelled *systems capabilities* (five items, $\alpha = 0.795$) with high loadings was indicated. Conceptually, this factor made theoretical sense, as formalization and routinization are two aspects of an organization's systems capabilities used to integrate explicit knowledge (Van den Bosch et al., 1999; Jansen et al., 2005). *Systems capabilities* were defined as capabilities that provide a memory for handling routine situations. That is, behaviours are programmed in advance of their execution (Van den Bosch et al., 1999; Jansen et al., 2005). The construct of *systems capabilities* encompasses both *formalization* and *routinization*. Thus, preliminary analysis suggested that Hypothesis 2 should be modified in Table 8 (page 96) by replacing *formalization* and *routinization* with *systems capabilities*. The desirability of this modification was subsequently confirmed with SEM, as described in Chapter Eight.

For *growth fitness*, the items loaded as hypothesized onto three factors (Table 44, Appendix E): *knowledge acquisition* (four items, $\alpha = 0.59$); *knowledge assimilation* (four items, $\alpha = 0.80$); and *knowledge transformation* (three items, $\alpha = 0.68$). Although there was some evidence of minor cross-loading and some suggestion that a two factor structure may be more appropriate (only two eigenvalues > 1 in Table 15), all three factors were retained in order to maintain a broad content domain.

The *business performance* items loaded onto two factors as hypothesized (Table 45, Appendix E). These dimensions were labelled *survival performance* (5 items, $\alpha = 0.89$) and *growth performance* (4 items, $\alpha = 0.72$). All loadings were reasonably high. One item (total revenue from sales) cross-loaded onto both factors. The labels of the two factors were based on interpretation of the underlying structures: the first factor was designated 'survival performance' because the components were efficiency ratios such

as ROI and profit measures. The second factor labeled ‘growth performance’ was composed of measures of change of both financial and business volume.

For the *ambidexterity* construct (Table 46, Appendix E), items loaded as hypothesized onto two factors: *Alignment* (2 items, $\alpha = 0.635$) and *Adaptability* (3 items, $\alpha = 0.747$) as expected. All loadings were high, with most over 0.8. One of the original items in the alignment subscale was dropped because of poor loading. This meant that only two items remained; however, the construct is only used in a secondary capacity (aggregated with adaptability as explained earlier this chapter) and the two remaining items were judged to provide a satisfactory overall measure.

Finally, *perceived survival fitness* (3 items, loadings of .836, .869, .687, $\alpha = 0.714$); *perceived growth fitness* (3 items, loadings .760, .663, .545, $\alpha = 0.737$) and *perceived business performance* (3 items, loadings .830, .850, .742, $\alpha = 0.704$) each loaded on a single factor as theorized.

Common Method Variance Bias

The correlation matrix of derived concepts in Table 41 (Appendix D) did not reveal any high correlations, so there was no initial evidence of possible common method bias (Bagozzi et al., 1991; Pavlou & El Sawy, 2006). Two related tests of potential common method variance bias (described Chapter 6) were then conducted.

First, all variables of interest were entered into a principal components analysis in a *Harman’s one-factor* test. The unrotated solution extracted 17 factors with eigenvalues greater than one; importantly, no general factor was apparent⁴⁵. This result did not suggest the presence of common method bias (Podsakoff & Organ, 1986) and demonstrated “independence among the conceptual domains of the various measures” (Matthews & Scott, 1995:43).

Second, a *partial correlation* procedure (Podsakoff & Organ, 1986) was performed (Table 42, Appendix D). Most of the partial correlations between factors in Table 42 remained significant while controlling for the first unrotated factor (which, as a general factor was assumed to most strongly represent common method variance). This suggested that there were still meaningful relationships between the main variates of interest after partialling out (statistically controlling) for a potential common method factor. Preliminary examination of the data with EFA did not therefore suggest serious common method variance bias.

⁴⁵ The first factor explained 19.2 per cent of the total variance; all factors explained 63 per cent.

External Consistency

A preliminary assessment of *external consistency* was made by including all the variables in the study in a single factor analysis (see Table 16) as discussed by Gerbing & Anderson (1988). Evidence of external consistency of a construct may be provided by indicators from other constructs; separate factor analyses of each scale cannot provide this assessment.

Table 16: Testing for External Consistency

Rotated Component Matrix								
	Survival Perform SP	Knowledge Assimilat KA	Socialize SOC	Systemiz SYS	Coordinat C	Growth Perform GP	Knowledge Acquisition KQ	Knowledge Transform KT
SP3	.828							
SP4	.802							
SP2	.786							
SP1	.698							
SP6	.694							
GP5	.531					.518		
KA8		.801						
KA9		.746						
KA7		.727						
KA10		.662						
KT15		.498						
SOC9			.866					
SOC8			.851					
SOC10			.717					
SOC7			.694					
SYS14				.798				
SYS17				.754				
SYS24				.715				
SYS15				.694				
SYS16				.640				
C2					.696			
C4					.616			
C1					.612			
C3					.550			
GP8						.672		
GP9						.670		
GP7						.572		
KQ4							.721	
KQ3							.646	
KQ2							.456	
KQ5								
KT13								.516
KT14								.483

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Only items with loadings > 0.45 are shown in Table 16 for clarity, and coefficients are sorted for size. Three problem areas were noted: One business performance item (GP5) loaded onto both performance factors as has been previously discussed; a knowledge acquisition item (KQ5) did not load strongly onto its proposed factor; and a knowledge transformation item (KT15) loaded more strongly onto the knowledge

assimilation construct. However, apart from these discrepancies, Table 16 provided evidence of external consistency.

Summary

Non-response bias did not appear to be problematic in this study. That is, responses of those surveyed were assumed typical of the target population. However, the responding sample of 381 SMEs was overrepresented by larger SMEs that were manufacturers; generalizations of results from this research about SMEs in New Zealand should be made with caution (Verreynne, 2005b).

Empirical investigation began with EFA because of the limited evidence to support the validity of proposed measures. EFA forced a re-think of two *survival fitness* constructs. Items measuring *routinization* were not found to be reliable. The items measuring routinization, constructed as repetitious tasks and environments with very few unexpected and novel events (Hage & Aiken, 1969; Withey et al., 1983), were not suggestive of a distinguishable one-dimensional concept. However, items measuring *formalization* were found to be reliable and internally consistent in the preliminary analysis. That is, the multiple measures can be regarded as alternative indicators of the same construct, the degree to which rules are observed within the firm (Deshpande & Zaltman, 1982; Jaworski & Kohli, 1993). The new construct *systems capabilities* consisted of formalization items and included a single item originally theorized to measure routinization: the use of systematic procedures for day to day operational procedures (Nelson & Winter, 1982). In sum, systems capabilities measured the capability of the SME to establish patterns of organizational action (Galunic & Rodan, 1998; Van den Bosch et al., 1999) and emphasized formalization capabilities more than routinization capabilities.

After this modification, EFA resulted in a refined set of indicators that loaded appropriately and uniquely onto their theorized constructs. Constructs showed adequate reliability and internal consistency as indicated by Cronbach's Alpha, and reasonable evidence of external consistency was found. A number of first-generation tests did not suggest the presence of severe common method variance bias.

Thus a preliminary examination of the collected and refined data suggested that it was suitable for use in measurement model development. The resulting sets of items which formed coherent factors were used to create constructs for the baseline measurement models, as described in the next section.

ANALYTICAL PROCEDURES

This section describes how SEM was used to construct two separate models for growth fitness and for survival fitness. Models were constructed from an integration of theory and data (Gerbing et al., 1994). The two models were constructed in layers. The process began by confirming the EFA measures described above with a first-order measurement analysis. Next an internal structure was specified and tested for each aspect of fitness. Finally two full causal structural models linking fitness and performance were tested. That is, relationships were progressively constrained and approximated the approach of Anderson & Gerbing (1988).

Assessment of Measurement Models

Measurement model validity depends on the goodness-of-fit of the measurement model, and requires specific evidence of the degree of construct validity, reliability, and unidimensionality of each construct (Byrne, 2001). There were three measurement models under consideration here. Growth fitness had three hypothesized dimensional indicators or facets: knowledge acquisition, knowledge assimilation and knowledge transformation; Survival fitness had three hypothesized dimensional indicators of coordination, socialization, and systems capabilities; and business performance had hypothesized dimensions of survival performance and growth performance.

Assessing fit. The measurement models were assessed by goodness-of-fit indices that perform adequately across a wide range of situations (Hair et al., 2006: 753). The indices (with heuristic thresholds) selected were Normed chi-square < 3 ; GFI $> .90$; CFI $> .92$; and RMSEA: $\varepsilon < .07$, each of which provides evidence of adequate overall model fit. Tests of *close fit* and *not-close fit* were also conducted by means of a 90% confidence interval (C.I.) for ε described in the section on sampling error in the previous chapter. Further, adequately-fitting models have a Root Mean-square Residual (RMR) that is near zero; values below 0.08 were considered to be adequate (Tabachnick & Fidell, 2007).

In the event of poor fit, problems were diagnosed by three main means: path estimates; standardized residuals; and modification indices. *Path estimates* should be statistically significant and have values of at least 0.5. *Standardized residuals* should be close to zero, and standardized residuals > 4 indicate a problem. *Modification indices* show how much the overall chi-square for the model would change by freeing constrained paths. A conservative approach to re-specification was adopted for this

study. Only minor modifications to measurement models were contemplated. Such modifications were driven by theoretical considerations as well as numerical improvement.

Construct Validity. Confirmatory factor analysis (CFA) was performed on each model with all constructs allowed to correlate freely. This is generally recommended as a first step in SEM to assess the degree of unidimensionality of each set of items and to examine how well proposed constructs have been measured (Barki & Hartwick, 2001; Byrne, 2001; Hair et al., 2006). That is, CFA facilitates assessment of the construct validity (Bagozzi et al., 1991) of a proposed measurement model. Important components of construct validity are convergent validity, discriminant validity and nomological validity.

Convergent validity is demonstrated by good overall model fit. That is, if items that are indicators of a construct share a high proportion of variance in common, they are said to exhibit convergent validity. Significant correlations between constructs provided initial evidence of convergent validity (Barki & Hartwick, 2001). Three additional indicators of convergent validity were also evaluated here. First, convergent validity was indicated by statistically significant factor loadings that are at least 0.5 (Hair et al., 2006). Second, average percentage of variance extracted (AVE) among a set of items measures their degree of convergence (Fornell & Larcker, 1981). The AVE was computed as the mean squared factor loading, and a value less than 0.50 indicated the proportion of unexplained variance that remained in the items (error) was greater than the variance explained by the latent factor structure. Third, *reliability* is an indicator of convergent validity. For multiple-item measurement, reliable measures will all be consistent in their values. Internal consistency is a commonly used measure of reliability; indicators of a construct should be highly intercorrelated (Churchill, 1979). Item-to-total correlations > 0.50 and inter-item correlations > 0.30 provide some evidence of adequate item reliability. Cronbach's alpha and a CFA *construct reliability* measure⁴⁶ were both reported in this study; values > 0.6 were considered to be desirable (Hair et al., 2006). For the computation of Cronbach's alpha it is assumed that the items form a unidimensional scale and have equal reliabilities; if these assumptions are false, the reliability of the composite score may be underestimated by Cronbach's alpha (Gerbing & Anderson, 1988).

⁴⁶ For each construct, if the squared sum of the factor loadings is L and the total error variance is E, then $L/(L+E)$ is the *construct reliability* (Fornell & Larcker, 1981).

Discriminant validity is the extent to which measurement items hypothesized to reflect a construct differ from those that do not make up the construct. High discriminant validity provides evidence that a construct is unique; the phenomenon is captured accurately by the construct. CFA was used to assess discriminant validity by checking that the variance-extracted percentages for any two constructs were both greater than the square of the correlation estimate between those two constructs (Fornell & Larcker, 1981; Hair et al., 2006). This test indicated whether a construct explained its item measures better than it explained another construct. Also, correlations between constructs that are significantly less than 1.0 provide evidence of their discriminant validity (Bagozzi & Phillips, 1982).

Construct validity is also indicated when evidence of relationships between the target concept and other pertinent constructs is demonstrated. This set of theoretical relationships has been called a 'nomological net'. Nomological validity involves useful predictions involving many constructs within an articulated theory (Venkatraman & Grant, 1986; Clark & Watson, 1995). Chandler and Lyon (2001) found that few SME studies mentioned nomological validity.

A preliminary assessment of *nomological validity* was made by examining whether correlations between the constructs in the measurement model were the same sign as predicted by the literature. The relationships between theoretically derived concepts that have previously been measured with validated instruments and tested in a variety of situations should hold for the current study; this provides evidence of the existence of a nomological 'network' (Straub et al., 2004).

Unidimensionality. Achieving unidimensional measurement is crucial in theory testing (Gerbing & Anderson, 1988). A unidimensional set of measures has a single underlying construct (Clark & Watson, 1995; Gefen, 2003; Hair et al., 2006). Each indicator loads on one construct only, and all cross-loadings are assumed to be zero. Thus unidimensionality implies there is no correlation among the error terms. *Between-construct* error correlation (correlated errors between measures from different constructs) is evidence of significant cross-loading of measures. If specific error terms from measures that reflect the same construct are significantly correlated (*within-construct* error correlation), this indicates that there may be an unconsidered construct underlying the measures.

In this study, models with between-construct error correlation and cross-loadings were only accepted after careful theoretical and empirical consideration. This was because significant cross-loadings are evidence of a lack of unidimensionality.

Although model fit may be improved by allowing cross-loadings, unidimensionality and validity are compromised. A similar approach was adopted for within-construct error correlation. That is, limited and theoretically justified within-construct error correlation was allowed (Byrne, 2001; Tabachnick & Fidell, 2007).

The preferred approach for assessing unidimensional measurement is confirmatory factor analysis (CFA) of multiple-indicator measurement models (Anderson, Gerbing, & Hunter, 1987), each construct defined by at least two measures, each measure indicates only one construct. Internal consistency measures and high EFA loadings are less rigorous methods than those provided by CFA (Chau, 1997; Gefen et al., 2000). Unidimensionality is evaluated in CFA not only by the relations of the items on a scale with each other, but also with all other items in the model⁴⁷.

CFA was applied to test how well the *a priori* specification of factors represented the observed data, and to assess the unidimensionality, validity, and reliability of the measurement items.

Assessment of Internal Structures

Hypotheses 1, 2 and 3 from Table 8 required the specification and testing of the factorial structure of growth fitness, survival fitness and business performance respectively. This meant that some of the relationships of the respective measurement models were intentionally constrained. The nesting of models allowed further assessment of nomological validity independently of the measurement model assessment. Developing and evaluating a theoretical construct separately from its measurement model provided a superior and comprehensive confirmatory assessment of construct validity (Gerbing & Anderson, 1988).

Theoretical Construct. Initially, a set of theory-driven relationships between factors was specified. Some relationships in the measurement model were constrained to zero (specified as absent); some covariance relationships (two-headed arrows) were replaced by dependence relationships (one-headed arrows); and some covariance relationships remained unchanged (see Figures 10 and 11). All internal structural models specified in this study were recursive, that is, all paths proceeded only from a predictor (antecedent) construct to the dependent (outcome) construct. A nonrecursive relationship between two constructs implies that both are causal influences on each other, a situation that is

⁴⁷ Unidimensionality as specified by a multiple-indicator measurement model, is that each pair of indicators of the same factor covaries proportionally with all other indicators in the model (Gerbing et al., 1994).

unlikely with cross-sectional data (Hair et al., 2006). The theoretical framework described in Chapter 5 did not indicate the need to specify nonrecursivity; in addition nonrecursive models have problems with statistical identification. Thus nonrecursive models with feedback loops were not considered here.

The resulting paths were indicated on a path diagram which depicted the underlying regression equations that were to be solved for various parameters. Parameters for the model were estimated which minimized the difference between a population covariance matrix Σ and the sample covariance matrix S . Free parameters refer to relationships that were estimated by AMOS software. Fixed parameters (either constrained to zero or fixed at unity for identification purposes) were not estimated. The covariance matrix was thus constrained by using “the set of free and fixed parameters representing hypothesized relationships” (Hair et al., 2006: 851). The parameters representing the structural relationships between factors become the new focus of the modelling effort. There are two types of parameters: those describing the effect of an exogenous construct on an endogenous construct, and those that link endogenous to endogenous constructs (see page 113 for definitions). Some constructs thus play the role of both independent and dependent variables. Finally, as with conventional linear regression, each endogenous construct has a residual error term associated with it (Arbuckle & Wothke, 1995). For growth fitness and survival fitness, second-order internal structures were hypothesized, for business performance two related first-order factors were hypothesized. Once these changes had been made to their respective measurement models, the validities of three separate (internal) structural models were assessed.

Assessing Internal Structural Model Validity. First, overall goodness-of-fit was compared with that reported for the measurement model. The fit of the measurement model provided a baseline to assess the adequacy of the structural model. If the fit of the structured model was significantly worse than the measurement model, this was taken as an indication of invalid structure, whereas an insignificant change in chi-square suggested adequate structural fit.

Second, parameter estimates were examined to check that they were practically and statistically significant, and in the predicted direction. As with the measurement model, diagnostic information (standardized residuals, modification indices, and path estimates) were examined. If the model did not fit the data well, an attempt was made to discover how the model might be modified to fit the data better. However, respecification was conservatively approached, and “closely guided by a researcher’s substantive expertise” (Bollen, 1989:304).

There has been much debate in the literature regarding *post hoc* respecification of models to improve goodness-of-fit (Maruyama, 1998; Byrne, 2001). SEM techniques were initially intended to be used for model confirmation, not model development. Nevertheless, many SEM researchers (including Jöreskog, developer of LISREL), have reasoned that as long as the researcher acknowledges the exploratory nature of the analysis and the tentativeness of conclusions, probing into the reasons for a poorly fitting model is justified. Bentler & Chou (1987), Gerbing & Anderson (1988), Byrne (2001), and Hair et al. (2006) noted that model improvements must make theoretical sense and should be cross-validated. As discussed in the previous chapter, this study adopted a position on a confirmatory-exploratory dimension that was not strictly confirmatory. Nested competing models were conservatively⁴⁸ tested for model improvement. Problems that might arise with model modification were addressed by assessing criterion validity and by cross-validation.

Criterion Validity. Criterion validity is the degree of correlation between a measure and a criterion variable, ideally a ‘gold standard’ against which measurement may be judged. Predictive validity is demonstrated when items hypothesized to measure a construct correlate with an outcome variable that is gathered through a different technique (Straub et al., 2004), or if the criterion occurs in the future (Bollen, 1989). When the criterion and measure exist simultaneously, this is called concurrent validity.

Concurrent validity was assessed in this study by means of a criterion variable (Nunnally & Bernstein, 1994; Barki & Hartwick, 2001; Straub et al., 2004; Hair et al., 2006). Constructs that measured an SME owner’s global assessments of survival fitness, growth fitness and business performance were included in each internal structural model, but were not used later in the full structural models. That is, the overall perception of the respondent was measured and deployed as a criterion measure (Barki & Hartwick, 2001). High correlations between the hypothesized constructs with their respective criterion measures provided evidence of concurrent validity.

Cross-Validation. The structural models were also tested with a second group of respondents not involved in development of the measurement model. Cross-validation is particularly important for exploratory research (Hair et al., 2006), and for cross-sectional surveys (Byrne 2001). Cross-validation provides additional evidence that structural models are valid (Byrne, 2001). Cross-validation was assessed in this study with two samples drawn from the same population of SMEs. A group of original

⁴⁸ An alternative nesting procedure (Cagli, 1984) keeps various parameters fixed while setting the test parameter to zero, and also uses $df = 1$ instead of $df1 - df2$. Cagli reasoned that otherwise one is testing all deleted parameters.

nonrespondents (described page 127) was used as a sample to cross-validate the structural model. That is, the model was tested for group invariance by means of several increasingly restrictive tests which assessed the degree of equivalence across the original and the validation group. Hair et al. (2006: p.819-825) described a series of increasingly more rigorous tests⁴⁹ which progressively assess increasing equivalence; their approach was adopted here.

Assessment of Full Structural Models

The analysis aimed to test hypotheses that link organizational fitness with business performance. The hypotheses examined here proposed direct and indirect effects between organizational fitness and business performance. The hypothesized causal relations were grounded in theory, so that analysis was strictly confirmatory.

Causal Structures. The causal structures to be tested by SEM hypothesized theoretical relationships between organizational fitness and business performance. Structural models for growth fitness and business performance were integrated into a full structural model that linked both concepts (Figure 13); similarly, structural models of survival fitness and business performance were integrated into a full structural model (Figure 14). All constructs were identified as either exogenous or endogenous.

Two approaches are possible when testing structural theory (Hair et al., 2006). First, the full structural models might be tested by constraining all factor loading estimates to those that have been earlier estimated. The approach assumes stable measurement parameters, and only structural loadings are estimated. This perspective emphasizes the “positivistic notion of independence between theory and data” (Chin & Marcolin, 1995:33). This view supposes that measures of organizational fitness established as valid will remain so even when linked with a construct of business performance in the context of a causal model.

A second and more common approach allows all parameters in the full model to be freely estimated (loadings, error variance terms and structural model coefficients). This is a ‘clean slate’ approach that analyses the full set of measures simultaneously for the theoretical context in which they are to be applied. The second approach was adopted in this study. This approach lies at the heart of SEM modelling strategy: theory and data are seen to interact. The validity and reliability of indicators can change when

⁴⁹ *Loose cross-validation*: model fits with validation sample. *Factor structure equivalence*: Model fitted with data from both groups simultaneously. *Factor loading equivalence*: Loading estimates are constrained to be equal in each group. *Tight cross-validation* requires loading estimates and error variance equivalence (Hair et al., 2006).

“embedded in a theoretical context as opposed to a separate atheoretical components analysis” (p.37). The situation where measurement model loadings do change with the structural model is called *interpretational confounding* (Hair et al., 2006). Interpretational confounding is indicated when factor loadings alter significantly from the measurement model to the full structural model. Thus, after performing SEM, standardized loading estimates were examined for large variation, which might indicate interpretational confounding.

Each model was assessed for overall goodness-of-fit. The procedure was described earlier this chapter. Parameter estimates were examined to check that they remained both practically and statistically significant, and in the predicted direction. As with the measurement models, diagnostic information (standardized residuals, modification indices, and path estimates) was examined.

Test for Direct Effects: (H4, H7). Direct effects between organizational fitness and business performance were indicated by high and significant path coefficients. Further, a chi-square difference test was conducted comparing two nested models. Model 0 had the direct effect constrained to zero; Model 1 allowed the path loading to be freely estimated. A significant chi-square difference is evidence of a direct effect between the constructs.

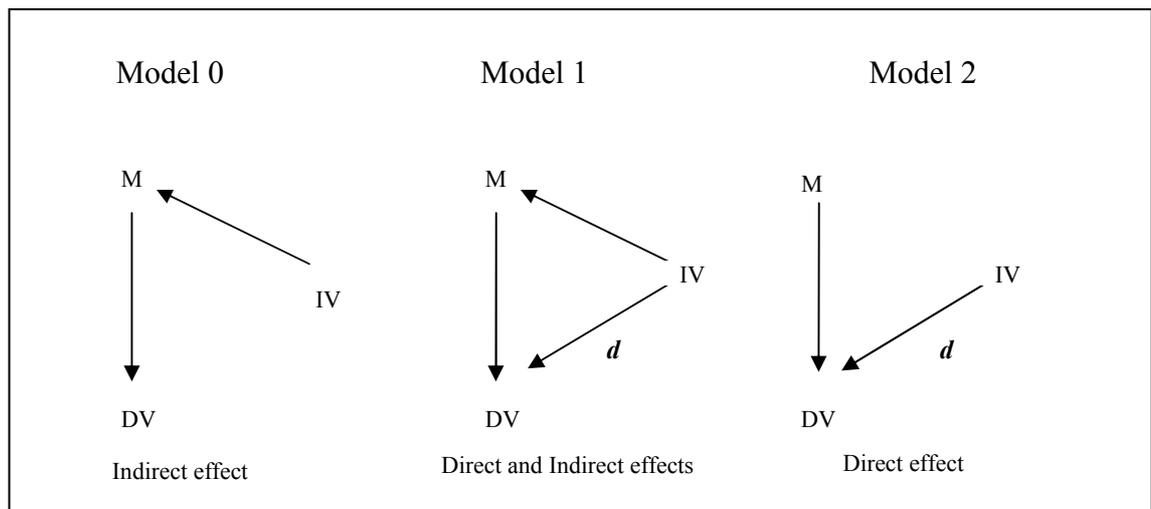
Test for the Invariance of a Causal Structure: (H5, H8). Hypotheses 5 and 8 tested the *invariance* of a causal structure of a full structural equation model. Five variables were considered as potential moderator variables. A moderator variable affects the direction and/or strength of the relationship between a predictor and a dependent variable (Baron & Kenny, 1986). At the firm level, it was hypothesized that size, age, administrative intensity, ambidexterity, and ownership type might affect the relationship between organizational fitness and business performance. The five categorical variables *Size2*, *Age2*, *Ownsr2*, *Intensity2*, and *Ambi2* (described in measures section of Chapter 7) were utilized here. Thus hypotheses tested whether the causal structure for smaller SMEs replicated for larger SMEs; for younger SMEs replicated for older SMEs; less ambidextrous SMEs replicated for more ambidextrous SMEs; and whether a structural model that fits SMEs with low administrative intensity also fits SMEs with higher administrative intensity. The procedure to test for moderation of effects followed Hair et al. (2006). That is, a model fitted with data from both groups simultaneously was compared with a model where loading estimates were constrained to be equal in each group.

Test for Indirect Effects: (H6, H9). Hypotheses 6 and 9 examined the presence of significant indirect effects between organizational fitness and business performance. In particular, it was tested whether survival performance mediates the effect of organizational fitness on growth performance.

Baron & Kenny (1986) defined a mediating variable as one that intervenes in the relationship between an independent variable (IV) and a dependent variable (DV). A mediating variable helps to explain how or why the IV has an effect on the DV. The procedure for testing whether an effect is mediated first assessed whether the loading between the IV and DV remained significant and unchanged when the mediator was introduced into the model. In this case, mediation was not supported.

Next, three nested models were compared. Model 0 constrained to zero the path weight d of the direct effect between the IV and the DV (Figure 15). Model 1 has the addition of a path between IV and DV, that is Model 1 allowed both direct and indirect effects. Model 2 allowed only a direct effect of IV on DV.

Figure 15: Comparison of Three Models for Mediated Effects



Full mediation is indicated by an insignificant Δ chi-square between Model 0 and Model 1 of Figure 15. That is, addition of path d does not improve fit (and deleting d does not harm fit). Further, if the path loading d is significant in Model 2 and becomes insignificant in model 1, this confirms full mediation.

Full mediation is not supported for a significant Δ chi-square between Model 0 and Model 1. In this case, if d is reduced but remains significant when comparing Model 2 with Model 1, then *partial* mediation is supported (Hair et al., 2006).

Summary. The realized sample of 381 SMEs had a median age of 20 years and median size of 17 FTE. Almost 40% of the sample had single owners, and typically

there were 1-2 in the active management team. Roughly half of the sample was either manufacturers or retailers. A check for nonresponse bias and representativeness did not reveal any problems. To check nonresponse bias, 285 early, 96 late, and 41 nonrespondents were compared by means of ANOVA. The three groups showed no differences on a range of variables. A check of representativeness showed that compared to NZ SMEs, manufacturers, and larger firms were slightly overrepresented.

Section two described how the measures were developed and specified, beginning with 76 items found in the academic literature. These items were supplemented with items from the practitioner literature to give 114 items that were subsequently refined to 79 items by a process that involved a variety of expert judges.

Growth Fitness was operationalized with three dynamic capabilities: knowledge acquisition, knowledge assimilation, and knowledge transformation. Survival Fitness was operationalized by means of coordination capabilities, socialization capabilities, and formalization and routinization capabilities. Business Performance was operationalized by combining importance and performance for growth and profitability, while ambidexterity was operationalized with simultaneous alignment and adaptability. Finally, three criterion variables that allowed the assessment of concurrent validity were operationalized as holistic overall perceptions.

Exploratory factor analysis found that all constructs were valid and reliable. An exception was that formalization and routinization had several crossloadings and insignificant loadings, which resulted in a refined *systems capabilities* factor. Systems capabilities were defined as capabilities that provide a memory for handling routine situations. Further, EFA suggested that common method variance bias and external consistency were not problematic. The final section of the chapter described how testing of covariance models was implemented for both direct and indirect effects. Models were assessed for fit and validity by means of SEM.

Chapters 5, 6, and 7 described how theory was developed, the research methodology adopted and the quantitative research methods deployed in this study. A summary of validity heuristics that were used in this study is shown in Table 17.

Table 17: Validity Heuristics

Validity Component	Technique	Heuristic	Source
Construct validity			
Content	Expert panels; judges; literature review	Consensus	Sekaran (2003)
Discriminant	PCA	Eigenvalues > 1, Scree test, Variance explained > 60% cross-loadings < 0.40	Sharma (1996), Hair et al. (2006), Tabachnick & Fidell (2007)
	SEM	CFI > .92, GFI > 0.90, RMSEA < 0.07, normed chi-square < 3 t-values > 1.96 AVE > squared correlations between constructs r < 1	Fornell & Larcker (1981), Bagozzi & Phillips (1982), Clark & Watson (1993) Byrne (2001), Hair et al. (2006)
Convergent	Correlations	r > 0.3; p < 0.05	Barki & Hartwick (2001)
	PCA	Eigenvalue > 1, Scree test, variance explained > 60%, loadings > 0.5	Sharma (1996), Hair et al. (2006), Tabachnick & Fidell (2007)
	SEM	factor loadings > .05 (p < 0.05), AVE > 0.5	Byrne (2001)
Nomological	Comparison with nomological nets Correlations		Straub et al. (2004), Clark & Watson (1993)
Unidimensionality	SEM	GFI > 0.90	Gefen (2003), Hair et al. (2006), Anderson, Gerbing, & Hunter (1987)
External Validity			
Concurrent	Correlation	r > 0.7	Barki & Hartwick (2001)
Cross validation	Multigroup SEM		Hair et al. (2006)
Internal Validity			
Common Methods	Second-order CFA Harman's One-factor	Significant chi-square difference	Williams & Anderson (1994), Podsakoff & Organ (1986)
Reliability			
Internal Consistency	Cronbach's Alpha	> 0.60	Churchill (1979), Gefen (2003), Hair et al. (2006)
	SEM Composite Reliability Coefficient	> 0.60	
External Consistency	Unidimensionality of each construct		Gerbing & Anderson (1988)

PART 4: ANALYSIS AND RESULTS

Chapter Eight: Findings

Section One describes the results of data screening. The structure of the remainder of the chapter parallels the development of theory presented in Chapter Five. Thus section Two describes the results for measurement and internal structure of the independent fitness constructs, growth fitness and survival fitness. Section Three contains the findings for the measurement and internal structure of the dependent business performance construct. Section Four contains results of hypotheses that test structural links between organizational fitness and business performance. Guidelines suggested by Boomsma (2000) for reporting results of structural equation models are followed in this chapter.

DATA SCREENING

This section describes how characteristics of the data were examined for consistency with distributional assumptions. First, individual variables were checked for normality by means of both univariate and multivariate procedures. Then data assumptions were checked for variates, by means of both univariate and multivariate procedures.

Data Screening of Individual Variables

Outliers. A single low outlier with $z < -4$ was observed for only 12 of the 74 ordinal variables. Further, the 12 outliers came from different cases. Since there was minimal evidence of univariate outliers, the initial decision was to retain all data. Next, Mahalanobis D^2 distances were generated for each case⁵⁰ using SPSS Regression with *case number* as the dependent variable and all non-demographic measures as independent variables. Higher D^2 values represent potential multivariate outliers. Examination of D^2 values for all cases did not suggest the presence of multivariate outliers⁵¹, so all observations were retained for analysis.

Normality. Twelve of the 74 variables were moderately negatively skewed, with skewness < -1 , although none of these had skewness < -2 . The standard error of skewness was 0.125, so these twelve variables were statistically significantly skewed at

⁵⁰ For details, see Tabachnick & Fidell (2007: p.99-100).

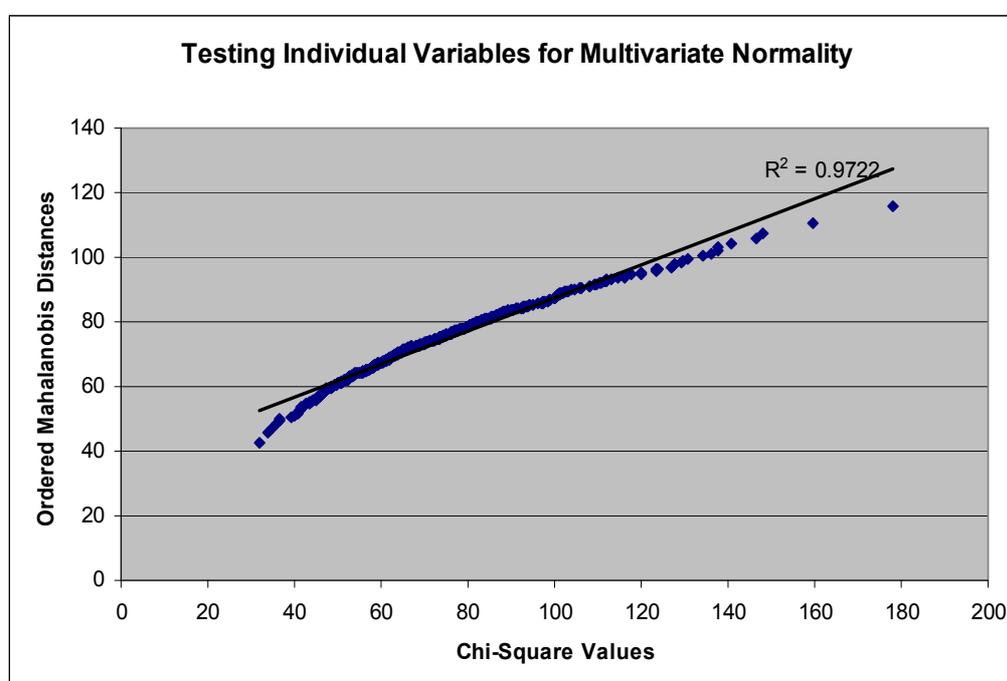
⁵¹ The calculation of the value D^2/df identifies outliers through a test of statistical significance, since D^2/df is approximately distributed as a t-value. $df = 74$, the number of variables. Hair et al. (2006) recommend a threshold value of 3.5 that must be exceeded before the case can be considered a multivariate outlier in a reasonably large sample (p.75). The largest value of D^2 for any case was 178.08, giving $D^2/df = 2.4$, below this threshold.

the 5% level. Fourteen variables had positive kurtosis > 1 . More seriously, four showed negative kurtosis < -1 .

The power of univariate tests is not severely affected if non-normality is solely due to skewness, however excessive kurtosis does seem to have an effect (Sharma, 1996). In particular, negative kurtosis (a flat distribution) has a more severe effect. Thus there was evidence of some univariate nonnormality (4 out of 74 variables with moderate negative kurtosis). The usual remedy of transformation of the data was not considered appropriate here, since the data were ordinal.

Multivariate normality of the individual variables (see Figure 16) was checked using the procedure described in Chapter 6 (Sharma, 1996: 380-382).

Figure 16: Multivariate Normality



The plot in Figure 16 is reasonably linear. The correlation coefficient of the plot is 0.985. This value exceeds the critical value⁵² of 0.983 ($\alpha = .05$, $n = 74$), so the data likely came from a multivariate normal distribution (Sharma, 1996).

In summary, some individual variables had moderately non-normal distributions, although overall the data appeared to have a multivariate normal distribution. This is unusual since evidence of univariate nonnormality often (but not always) suggests multivariate nonnormality. In the present context, since the data are ordinal with only six discrete values, since hypothesis testing in this study was multivariate in nature, and

⁵² Probability Plot Correlation Coefficient Test for Normality (Sharma, 1996:466, Table T.5).

since less than 10% of the variables had moderate negative kurtosis, normality of the individual variables was assumed.

Homoscedasticity and Homogeneity of Variance. Most individual variables were measured at the ordinal level, so homoscedasticity was not evaluated by means of bivariate plots. Levene's test of homogeneity of variance was assessed for four categorical variables: *Firm Age* (four categories: 0-5; 5-9; 10-19; 20+ yrs); *Firm Size* (four categories: 6-9; 10-19; 20-49; 50-99 employees); *OwnershipType* (four categories); and *Industry* (six categories)⁵³. Results are summarized in Table 18 which shows the level of significance of the Levene statistic.

Table 18: Homogeneity of Variance: Levene Statistic

	Survival Performance	Growth Performance	Performance Index
Firm Age	$F_{3,377} = 1.517, ns$	$F_{3,377} = 4.822, p < .05$	$F_{3,377} = 2.611, ns$
Firm Size	$F_{3,377} = 0.655, ns$	$F_{3,377} = 0.567, ns$	$F_{3,377} = 0.029, ns$
Industry	$F_{6,374} = 1.217, ns$	$F_{6,374} = 0.998, ns$	$F_{6,374} = 0.741, ns$
Ownership Type	$F_{3,374} = 0.329, ns$	$F_{3,374} = 0.752, ns$	$F_{3,374} = 0.612, ns$

Levene's test of homogeneity of variance in Table 18 was not significant, except for *Growth Performance* across the four *Firm Age* categories. Closer examination revealed that the ratio of the largest cell variance to the smallest was $1.34/0.81 = 1.66$, with similar cell sizes. This ratio is well within acceptable limits (Tabachnick & Fidell, 2007: 86). Thus variances of dependent variables across categories of the predictor variables were found to be similar.

Data Screening of Variates

Normality. First, skewness and kurtosis values were assessed (Table 19), and the general shapes of histograms were examined. None of the values in Table 19 in the first two columns have an absolute value greater than one, indicating little suggestion of univariate nonnormality.

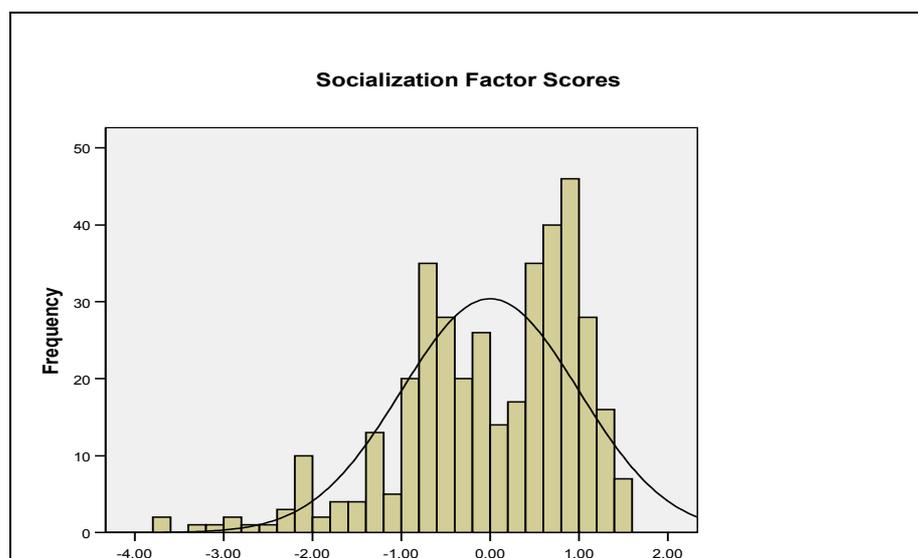
⁵³ The original ten industry categories were collapsed into six categories: Wholesale/ Retail Trade, Manufacture, Construction, Agriculture/Forestry/Fishing, Personal Services, Transport/Storage, and Other Services.

Table 19: Skewness and Kurtosis of Variates

	Skewness (St. Error = 0.125)	Kurtosis (St. Error = 0.249)	Kolmogorov- Smirnov Z
Adaptability	-.743	.959	1.69
Alignment	-.562	-.059	2.17
Ambidexterity	-.510	.416	1.13
Survival Performance	.247	-.301	.70
Growth Performance	.139	-.256	.62
Performance Index	.248	-.449	1.03
Assimilation	-.407	.220	.99
Acquisition	-.181	-.674	.94
Transformation	-.735	.943	1.52
Systems	-.204	-.364	.64
Socialization	-.890	.721	2.23
Coordination	-.539	.349	1.09

A Kolmogorov Smirnov z test was conducted to provide additional evidence of univariate normality (Tabachnick & Fidell, 2007:80). Generally, a z-value above 2.58 signals that normality can be rejected at the 1% level of significance. (Hair et al., 2006). The highest z-value observed is 2.23 for *socialization* (third column of Table 19); the histogram of *socialization* with superimposed normal curve is shown in Figure 17.

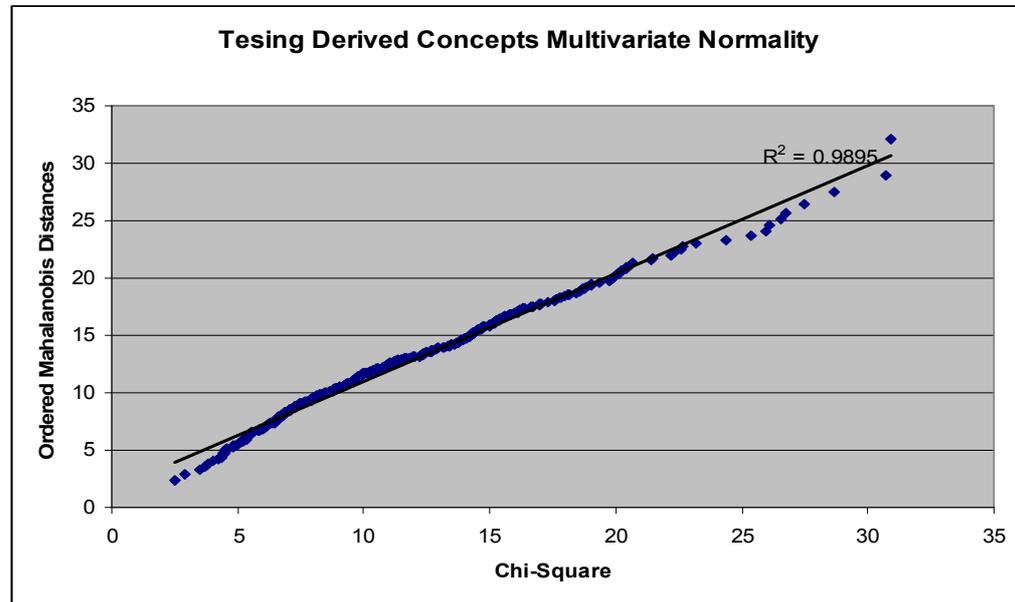
Figure 17: Socialization Scores



The ‘worst-case’ histogram in Figure 17 was non-normal, but not remarkably so. It was decided not to transform the measure since underestimation of variance associated with positive kurtosis diminishes with sample sizes over 200 (Tabachnick & Fidell,

2007). Normality of the variates was then tested from a multivariate perspective (Figure 18).

Figure 18: Multivariate Normality of Variates



The plot in Figure 18 shows very little suggestion of curvature. The correlation coefficient of the plot is 0.995. This value exceeded the critical value of 0.926 (alpha = .05, $n = 12$), so the data likely have a multivariate normal distribution (Sharma, 1996).

Homoscedasticity, Homogeneity of Variance, and Box's M Test. A total of 27 scatterplots of three dependent variates of Table 19, namely *Performance Index*, *Survival Performance* and *Growth Performance* with the other nine variates as predictors, were examined for homoscedasticity. All indicated that the variability in dependent variate scores was roughly the same at all values of each predictor variate.

Homogeneity of variance statistics for five categorical variables *Intensity2*; *Ambi2*; *Age2*; *Owner2*; *Size2*, are summarized in Table 20. The Levene statistic was generally not significant, indicating that homogenous variances may be assumed. There were two exceptions, for *Growth Performance* and *Performance Index* across the *Age2* categories. However, closer examination revealed that the ratio of the largest cell variance (older SMEs) to the smallest (younger SMEs) was $1.17/0.806 = 1.45$ for *Growth Performance*, and $510.6/375.9 = 1.36$ for *Performance Index* with similar cell sizes. This ratio was deemed to be well within acceptable limits (Tabachnick & Fidell, 2007: 86).

Table 20: Homogeneity of Variance for Grouped Variables

	Survival Performance	Growth Performance	Performance Index
Intensity2	$F_{1,379} = 0.654, ns$	$F_{1,379} = 0.964, ns$	$F_{1,379} = 0.006, ns$
Ambi2	$F_{1,379} = 2.797, ns$	$F_{1,379} = 0.407, ns$	$F_{1,379} = 2.995, ns$
Age2	$F_{1,379} = 3.018, ns$	$F_{1,379} = 8.350, p < .01$	$F_{1,379} = 6.247, p < .05$
Size2	$F_{1,379} = 0.001, ns$	$F_{1,379} = 0.036, ns$	$F_{1,379} = 0.877, ns$
Owner2	$F_{1,379} = 0.654, ns$	$F_{1,379} = 0.964, ns$	$F_{1,379} = 0.006, ns$

Finally, a Box's M test was performed by specifying all three dependent variates in a multivariate assessment⁵⁴ of the homogeneity of variance-covariance matrices. None of the results were significant, except for the *Age2* grouping: *Age2* ($M = 16.68, F = 2.75, p < .05$); *Intensity2* ($M = 3.113, F = .514, ns$); *Ambi2* ($M = 4.50, F = .744, ns$); *Size2* ($M = 2.011, F = .332, ns$); *Owner2* ($M = 4.659, F = .770, ns$).

In sum, there was little evidence to suggest that the assumption of homoscedasticity was not reasonably satisfied by the dataset.

Linearity and Multicollinearity. Multicollinearity is a problem that occurs when variables are highly correlated ($>.90$); the sizes of error terms become inflated (Tabachnick & Fidell, 2007). Correlations between the variates were calculated (see Appendix D, Table 41). None of the correlations in Table 41 were above 0.80, thus this preliminary analysis did not suggest that any of the variates were redundant. Finally, scatterplots were examined and little suggestion of excessive non-linearity was found.

In summary, individual variables and variates were tested for basic distributional assumptions before testing relationships between constructs. Overall, the data screening process concluded that the data was suitable for further multivariate analysis.

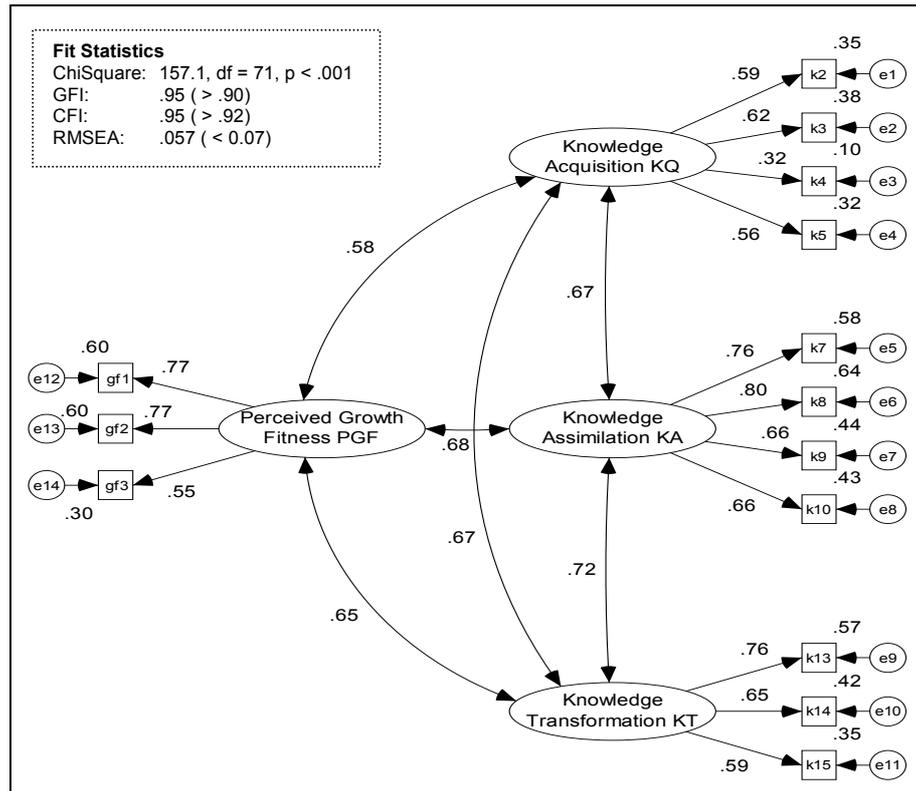
INDEPENDENT CONSTRUCT: GROWTH FITNESS

Measurement Model

Confirmatory factor analysis was performed where three factors, knowledge acquisition, knowledge assimilation, and knowledge transformation derived from EFA (Chapter 7) were allowed to correlate freely with each other. The path diagram together with standardised parameter estimates is shown in Figure 19.

⁵⁴ The SPSS General Linear Model procedure was utilized for this analysis.

Figure 19: Measurement Model of Growth Fitness



The measurement model (Figure 19) hypothesized that three hypothesized growth fitness dimensions of knowledge acquisition, assimilation and transformation were correlated, as represented by the two-headed arrows. Included in the model was a factor measuring overall growth fitness as perceived by the respondent. These are all unobserved constructs and are thus enclosed by ovals. Fourteen measures⁵⁵ (enclosed by rectangles) were specified, each with a nonzero loading on the factor it was designed to measure, and zero loading on other factors. Thus each indicator was identified with a unique construct. Error variables (enclosed by ovals because they are not directly observed) represent a composite of any influences on the observed measures that are not measured in this study. For example, in Figure 19 the single-headed arrow leading from knowledge acquisition to item K2 shows that K2 scores depend only in part on knowledge acquisition; specifically the hypothetical ‘knowledge acquisition’ construct accounts for 35% of the variance in scores for item K2. Alternatively, the path coefficient (loading) that describes the impact of K2 on knowledge acquisition is 0.59 (Arbuckle, 1995). As Figure 19 shows, the model is specified so that that measurement error associated with each indicator is uncorrelated with measurement error from other indicators (Byrne, 2001).

⁵⁵ For a correlation matrix of the measures see Table 50, Appendix J

Assessing Overall Fit. Key fit statistics are summarized in the top left corner of Figure 19. There are 71 degrees of freedom (105 distinct sample moments less 34 parameters estimated. The 4 construct variances and 14 error variances are not shown for visual clarity). Thus normed chi-square = $(157.1/71) = 2.21$, GFI = .95, CFI = 0.95 all suggested the model is plausible. The RMSEA index is acceptably low at $\epsilon = .057$, with a 90% C.I. for $\epsilon = (0.045, 0.068)$. As described in Chapter 6, a C.I. for ϵ provides a test of *close fit* (C.I. straddles 0.05), and *not-close fit* (entire C.I. lies above 0.05). Thus for the growth fitness measurement model, a hypothesis of *close fit* $\epsilon < 0.05$ was accepted, and *not-close fit* $\epsilon > 0.05$ was rejected. Further, the model had a suitably low Root Mean-square Residual (RMR) value of 0.059, with an acceptable largest standardized residual of -2.0. There was thus evidence to suggest that the growth fitness measurement model had adequate overall goodness-of-fit.

Construct validity. The CFA provided a test of convergent validity for each of the sets of items that measured each construct. All path estimates were significant at the 1% level, and loadings between measured variables and factors were generally greater than 0.5. Indicators loaded significantly on their hypothesized construct, indicating adequate levels of *convergent validity* (Bagozzi & Phillips, 1982; Barki & Hartwick, 2001).

The AVE (average variance extracted) values are shown in Table 21 as shaded diagonal cells. Two of the four sets of items had AVE less than 0.5. Thus indicators of knowledge acquisition (KQ) shared a low proportion of variance (0.30), which suggested questionable convergent validity for knowledge acquisition⁵⁶. Construct reliabilities (shown on the right side of Table 21) were generally high, although construct reliability of 0.61 for KQ was only marginally acceptable (Hair et al., 2006).

Table 21: AVE and Squared Correlations: Growth Fitness

	PGF (Perceived Growth Fitness)	KQ (Knowledge Acquisition)	KA (Knowledge Assimilation)	KT (Knowledge Transformation)	Construct Reliability
PGF	.50				.74
KQ	.33	.30			.61
KA	.46	.44	.53		.80
KT	.42	.44	.51	.45	.71

Also shown in Table 21 in the off-diagonal, unshaded cells, are the squared correlations between factors. The degree of discriminant validity was assessed by

⁵⁶ Clearly, the weakest indicator was K4 (see Figure 19), which assessed how frequently employees seek outside knowledge. Although model fit would be improved numerically by dropping K4, it was considered to be of theoretical importance to the construct of *knowledge acquisition*, and the item was retained.

comparing each construct AVE with its squared correlations with other constructs. For example, AVE for PGF = .50 which exceeded the squared correlations of PGF with other constructs; thus the items measuring *perceived growth fitness* explained their hypothesized factor better than they explained other factors. This validity ‘rule of thumb’ was satisfied by PGF, KA and KT, but not by KQ. However, all of the correlations in Figure 19 were significantly less than one, which suggested a reasonable overall degree of discriminant validity. Figure 19 shows that the goodness of fit index GFI exceeded a threshold level (GFI = 0.95), evidence of unidimensionality (Gerbing et al., 1994).

Nested Models. The plausibility of three dimensions of growth fitness for SMEs (as opposed to, for example, a single dimension) was assessed in a nested modelling process. Thus a further test of the measurement model was made by comparing four nested models (Barki & Hartwick, 2003), as described in Chapter 6.

In Model 1, all items were loaded onto a single factor (see Table 22). Thus Model 1 hypothesized that the items do not differentiate any underlying dimensions. As anticipated, Model 1 had a relatively poor fit (normed chi-square = 4.49; RMSEA = 0.096).

In Model 2 there were two factors, one for PGF items and one for hypothesized growth fitness items.

In Model 3, items were loaded onto a PGF factor and two other factors: *knowledge acquisition-assimilation*, and *knowledge transformation*.

Finally, Model 4 was the realized model of Figure 19.

Table 22: Nested Sequence of Growth Fitness Measurement Models

Model	Description	GFI	ECVI	Chi-square	df	Δ Chi-square	Δ df	p
1	Single factor: (KA+KQ+KT+PGF)	.88	1.05	345.9	77			
2	Two factors: (PGF)(KA+KQ+KT)	.91	.84	260.5	76	85.4	1	< .001
3	Three factors: (PGF) (KT) (KA+KQ)	.92	.73	216.7	74	43.8	2	< .001
4	Four factors: (PGF) (KA) (KQ) (KT)	.95	.59	157.1	71	59.6	3	< .001

The comparison of models in Table 22, shows that Model 4 (the realized model) fitted the data best of the four models with the highest GFI (0.95) and the lowest ECVI

(0.59). Further, Model 4 had a significant chi-square difference to Model 3 (which in turn fitted significantly better than Model 2 and Model 1).

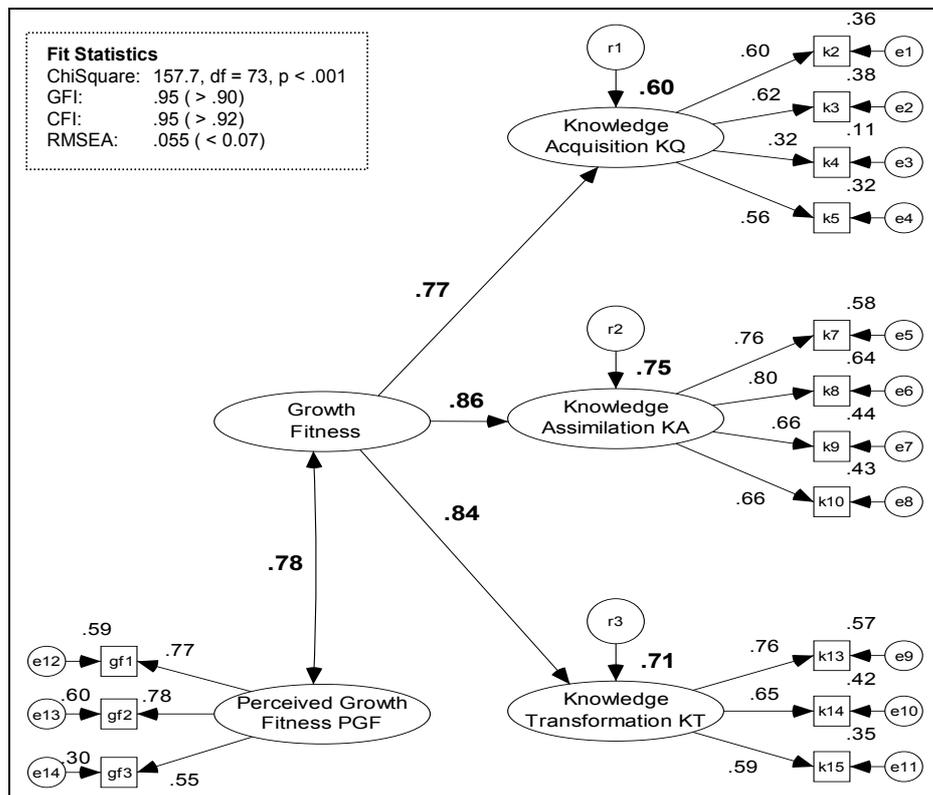
Summary. Overall, the results described in this section provided support for the theorized measurement model: responses to the instrument are explained by three growth fitness factors: *knowledge acquisition, knowledge assimilation, and knowledge transformation*, and an overall criterion factor of *perceived growth fitness*.

Internal Structural Model: Growth Fitness (GF)

The measurement model of Figure 19 was modified by replacing covariance relationships between the three fitness dimensions with dependence relationships on a second-order growth fitness construct. Three residual error terms were added to the resulting endogenous constructs.

The internal structural model thus specified three *facets* (Gerbing et al., 1994) of a *growth fitness* construct. Organizational growth fitness was operationalized as a second-order factor, with the facets as indicators. Each first-order factor was assumed to be a function of two components: a component that is shared with the other primary factors (corresponding to growth fitness) and a unique (residual) component. The standardised parameter estimates are shown in Figure 20.

Figure 20: Second-Order Growth Fitness



Assessing Fit. There are 73 degrees of freedom (105 distinct sample moments less 32 parameters estimated. The 2 construct, 3 residual and 14 error variances are not shown). Goodness-of-fit indices (normed chi-square 2.16, CFI = 0.95, GFI = 0.95) all indicated acceptable fit. The RMR = 0.059 and the largest standardized residual was 2.2. Importantly, a 90% C.I. for $\varepsilon = (0.043, 0.067)$ indicated that a hypothesis of *close fit* is not rejected. There was evidence that a second-order structure for growth fitness is plausible.

Construct validity. First-order factor loadings were all significant and averaged 0.64, while second-order factor loadings were 0.77 for knowledge *acquisition*, 0.86 for knowledge *assimilation*, and 0.84 for knowledge *transformation*. As shown in Figure 20, the squared multiple correlations (SMC) were 0.60, 0.75 and 0.71. For example, 60% of the variance in knowledge acquisition was explained by a higher-order construct (growth fitness); these SMC values provide additional evidence of model validity.

The AVE of *growth fitness* was 0.68. Thus on average over two-thirds of the variance in the first-order constructs was accounted by a second-order growth fitness construct. Further, the target coefficient (T) was calculated (Marsh & Hocevar, 1985). T is the ratio of the chi-square of a first-order model to the chi-square of the more restrictive second-order model. $T = 0.996$ (upper bound is unity)⁵⁷ suggested the second-order model was appropriate.

Nested Models. A further test of the internal structural model was made by the comparison of two nested models. The growth fitness measurement model (Figure 19) provided a useful baseline to assess the fit of the second-order structural model shown in Figure 20. That is, the first-order model (Model 1) was compared with the second-order (Model 2). The comparison of models 1 and 2 (see Table 23) showed that ECVI, a parsimony-adjusted index used for model comparison, decreased slightly from 0.593 to 0.583. Further, the RMSEA of Model 2 was slightly lower (.055) than Model 1 (.057). Small values for each of these indices are desirable for good fit.

Table 23: Nested Model Comparison: Growth Fitness

Model	Description	Chi-square	df	p	GFI	RMSEA	ECVI	Δ Chi-square	Δ df	p
1	First Order	157.1	71	<.001	0.95	0.57	0.593			
2	Second Order	157.7	73	<.001	0.95	0.55	0.583	0.6	2	> .25

⁵⁷ The goodness-of-fit of a second-order model can never be better than the corresponding first-order model.

Comparing the two models resulted in an insignificant chi-square difference (Δ chi-square = 0.6, Δ *df* = 2, $p > 0.25$) which was strongly suggestive of an adequate fit by the second-order model (Hair et al., 2006).

Criterion. The correlation between growth fitness and a criterion variable of overall perceived growth fitness was 0.78 (Figure 20). This value indicated a degree of *concurrent validity* and provided support for H1 (Barki & Hartwick, 2001). Thus the growth fitness construct was positively correlated with a criterion variable that assessed the SME owner's overall perception of growth fitness.

Cross-Validation. The model was also tested for across-sample validity. The hypothesized second-order model for growth fitness was fitted to two different samples of SMEs. The first group, labelled *early*, consisted of the 285 early respondents. The second group, labelled *late*, consisted of 96 late respondents and 42 original nonrespondents, resulting in a total group size of 138. Thus nearly one third of *late* were holdout observations that had not been included in the modelling process, introducing a degree of independence into the comparison. A series of increasingly constrained nested models were evaluated for fit (described in Chapter 6). The results are shown in Table 24.

Table 24: Cross-Validation Indices for Growth Fitness

Model description	ChiSq	df	RMSEA	Comments	Δ Chi-square	Δ df	p
1. Loose Cross-Validation: Early	148.7	73	0.06	<i>close fit</i>			
	Late	96.3	73	0.05	<i>close fit</i>		
2. Factor Structure Equivalence	245.0	146	0.040	<i>close fit</i>			
3. Loading Equivalence	260.3	154	0.040	<i>close fit</i>	15.3	8	> .05
4. Covariance Equivalence	264.3	159	0.040	<i>close fit</i>	4.0	5	> .05
5. Error Variance Equivalence	277.8	173	0.038	<i>close fit</i>	13.5	14	> .05

The first two rows of Table 24 show that loose cross-validation (Hair et al., 2006) was established by separately applying SEM to the *early* responding group of SMEs, and then to the *late* SMEs. Goodness-of-fit statistics were adequate for each group. Thus *Early (Late)* normed chi-square = 2.03 (1.32); CFI = 0.93 (0.96); RMR = 0.06 (0.08); RMSEA = 0.06 (0.05).

Next, the model was estimated for both groups simultaneously for factor structure equivalence (Number 2, Table 24). A 90% C.I. for ϵ is (0.031, 0.049), so a hypothesis of *close fit* $\epsilon < 0.05$ was not rejected. The same structure was thus appropriate for each

group of SMEs. Next, three progressive tests were performed: factor loading equivalence was tested by constraining the factor loading estimates to be equal for both groups; covariance equivalence was tested by additionally constraining all interfactor loadings to be equal across the two groups; and finally error variance equivalence was tested by additionally constraining the fourteen error variances to be equal for both groups. As shown in Table 24, none of the increasingly rigorous tests were significant at the 5% level, as would be evidenced by a significantly worsened chi-square value. Each progressive test supported cross-validation; one group's results were cross-validated fully by a subsequent sample.

Summary. The results reported in this section provided support for Hypothesis 1: SME growth fitness is a second-order construct that is positively reflected by knowledge acquisition, knowledge assimilation and knowledge transformation.

INDEPENDENT CONSTRUCT: SURVIVAL FITNESS

Measurement Model

CFA was performed where three hypothesized dimensions of survival fitness (*coordination*, *socialization* and *systems capabilities*) were allowed to correlate freely with each other, and with a criterion variable *perceived survival fitness*⁵⁸. The model showed reasonable fit for most indices, however a RMSEA test of *not-close* fit was significant. That is, a 90% C.I. for $\epsilon = (0.056, 0.075)$ lay entirely above 0.05. Thus it was unlikely that a model with all error items uncorrelated had a close fit.

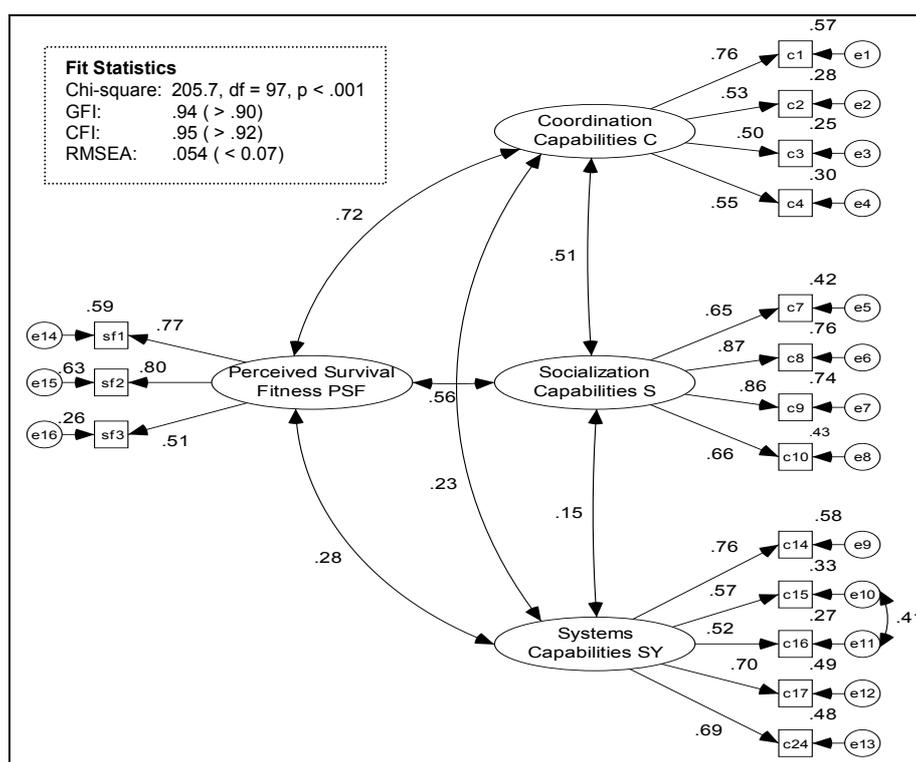
Examination of the modification indices showed the overall chi-square for the model would decrease by 20.67 by freeing the path previously constrained to zero between the unique error terms for two *systems capabilities* items, C15 and C16. The question therefore was: could a correlated error term between C15 and C16 be theoretically justified?

As discussed in Chapter 6, specification of correlated error terms for purposes of achieving a better fitting model is not desirable; any process that is data driven is inherently susceptible to capitalization on chance (MacCallum, Roznowski, & Necowitz, 1992). However, it seemed that a case for modification existed here. Each of the two items refers to *written* records and job descriptions: the two items may thus be emphasizing concrete, tangible procedures rather than procedures that are understood

⁵⁸ For a correlation matrix of the measures see Table 51, Appendix J.

but not formalized. Limited and theoretically justified *within-construct* error correlation has been allowed by others (Byrne, 2001; Tabachnick & Fidell, 2007). Implementation of the correlated error modification resulted in an improvement (drop) in the ECVI (0.879 vs. 0.749) value. Further, the difference in fit between the two nested models was statistically significant (Δ chi-square = 52.5, $df = 1$, $p < .001$). Thus the two errors were allowed to correlate in the realized model, which is shown with standardised estimates of the coefficients in Figure 21.

Figure 21: Measurement Model of Survival Fitness



Assessing Overall Fit. The CFI value of 0.95, and GFI of 0.94 provided evidence of good fit. This was supported by a reasonably low normed chi-square, within bounds at 2.12. A 90% C.I. for ϵ was (0.044, 0.066). Thus for the model of Figure 21, a hypothesis of *close fit*, $\epsilon < 0.05$ was not rejected. The RMR value was 0.08, slightly larger than desirable, however, none of the standardized residuals were greater than four, the threshold suggested by Hair et al. (2006). Correlations between the factors were all significant ($t > 2.5$). There was little evidence to suggest that the realized survival fitness measurement model had unacceptable goodness-of-fit.

Construct validity. All path estimates were significant ($t > 8$, $p < .01$) and loadings between measured variables and factors were generally greater than 0.5, evidence of convergent validity. However, the AVE for *coordination* was noticeably lower than a

threshold of 0.5 (see Table 25, shaded cells), indicating that indicators of *coordination* shared a low proportion of their variance (0.35).

Correlations between factors in Figure 21 were significantly less than one which suggested a reasonable degree of discriminant validity. Further evidence of discriminant validity was AVE extracted for each construct generally exceeded its squared correlation with other constructs (Table 25). A notable exception was the AVE for C which did not exceed the squared correlation of 0.52 between PSF and C. Construct reliabilities were acceptable as shown in the right column.

Table 25: AVE and Squared Correlations: Survival Fitness

	PSF (Perceived Survival Fitness)	C (Coordination)	S (Socialization)	SY (Systems Capabilities)	Construct Reliability
PSF	.49				.74
C	.52	.35			.68
S	.31	.26	.59		.85
SY	.08	.05	.02	.43	.79

Nested Models. A further test of the measurement model was made by comparing four nested models (see Table 26). In Model 1, all items were loaded onto a single factor. In Model 2 there were two hypothesized factors, one for PSF items and one for hypothesized survival fitness items. In Model 3, items were loaded onto a PSF factor and two other factors: *socialization-coordination*; and *systems capabilities*. Finally, Model 4 was the realized model of Figure 21.

Table 26: Nested Sequence of Measurement Models for Survival Fitness

Model	Description	GFI	ECVI	Chi-square	df	Δ Chi-square	Δ df	p
1	Single factor: (PSF+C+S+SY)	.73	2.52	890.5	103			
2	Two factors: (PSF) (C+S+SY)	.75	2.24	783.5	102	107	1	< .001
3	Three factors: (PSF) (SY) (C+S)	.87	1.22	392.6	100	390.9	2	< .001
4	Four factors: (PSF) (SY) (C) (S)	.94	.75	205.7	97	186.9	3	< .001

As anticipated, the unidimensional Model 1 of survival fitness had poor fit (normed chi-square = 8.65; RMSEA = 0.142). Model 4 fitted the data best with the highest GFI

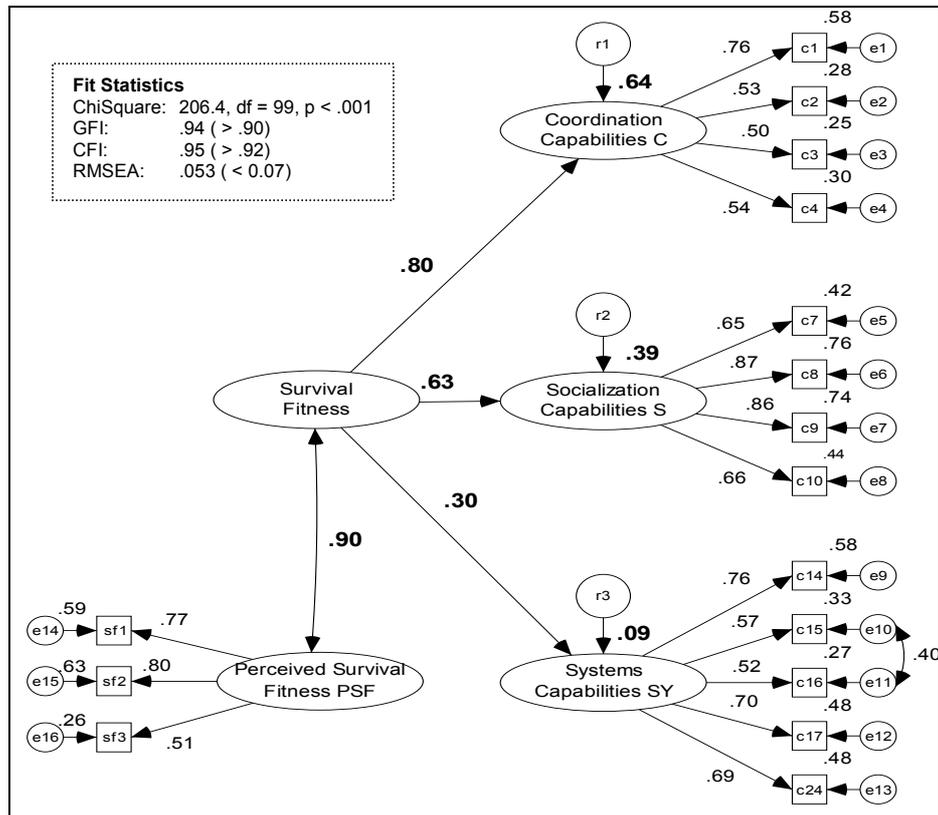
(.94) and the lowest ECVI (0.75). Further, Model 4 had a significant chi-square difference to Model 3 (which in turn fit significantly better than Model 2 and Model 1).

Summary. Overall, the results described in this section provided support for the realized measurement model shown in Figure 21. Responses can be explained by three survival fitness factors (coordination, socialization, systems capabilities) and a factor that represents the owner’s overall perception of survival fitness.

Internal Structural Model: Survival Fitness (SF)

The measurement model of survival fitness (Figure 21) was modified by replacing covariance relationships between the three fitness dimensions with dependence relationships and a second-order survival fitness construct (see Figure 22).

Figure 22: Second-Order Survival Fitness



Assessing Fit. Overall goodness-of-fit indices (normed chi-square 2.08, CFI = 0.95, GFI = 0.94) indicated acceptable fit. Examination of the individual residuals showed that the largest standardized residual was 3.0, within acceptable limits (Hair et al., 2006). A 90% C.I. for $\epsilon = (0.043, 0.064)$ straddled 0.05, indicating that a hypothesis of *close fit* $\epsilon < 0.05$ is not rejected. Thus the second-order survival fitness model demonstrates adequate fit.

Construct validity. First-order loadings were all significant and averaged 0.66; second-order factor loadings were 0.80 for *coordination*, 0.63 for *socialization*, and 0.30 for *systems capabilities*. From Figure 22 the squared multiple correlations (SMC) were 0.64, 0.39 and 0.09. Thus 64% of the variance in coordination capabilities was explained by a higher-order construct (survival fitness), however only 9% of the variance of systems capabilities was shared with a higher-order construct.

The average variance extracted for survival fitness was 0.38, below a desirable threshold of 0.50. Thus barely 40 percent of the variance in the first-order constructs was accounted by the second-order survival fitness construct. The low AVE was influenced by the low (yet significant) path weight between *survival fitness* and *systems capabilities*. A decision had been taken early in the measurement modelling procedure to retain *systems capabilities* for theoretical rather than empirical reasons.

In order to explore the low AVE further, the target coefficient T was calculated and found to be greater than 0.99. The application of T has the advantage of separating lack of fit due to the second-order structure, from lack of fit in the definition of first-order factors. Thus it is possible to have a high T even when the overall fit of the first-order model is only modest, as was the case here. The present result indicated that the lack of fit occurred in the measurement of the first-order factors (i.e. measurement model) rather than the specification of the second-order factor (Marsh & Hocevar, 1985).

Nested Models. A further test of the internal structure of the model was made by comparing the fit of the hypothesized second-order structure with a nested first-order structure (Barki & Hartwick, 2003). The comparison of the first-order and second-order models (see Table 27), showed that there was a small (desirable) decrease in the value of the ECVI.

Table 27: Nested Model Comparison: Survival Fitness

Model	Description	Chi-square	df	p	GFI	CFI	ECVI	Δ Chi-square	Δ df	p
1	First Order	205.7	97	<.001	0.94	0.95	0.75			
2	Second Order	206.4	99	<.001	0.94	0.95	0.74	0.7	2	> .25

Further, a comparison of the second-order model (Table 27) with its baseline first-order measurement model resulted in an insignificant chi-square difference which suggested adequate fit of the second-order model (Hair et al., 2006).

Criterion. The correlation between survival fitness and the criterion variable of overall *perceived survival fitness* was high at 0.90 (see Figure 22). This significant

correlation showed concurrent validity for the model, and provided further support for H2 (Barki & Hartwick, 2001).

Cross-Validation. The model was tested for across-sample validity. Table 28 summarizes the results of cross-validation between two groups of SMEs: Group 1, *Early*, had 285 early respondents; group 2, *Late*, had 96 late respondents and 42 nonrespondents.

Table 28: Cross-Validation Indices for Survival Fitness

Model description	ChiSq	df	RMSEA	Comments	Δ Chi-square	Δ df	p
1. Loose Cross-Validation: Early	192.5	99	0.058	<i>close fit</i>			
Late	133.7	99	0.051	<i>close fit</i>			
2. Factor Structure Equivalence	326.3	198	0.039	<i>close fit</i>			
3. Loading Equivalence	332.8	208	0.038	<i>close fit</i>	6.5	10	> .25
4. Covariance Equivalence	336.0	213	0.037	<i>close fit</i>	3.2	5	> .25
5. Error Variance Equivalence	352.1	230	0.036	<i>close fit</i>	16.1	17	> .25

Each progressive test from Table 28 supported cross-validation. The progressive tests produced adequate fit statistics, as well as an insignificant change in fit over the previous test as measured by a chi-square statistic. There was evidence that constraining relationships to be equal in both groups had not significantly harmed the model fit. The survival fitness measurement model was cross-validated by two different groups of SMEs.

In summary, the results reported in this section provided a reasonable level of support for Hypothesis 2: SME survival fitness is a second-order construct positively reflected by coordination, socialization, and systems capabilities.

DEPENDENT CONSTRUCT: BUSINESS PERFORMANCE

Measurement Model

CFA was conducted on a model with two hypothesized dimensions of business performance, namely *survival performance* and *growth performance*, and a criterion variable *perceived business performance* all correlated with each other⁵⁹. The theoretical measurement model did not fit the data very well. A test of *not-close* fit was significant, that is the 90% C.I for ϵ was wholly above 0.05 (see Model 1 of Table 29).

⁵⁹ For a correlation matrix of the measures see Table 52, Appendix J

Respecification of the measurement model was therefore indicated. First, examination of the modification indices showed that cross-loading item *bpp6* onto survival performance improved model fit. The item *bpp6* measured ‘change in the net worth of the firm in the last two years’. There were no guidelines in the literature as to whether net worth has been perceived as a measure of growth or profitability. Theoretically, cross-loading seemed to be reasonable in this case, since change in net worth captures both aspects of performance. Although cross-loading the item meant that the unidimensionality of each set of items was compromised, this modification was implemented rather than item deletion because practitioners had identified net worth as an important measure of business performance. Cross-loading *bpp6* resulted in Model 2 (Table 29), which showed improved fit (for example, ECVI dropped from .536 to .492), however the test of *not-close* fit was still significant. Examination of the residuals of Model 2 showed a large problematic residual of 4.2. This was associated with one of the items measuring perceived business performance, *pbp3* (financial stakeholders’ satisfaction). Residuals associated with *pbp3* were generally large; this item was therefore deleted. As shown in Table 29, a Model 3 with *pbp3* deleted showed the anticipated improved fit; ECVI fell from .492 to .366. Further, Model 3 satisfied a test of *close fit* since a 90% C.I. for ϵ lay entirely below 0.05. A chi-square difference test was significant, which showed that Model 3 fitted the data significantly better than Model 2. Dropping the item *pbp3* of perceived business performance weakened possible testing of concurrent validity; however the remaining two items (customer and employee satisfaction) still provided a broad measure of perceived business performance⁶⁰.

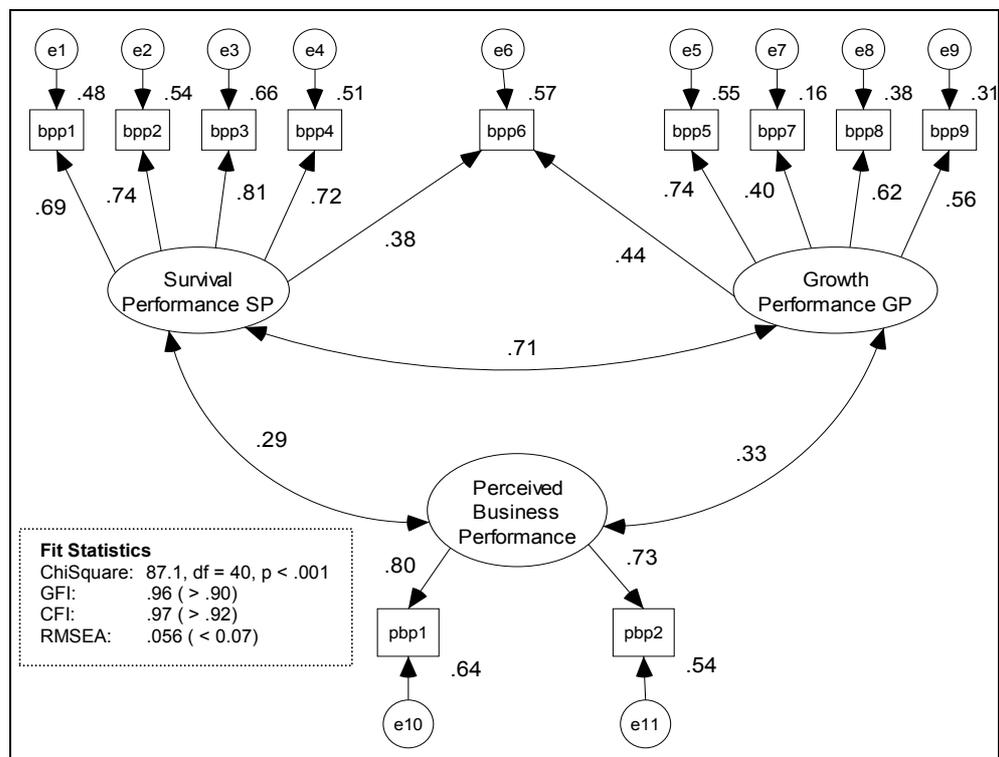
Table 29: Model Comparisons: Business Performance

Model	Description	Chi-square	df	Δ Chi-square	Δ df	p	ECVI	RMSEA 90% C.I.
1	Theoretical Model	149.5	51				.536	(.058, .085)
2	<i>Bpp6</i> cross-loaded	130.9	50	18.65	1	< .001	.492	(.052, .079)
3	<i>Pbp3</i> dropped	87.1	40	43.73	10	< .001	.366	(.040, .072)

⁶⁰ Three or four items per construct are generally recommended as a minimum for identification purposes. Although a unidimensional two-item CFA construct is underidentified by itself, when this construct is integrated into the overall measurement model as is the case here, an overidentified model results. That is, the extra degrees of freedom from survival performance and growth performance can provide sufficient degrees of freedom to test the whole model (Hair et al., 2006).

When a variable has been declared to measure more than one factor, as is the case here for *bpp6*, it is important to examine not only the pattern loadings of Figure 23 below, but also the coefficients of the *structure* matrix (Maruyama, 1998). The structure matrix is the product of the factor pattern matrix and the factor correlation matrix. If factors are uncorrelated, pattern and structure coefficients are identical. However, if factors are correlated, the two coefficients may be different. For example, even if the pattern coefficient for item A with factor F has been constrained to zero, the corresponding structure coefficient representing the correlation of A with F may not be zero (Graham, Guthrie, & Thompson, 2003). Structure and pattern loadings are reported in Table 47 (Appendix G). Table 47 shows that although *bpp6* has relatively low pattern loadings on GP and SP, a large portion of the variance contributed by *bpp6* is shared by other variables measuring the same factor (shown in bold). Although the model re-specification was data driven, cross-loading item *bpp6* onto both performance constructs has thus both theoretical and empirical support. Parameter values of the realized model are shown in Figure 23

Figure 23: Business Performance



Assessing Overall Fit. A CFI value of 0.97, GFI of 0.96, and normed chi-square of 2.18, all confirmed adequate model fit. The model had reasonably low residuals: the largest standardized residual was 2.7, below the problematic threshold of 4 (Hair et al.,

2006). A 90% C.I. for $\varepsilon = (0.040, 0.072)$ implied that a hypothesis of *close fit*, $\varepsilon < 0.05$ was not rejected.

Construct Validity. The improvement gained by cross-loading *bpp6* showed the degree of overlap between the two sets of items. As can be seen in Figure 23 the correlation between SP and *perceived business performance* was 0.29 ($p < .001$), and the correlation between GP and *perceived business performance* was 0.33 ($p < .001$).

All path estimates were significant (t-values > 4.1 , $p < .01$), and loadings between measured items and factors were generally greater than 0.5 suggesting a degree of convergent validity. An exception to this was the lower loading of 0.40 for item *bpp7* (change in number of fulltime staff in last two years). Although overall model fit would be improved by deletion of this item, it is one of the few non-financial measures that are commonly used for studies of SME business performance (Murphy et al., 1996), for example see Dubelaar et al. (2002). Therefore it was decided to retain the item to retain a broad content domain.

AVE for PBP and SP were above 0.5 providing further evidence of convergent validity (Table 30) for these two constructs. The AVE for GP was questionable at 0.35, mainly due to the single poorly-loading item *bpp7*.

Table 30: AVE and Squared Correlations: Business Performance

	PBP (Perceived Business Performance)	SP (Survival performance)	GP (Growth Performance)	Construct Reliability
PBP	.59			.74
SP	.08	.55		.82
GP	.11	.50	.35	.80

Correlations between the constructs in Figure 23 were significantly below one which suggested a reasonable degree of discriminant validity. Table 30 shows that AVE for each construct exceeded its squared correlation with other constructs (except for the SP-GP correlation), and construct reliabilities were all high.

Nested Models. A further test of the measurement model was made by comparing two nested models. A single-factor Model 1 (all *bpp* items loaded onto one factor) was compared with a two-factor Model 2 (the realized model of Figure 23). Model 2 fit the data better than Model 1. A two factor-model had a higher GFI (0.96 vs. 0.91) and a lower ECVI (0.37 vs. 0.57). Further, Model 2 had a significant chi-square difference to Model 1 (Δ chi-square = 84.3, $df = 3$, $p < .001$). Importantly, a hypothesis of *close fit*

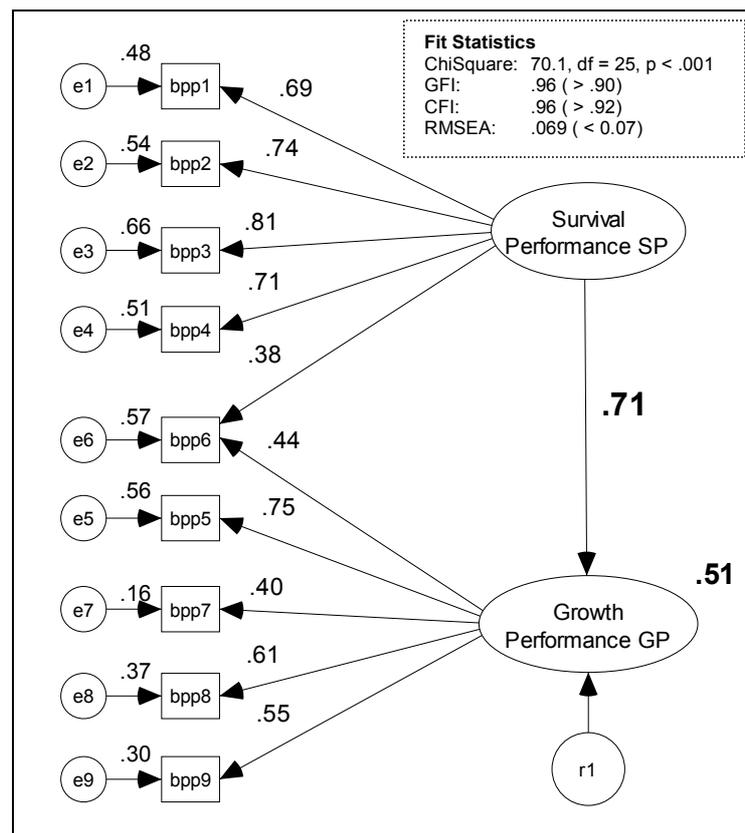
was rejected for Model 1 (90% C.I. for $\varepsilon = (0.075, 0.103)$). This was clear evidence that two factors explained the data more adequately than one factor.

In summary, the results provided a reasonable level of support for the realized measurement model of business performance. Responses to the measuring instrument can be explained by two factors representing hypothesized dimensions of business performance. However, there was a degree of overlap and consequent loss of unidimensionality for the *survival performance* and *growth performance* constructs.

Internal Structural Model: Business Performance (BP)

An internal structural model that replaced the covariance relationship between survival performance and growth performance in Figure 23 with a dependence relationship was tested with SEM (see Figure 24).

Figure 24: Survival and Growth Performance



Model fit was adequate (normed chi-square 2.8; CFI = 0.96; GFI = 0.96). The largest standardized residual was 2.5, and a test of *close fit* was significant. The path loading of 0.71 shown in Figure 24 confirmed a positive link between SP and GP. Further, SP explained 51% of the variance in GP. This model fitted significantly better (Δ chi-square

= 130.1, $df = 1$, $p < .001$; ECVI dropped from .632 to 0.290) than a model which constrained the dependence relationship between the two performance constructs to zero.

Nested Models. As a further test of the internal structure, three models were compared for fit. A unidimensional model (Model 0) hypothesized a single business performance construct loading onto all measured variables. The first-order model of Figure 24 (Model 1) hypothesized two first-order constructs that are positively related. A second-order model (Model 2) hypothesized a second-order construct of business performance reflected by first-order constructs of SP and GP (see Table 31).

As anticipated, Model 0 had poor fit (normed chi-square = 7.1; RMSEA = 0.13). In contrast, both Model 1 (normed chi-square = 2.8, GFI = .96, CFI = .96) and Model 2 (normed chi-square = 2.18, GFI = .96, CFI = .96) demonstrated acceptable fit. For both Model 1 and Model 2, a test of *close fit* was significant.

Table 31: Nested Model Comparison: Business Performance

Model	Description	Chi-square	df	p	GFI	CFI	ECVI	Δ Chi-square	Δ df	p
0	Unidimensional	312.1	44	<.001	0.87	0.81	0.937			
1	First Order	70.1	25	<.001	0.96	0.96	0.290	242	19	<.001
2	Second Order	87.2	40	<.001	0.96	0.96	0.366	17.1	15	>0.25

Importantly, Table 31 shows that Model 2 did not fit the data significantly better than Model 1 (Δ chi-square = 17.1, $df = 15$, $p > 0.25$). Further, Model 1 had a lower value for ECVI (0.29 vs. 0.37). ECVI is a parsimony-related index that is used for comparing two models: the lower the value the better. Thus these results indicated that a second-order model was less appropriate than a first-order model.

In summary, the results reported in this section provided support for Hypothesis 3: growth performance will have a positive dependence relationship with survival performance for SMEs.

STRUCTURAL MODELS OF FITNESS AND PERFORMANCE

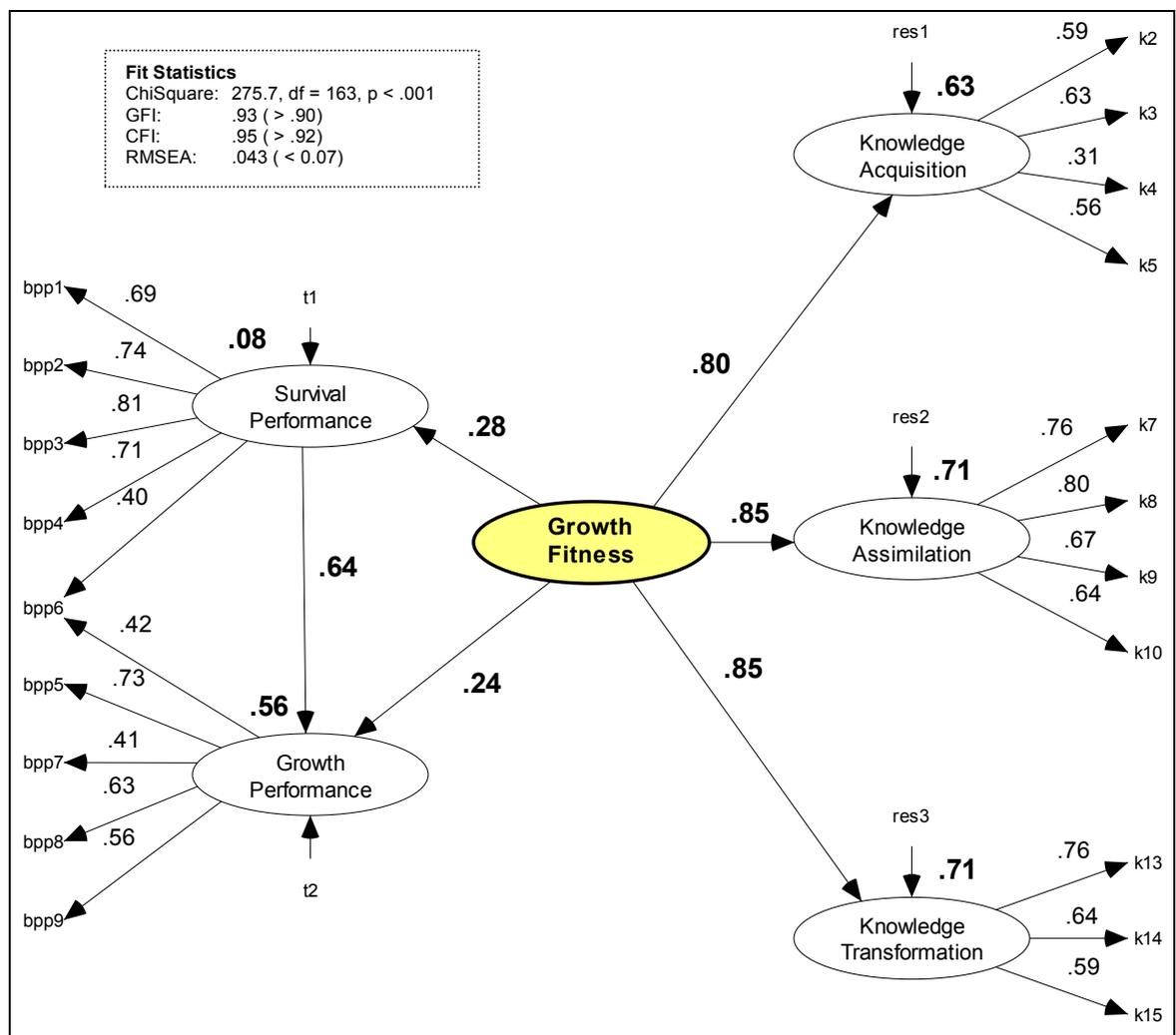
SME Growth Fitness and Business Performance

Three hypotheses, H4, H5, and H6 specifically addressed research question R1: *What relationships, if any, are there between organizational growth fitness and business performance for SMEs?* To answer R1, the internal structural model for growth fitness

(Figure 20) and the internal structural model for business performance (Figure 24) were integrated into a full SEM model which was used to test the three hypotheses.

H4: Direct effect of growth fitness on business performance. Figure 25 shows the parameters that resulted from the SEM analysis of relationships between growth fitness, growth performance and survival performance. Adequate overall fit of the model was found for the sample (N = 381) of SMEs (GFI = 0.93; CFI = 0.95; normed chi-square = 1.69). The largest standardized residual was 2.76, and the root mean-square error of approximation (RMSEA) was 0.043. Also, a 90% C.I. for $\epsilon = (0.034, 0.051)$ resulted in a significant test of *close fit*.

Figure 25: Growth Fitness-Business Performance Model



A number of features may be noted in Figure 25. First, *growth fitness* had a positive, significant loading of 0.28 on *survival performance* ($p < .001$). A chi-square difference test, with the GF-SP path constrained to zero, was significant (Δ chi-square = 19.6, $df = 1$, $p < .001$).

Second, *growth fitness* was significantly and positively related to *growth performance*, with a path loading of 0.24. A chi-square difference test with the GF-GP path constrained to zero was significant ($\Delta\text{chi-square} = 15.7$, $df = 1$, $p < .001$).

Third, dimensional loadings for the three facets of growth fitness: knowledge acquisition, assimilation and transformation, were all high and significant (0.80, 0.85, 0.85, respectively). These loadings were consistent with those found under H1, providing additional support for a second-order, multidimensional *growth fitness* construct. Finally, a significant path loading of 0.64 ($p < .001$) between survival performance and growth performance was also consistent with result of H3.

In summary, Hypothesis 4 was supported. SME growth fitness was found to be positively and directly related to both growth performance and to survival performance

H5: Invariant effect of Growth Fitness on Business Performance. H5 examined whether relationships between growth fitness and business performance were moderated by firm size, firm age, administrative intensity, ambidexterity, or ownership structure. The causal structure of Figure 25 was tested for invariance across samples of SMEs that differed from each other on key firm-level characteristics. As described in the measures section of Chapter 7, the sample of 381 SMEs was split into two similar-sized groups by the sample median for each of the five hypothesized moderating variables. The resulting categorical variables *Size2*; *Age2*; *Intensity2*; *Ambi2*, and *Ownr2* were tested as potential moderators of the relationship between growth fitness and business performance.

Using multigroup SEM to test moderation effects. For each potential moderator of the direct effects of *growth fitness*, a model was estimated with SEM using data from both the low and the high groups simultaneously (Model 0). Thus only Model structure was constrained between the two groups. In this procedure, parameters are freely estimated for each group, and may be different for each group. However, only a single chi-square value and goodness-of-fit statistics are calculated, which refers to how well Model 0 fits both groups. If the fit of the two-group SEM is adequate, this indicates at least minimal evidence of cross-validation (Byrne, 2001; Hair et al., 2006). Next, the structural relationships in the model were constrained to be equal for both groups (Model 1). Thus in Figure 25 factor loadings between all constructs were forced to take the same value for the *low* group and for the *high* group. If this constraint results in a deteriorated model fit from Model 0 to Model 1 (measured by a significant $\Delta\text{chi-square}$), moderation by the categorical variable is supported. The results summarized in Table 32 show that none of size, age, administrative intensity, ambidexterity, or ownership type moderated the direct effect of *growth fitness* on business performance.

Table 32: Moderation of Direct Effects: Growth Fitness

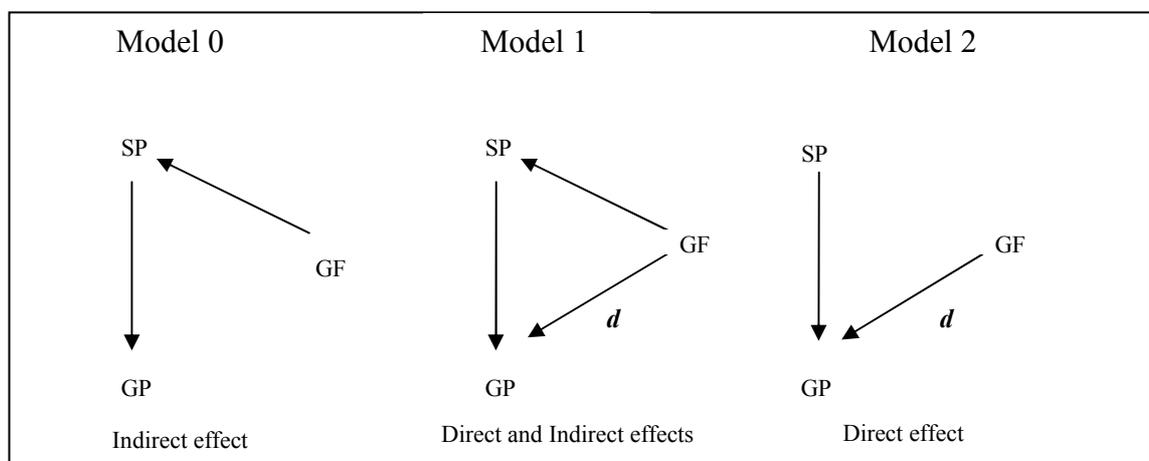
	Model	ChSq	df	Δ Chi	Δ df	p	Moderation
Size2	0	466.1	326				
	1	472.9	332	6.8	6	>.25	not supported
Age2	0	473.5	326				
	1	476.0	332	2.5	6	>.25	not supported
Inten2	0	461.9	326				
	1	472.7	332	10.8	6	>.10	not supported
Ambi2	0	453.2	326				
	1	459.7	332	6.5	6	>.25	not supported
Ownr2	0	447.4	326				
	1	458.6	322	11.2	6	>.05	not supported

Note: all models showed adequate goodness-of-fit (CFI > 0.93; RMSEA < 0.045)

In summary, there was support for Hypothesis 5. The relationships between SME growth fitness and business performance are not moderated by contextual ambidexterity, administrative intensity, ownership structure, firm age, or firm size.

H6: Mediation effect. Hypothesis 6 suggested the effect of growth fitness (GF) on growth performance (GP) is partially mediated by survival performance (SP). To test whether the relationship between GF and GP is mediated by SP, three nested models were compared. Model 0 constrained to zero the path weight d between the exogenous construct GF and the endogenous construct GP (see Figure 26 below). Model 1 had the addition of a path between GF and GP, that is, Model 1 allowed both direct and indirect effects. Model 3 allowed only a direct effect of GF on GP.

Figure 26: Mediation of Growth Fitness Effect on Growth Performance



The comparison of Model 0 and Model 1 was significant (Δ chi-squared = 15.7, df = 1, p < .001), indicating full mediation was not supported. However, there was evidence

found of partial mediation. A comparison of Model 2 and Model 1 showed the relationship between growth fitness and growth performance (path *d* in Figure 26) remained significant but reduced from 0.28 (Model 2) to 0.24 (Model 1). Further, for Model 1, the standardized indirect effect of GF on GP was 0.18, less than the standardized direct effect of 0.24.

There was therefore initial support for Hypothesis 6. Survival performance partially mediates the relationship between growth fitness and growth performance. However, a further question arose: Is the partially-mediated relationship between GF and GP moderated by firm size, age, administrative intensity, ambidexterity, or ownership structure? For example, does SP intervene between GF and GP for small SMEs, but not for larger SMEs? Multigroup SEM was used to explore H6 further, with a Δ chi-squared test between Model 0 and Model 1 that was conducted separately for each level of each potential moderator. The significance of the chi-square difference indicates whether or not full mediation is supported contingent upon the firm-level variable (Table 33).

Table 33: Mediation of Growth Fitness Effect on Growth Performance

GF	Value	Model	ChSq	df	Δ Chi	Δ df	p	Full Mediation By Survival Performance
Size2	< 17	0	261.8	164				
		1	253.2	163	8.6	1	< .005	not supported
	> 17	0	220.1	164				
		1	212.9	163	7.2	1	< .01	not supported
Age2	< 20	0	224.0	164				
		1	217.9	163	6.1	1	< .05	not supported
	> 20	0	265.5	164				
		1	255.7	163	9.8	1	< .005	not supported
Inten2	< .10	0	223.6	164				
		1	212.2	163	11.4	1	< .001	not supported
	> .10	0	252.8	164				
		1	249.7	163	3.1	1	ns	supported
Ambi2	< 0	0	217.2	164				
		1	207.4	163	9.8	1	< .005	not supported
	> 0	0	253.6	164				
		1	245.8	163	7.8	1	< .005	not supported
Ownr2	multiple	0	206.8	164				
		1	195.9	163	10.9	1	< .001	not supported
	single	0	256.7	164				
		1	251.5	163	5.2	1	< .025	not supported

Note: all models showed adequate goodness-of-fit (CFI > 0.92; RMSEA < 0.057)

Table 33 shows the chi-square difference was significant in most cases indicating that full mediation was not supported (see Figure 26). That is, full mediation of the GF-GP relationship by SP is not supported even when different firm size, age, ambidexterity, or ownership structure is separately controlled. An exception to this finding occurred for administrative intensity. For SMEs with more than one active owner per ten full time equivalent employees, survival performance does positively and fully mediate the effect of growth fitness on growth performance.

Next, path coefficients between Model 2 and Model 1 were examined to see if they had changed. A reduced path coefficient, d , between GF and GP is evidence of partial mediation. A summary of the results is presented in Table 48 (Appendix H). The table shows that d decreases for all control variables, indicating partial mediation by SP of the relation between GF and GP. Full mediation is only shown (shaded cell) for those SMEs with higher levels of administrative intensity, as anticipated from Table 33.

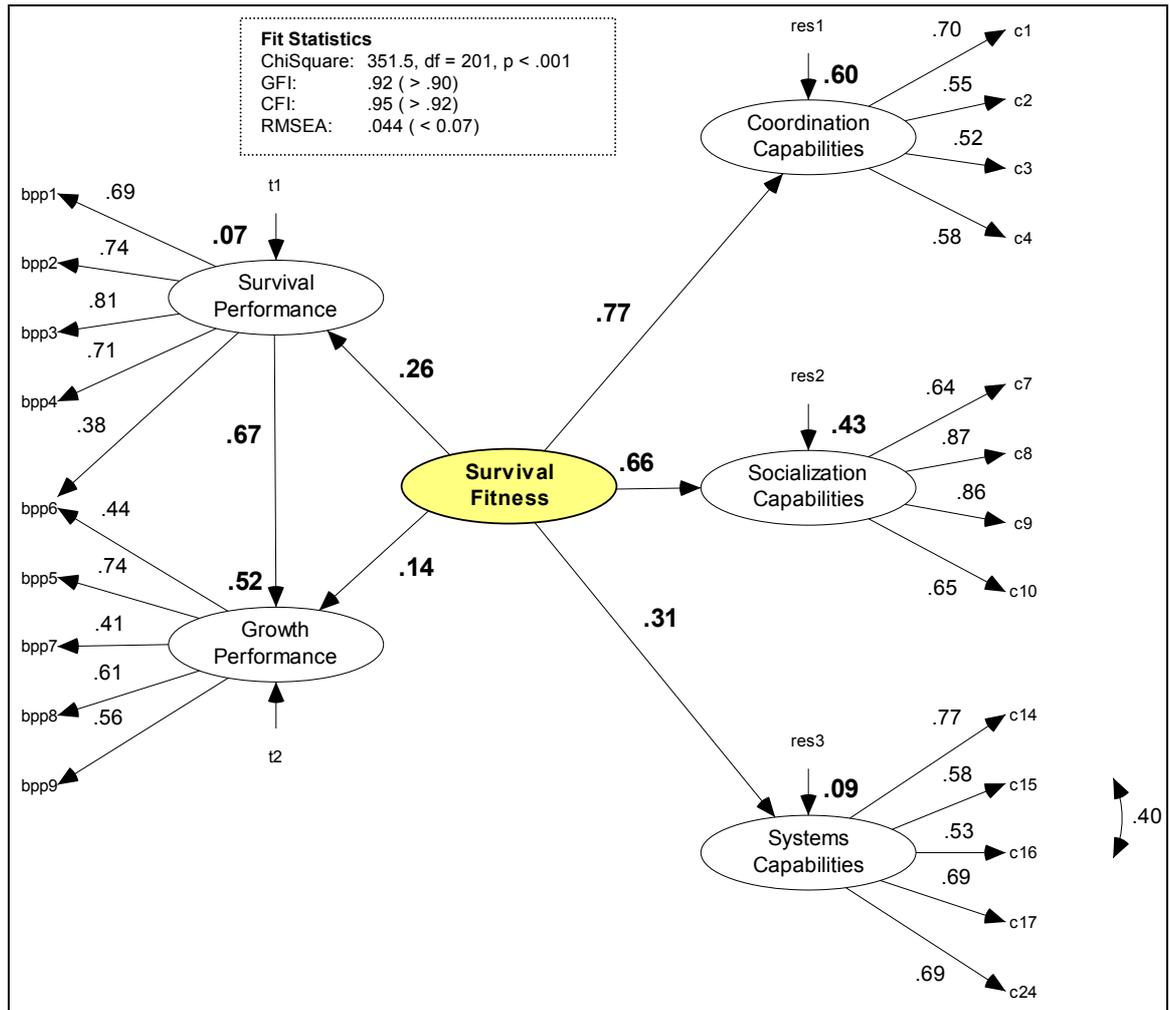
Overall, the results showed that Hypothesis 6 was supported in a variety of contexts. The effect of Growth Fitness on Growth Performance is partially mediated by Survival Performance. This indirect relationship was invariant for firm-level variables.

SME Survival Fitness and Business Performance

Three hypotheses, H7, H8, and H9 specifically addressed research question R2: *What relationships, if any, are there between organizational survival fitness and business performance for SMEs?* The internal structural model for survival fitness (Figure 22) and the internal structural model for business performance (Figure 24) were integrated into a single full SEM model which was used to test the three hypotheses.

H7: Direct effect of survival fitness on business performance. Figure 27 shows the estimated parameters linking survival fitness, survival performance and growth performance.

Figure 27: Survival Fitness- Business Performance Model



Adequate overall fit (normed chi-square 1.75; GFI = 0.92; CFI = 0.95) was indicated for the model by most indices. There was, however, some evidence of poor fit: six of the 220 standardised residuals (almost three percent) were greater than three in magnitude. Hair et al. (2006) suggested that residuals become highly problematic when their value exceeds a value of four. RMSEA was an acceptable 0.044, and a 90% C.I. for $\epsilon = (0.037, 0.052)$ resulted in a significant test of *close fit*. Despite some mixed evidence, overall model fit was found to be adequate.

Construct validity. Figure 27 shows that SF had a significant ($p < .005$) and positive loading of 0.26 on SP: survival fitness was positively associated with survival performance as hypothesized. A chi-square difference test with the SF-SP path constrained to zero was significant ($\Delta\text{chi-square} = 12.3, df = 1, p < .001$).

However, the path loading between SF and GP was relatively low at 0.14; the estimated loading was not significantly different from zero ($p > 0.05$). Further, a chi-square difference test with the SF-GP path constrained to zero was also (marginally) not

significant ($\Delta\text{chi-square} = 3.8$, $df = 1$, $p > 0.05$). Thus survival fitness is *not* directly related to growth performance on this evidence, as hypothesized by H7.

Dimensional loadings for the three survival fitness facets of *coordination* (0.77), *socialization* (0.66), and *systems capabilities* (0.31) were all significant ($p < .001$). These loadings were consistent with those found under H2, providing additional support for a second-order SF construct. Finally, a significant path loading between SP and GP of 0.67 ($p < .001$), was consistent with H3.

In summary, Hypothesis 7 was supported. SME survival fitness is positively and directly related to survival performance; and survival fitness is not directly related to growth performance.

H8: Invariant effect of Survival Fitness on Business Performance. Hypothesis 8 examined whether the relationship between survival fitness SF and survival performance SP is moderated by firm size, firm age, administrative intensity, ambidexterity, or ownership structure. Further, H8 examined whether the absence of a significant direct effect between SF and growth performance GP found in H7 is contingent on these five firm-level variables.

To test H8, the presence and strength of the direct relationship between survival fitness and the two performance dimensions was tested for invariance across five grouped categorical variables *Size2*; *Age2*; *Intensity2*; *Ambi2* and *Ownr2*. The results summarized in Table 34 show that none of firm size, age, administrative intensity, ambidexterity, or ownership structure significantly moderated the presence or strength of the direct effects of survival fitness.

Table 34: Moderation of Direct Effects: Survival Fitness

	Model	ChSq	df	ΔChi	Δdf	p	Moderation
Size2	0	568.1	402				
	1	580.5	408	12.4	6	> .05	not supported
Age2	0	615.6	402				
	1	621.5	408	5.9	6	> .25	not supported
Inten2	0	600.6	402				
	1	604.9	408	4.3	6	> .25	not supported
Ambi2	0	576.2	402				
	1	580.3	408	4.1	6	> .25	not supported
Ownr2	0	599.0	402				
	1	609.2	408	10.2	6	> .10	not supported

Note: For all models, CFI > 0.93 all have significant result for test of *close-fit*.

In summary, a multigroup SEM analysis provided evidence of an invariant positive direct relationship between survival fitness and survival performance. Also, there is evidence that the absence of a direct effect between survival fitness and growth performance is invariant. These results therefore supported Hypothesis 8.

H9: Growth Performance is fully mediated by Survival Performance. Hypothesis 9 examined whether survival performance intervenes between survival fitness and growth performance. That is, whether the effect of SF on GP is fully mediated by SP. To test this hypothesis, three nested models were compared using the same procedure described earlier for H6 (refer to Figure 26). Model 0 constrained the path between SF and GP to zero; Model 1 has the addition of a path between SF and GP; Model 2 allowed only a direct effect of SF on GP. Results are summarized in Table 35.

Table 35: Indirect Effect of Survival Fitness on Growth Performance

	Model Description: SF - GP	Chi-square	df	Δ Chi-square	Δ df	p	Path Weight SF-GP
Model 0	Indirect effect only	355.4	202				
Model 1	Indirect and direct effect	351.6	201	3.8	1	p > .05	0.14 ns
Model 2	Direct effect only	485.3	203	133.7	2	p < .01	0.32 **

Note: all models have RMSEA < 0.06

Comparison of Model 0 and Model 1 in Table 35 showed that inclusion of a direct effect of SF on GP (Δ chi-squared = 3.8, $df = 1$, $p > .05$) was not significant, indicating full mediation was supported. Also, a comparison of Model 2 and Model 1 showed the path loading between SF and GP became insignificant and reduced from 0.32 ($p < .01$) (Model 2) to only 0.14 *ns* (Model 1). Further, the standardized indirect effect of SF on GP was 0.17, greater than the standardized direct effect of 0.14. As a result of an indirect effect, 52% of the variance in GP was explained by SF when mediated by SP. Survival fitness on its own only explained 11% of growth performance.

Hypothesis 9 thus received support from a nested model comparison. Survival performance mediates the relationship between survival fitness and growth performance. Two models were then compared to test whether a fully-mediated relationship between SF and GP was moderated by performance contingencies. Model 0 did not have a direct path between SF and GP; Model 1 had both direct and indirect paths. A chi-squared difference test between Model 0 and Model 1 was conducted separately for each of five firm-level variables. Results of this test are summarized in Table 36.

Table 36: Effect of Survival Fitness on Growth Performance

GF	Value	Model	ChSq	df	Δ Chi	Δ df	p	Mediation by Survival Performance
Size2	< 17	0	280.8	202				
		1	277.5	201	3.3	1	>.05	supported
	> 17	0	292.0	202				
		1	290.6	201	1.4	1	> .10	supported
Age2	< 20	0	273.0	202				
		1	268.7	201	4.3	1	< .05	not supported
	> 20	0	347.2	202				
		1	346.9	201	0.3	1	> .25	supported
Inten2	< .10	0	296.3	202				
		1	292.7	201	3.6	1	> .05	supported
	> .10	0	307.9	202				
		1	307.8	201	0.1	1	> .25	supported
Ambi2	< 0	0	304.8	202				
		1	302.4	201	1.4	1	> .10	supported
	> 0	0	275.7	202				
		1	273.8	201	1.9	1	> .10	supported
Ownr2	Multiple	0	320.4	202				
		1	320.1	201	0.3	1	> .25	supported
	Single	0	282.1	202				
		1	278.9	201	3.2	1	> .05	supported

Note: all models showed adequate goodness-of-fit (CFI > 0.92; RMSEA < 0.057)

Table 36 shows the chi-square difference was not significant in most cases indicating that full mediation was supported (see Figure 26). For example, the first two rows of Table 36 confirm that for smaller SMEs, SP mediates the effect of SF on GP. That is, for smaller SMEs, increased growth performance is associated with increased survival fitness only indirectly through survival performance. Support for the full mediation effect of SP was weakest for SMEs that have been operating for less than 20 years in business ($p = 0.04$). That is, for younger SMEs, the indirect effect of SF on GP (through SP) does not outweigh the direct effect of SF on GP at the 5% level of significance (but not at the 1% level).

In sum, Hypothesis 9 was supported. For SMEs, survival performance fully mediates the effect of survival fitness on growth performance. This indirect relationship is invariant for a variety of firm-level variables.

SUMMARY OF FINDINGS

The characteristics of the data appeared consistent with univariate and multivariate distributional assumptions underlying SEM testing of research hypotheses.

Growth fitness was confirmed as a second-order theoretical concept positively measured by knowledge acquisition, assimilation, and transformation (H1).

Survival fitness was confirmed as a second-order theoretical concept positively measured by coordination, socialization, and systems capabilities (H2).

Business performance was adequately measured by two factors, survival performance and growth performance, which have a dependence relationship (H3).

Research Question R1: Growth fitness was positively related to survival performance and growth performance (H4). The effect of growth fitness on growth performance was partially mediated by survival performance (H5). Relationships remained significant under performance contingencies of SME size, age, ownership type, ambidexterity, and administrative intensity (H6).

Research Question R2: Survival fitness was positively related to survival performance and *not* related to growth performance (H7). The effect of survival fitness on growth performance was fully mediated by survival performance (H8). Relationships were invariant for cross-validation comparisons. The comparisons involved successive testing of two groups of SMEs that differed by size, age, ownership type, ambidexterity, and administrative intensity (H9).

Research Problem R: By synthesizing the findings of R1 and R2, this research finds evidence of a positive relationship between organizational fitness and business performance for SMEs in New Zealand. SMEs that pay attention to internal knowledge transformation capabilities and firm-level combinative capabilities report superior performance. Capability to generate variety within the firm and at the firm level is associated with superior business performance in terms of profitability and growth.

Organizational fitness was not operationalized as a single concept in this study. Rather, organizational fitness was defined at two firm levels, namely survival fitness and growth fitness that correspond respectively to a capability for variation at a firm level and a within-firm level. There is scope to test an overall combined model with both survival fitness and growth fitness, however this was not attempted here. The theoretical development did not envisage an overall concept of fitness reflected by several dimensions. That is, the research model did not anticipate both survival fitness and growth fitness would vary together. Hence, conclusions and implications for R are

drawn from the separate findings for R1 and R2. There is a potential impact of not including both levels of fitness in the same model that they explain overlapping performance, this impact might be evaluated in future research by means of a Partial Least Squares approach that is discussed further in Chapter 9.

Table 37 summarises the results of hypothesis testing. The table shows that there is support for the nine hypotheses tested (columns 3, 4, 5). Further, the four objectives described in Chapter 1 are achieved (column 1), and the two research questions R1 and R2 of Chapter 5 are addressed.

Table 37: Results of Hypothesis Testing

Hypothesis			Result	
O1 O2	H1	Growth Fitness for a SME is a second-order construct reflected by knowledge acquisition (+), assimilation (+), and transformation (+)	Support	
O1 O2	H2	Survival Fitness for a SME is a second-order construct reflected by coordination (+), socialisation (+), and systems capabilities (+).	Support	
O1 O2	H3	Growth Performance will have a positive dependence relationship with Survival Performance for SMEs	Support	
O3	R1	H4	Growth Fitness for a SME is related to Growth Performance (+) and is also related to Survival Performance (+)	Support
O4	R1	H5	The relationships between SME Growth Fitness and Business Performance are not moderated by contextual ambidexterity, administrative intensity, ownership structure, firm age, or firm size.	Support
O4	R1	H6	The relationship between SME Growth Fitness and Growth Performance is partially mediated by Survival Performance (+).	Support
O3	R2	H7	Survival Fitness of a SME is related to its Survival Performance (+), but is not related to its Growth Performance.	Support
O4	R2	H8	The relationship between SME Survival Fitness and Survival Performance is not moderated by contextual ambidexterity, administrative intensity, ownership structure, firm age, or firm size. The absence of a direct relationship between Survival Fitness and Growth Performance is invariant under these contexts.	Support
O4	R2	H9	The relationship between SME Survival Fitness and Growth Performance is fully mediated by Survival Performance (+).	Support

PART 5: CONCLUSIONS AND IMPLICATIONS

Chapter Nine: Discussion

The purpose of this study was to examine relationships between organizational fitness and business performance for SMEs. Although research has previously been devoted to organizational fitness, important issues such as the purpose of fitness and the content of fitness are not well understood. In addition, research into organizational fitness has only recently begun to explore components and dimensions.

The extent to which fitness is linked with business performance from a SME perspective has been largely ignored. However, it is argued here that organizational fitness may be more critical for SMEs than for corporations in terms of alleviating selection pressures. For SMEs, structural features of coupling and hierarchy influence the effectiveness of local adaptation within a given structure and change in a firm's underlying structure (Ethiraj & Levinthal, 2004). Thus the manner in which a firm attempts to be 'ready for action' may differ for a SME and a large firm in terms of trade-off between first-order and second-order change capabilities. The business performance of a small firm is more likely to result from its idiosyncratic properties, while large organizations are better protected from selection pressures. In contrast to the relatively mindless, mechanistic nature of large corporations, SMEs are multi-minded systems that are bonded by knowledge coordination, sharing and interaction (Davenport, Leibold, & Voelpel, 2006). Thus the desired outcome of fitness for SMEs is achievement of self-determined goals, whereas for large firms it is maintenance of market position.

Accordingly, this study assessed links between organizational fitness and performance specifically for SMEs, or small single unit firms. This simplification of the research model meant that fitness need be examined at only two levels. However, the ideas presented here might be expanded in future research to include multiunit firms with variation arising within units, between units, and at the firm level. For example, the Managed Selection Model of Volberda & Lewin (2003) that also employs a dual-hierarchy approach might be operationalized.

Organizational fitness was conceptualized non-tautologically as the capability to produce variation across occasions, both within the firm and at the firm level (Campbell, 1967). The conceptualization of organizational fitness proposed allows the influence of the external environment to be put to one side, and emphasis to be placed on the internal resources and capabilities of the firm (Penrose, 1959). Experimenting

with possible services that might be provided by actualized and potential resources enables a SME to strategically influence its evolution (Durand, 2006).

This empirical study answered calls for a more comprehensive and integrative approach to research on organizational fitness (Schwaninger, 1993; Poole & Van de Ven, 2004; Voelpel, Leibold, & Mahmoud, 2004), and contributes to that emerging research stream. Because at least four theoretical perspectives of fitness can be identified, existing research on organizational fitness has a relatively fragmented nature. Some integration is desirable because any one of these perspectives “invariably offers only a partial account of a complex phenomenon” (Van de Ven & Poole, 1995: 511). Consequently, the relationship of organizational fitness with business performance is assessed here from both an evolutionary and a strategic management perspective.

The contribution of the research is discussed next.

CONTRIBUTION OF THIS RESEARCH

As stated in Chapter One, this study explores three issues related to organizational fitness. What is organizational fitness? To what extent is the organizational fitness of a SME related to its business performance? How can a SME improve its organizational fitness? This research makes a contribution by formulating and testing theory that helps to address these three issues (Table 38).

Table 38: Contributions of this Study

Contributions of this study	
What is organizational fitness?	<ul style="list-style-type: none"> • Constructed as a capability for variation • Emphasised transference of knowledge • Identified two dimensions of organizational fitness: growth fitness and survival fitness
To what extent is the fitness of a SME related to its business performance?	<ul style="list-style-type: none"> • Dual-nature concept of organization relates fitness with performance • Evidence is provided specifically for SMEs • Identified two dimensions of performance for SMEs
Can a SME improve its organizational fitness?	<ul style="list-style-type: none"> • Utilized an Integrative approach – evolutionary framework that allows for strategic management • Identified dynamic capabilities of knowledge acquisition, assimilation and transformation are positively related to growth fitness • Identified dynamic capabilities of coordination, socialization and systems capabilities are positively related to survival fitness

What is organizational fitness?

This study defines organizational fitness in terms of capability for variation (Table 38, Row 1). Variations are departures from present procedures. That is, variation arises

across occasions, and is a dynamic, temporal concept (Campbell, 1969). Given that variation is constantly reducing and disappearing (Lewin et al., 2004), achieving and maintaining organizational fitness may be associated with the capability to produce variation. The key sources of variation are organizational entities that retain and transfer information through time (Durand, 2006). Organizational fitness thus arises from elements of organizational memory that preserve, assimilate and disseminate knowledge across occasions (Cohen & Bacdayan, 1994). That is, processes of replication and recombination (which lead to variation) are associated with organizational fitness. It is the ability to code images (rather than the images themselves) that underlies the generation of variety (March, 1991; Boisot, 2002). Further, organizational fitness is conceptualized here as a learned ability to generate blind variations. Blind variations learn from history and are associated with the retention process, but are indistinguishable from deliberate variations.

This study identifies two distinct dimensions of organizational fitness, namely growth fitness and survival fitness (Table 38, Row 1). Prior research has generally assumed that organizational fitness is a unidimensional concept e.g. Larréché (2002), Beer (2003). However, Schwaninger (2000), Davenport et al., (2006), and Helfat et al., (2007) have suggested that there may be multiple dimensions of organizational fitness. This empirical study contributes to that emerging research stream. Growth fitness refers to a capability for variety generation by structuring information within the firm. In this study, growth fitness is associated with visualization, imagining possible routines from information. Survival fitness refers to a capability for variety generation by reconfiguration of activities at the firm level. Survival fitness is associated here with visualizability, the capability that takes advantage of routines to generate possible coherent images (Boisot & Child, 1999; Siggelkow & Rivkin, 2006).

To what extent is organizational fitness related to business performance for SMEs?

This study proposes that organizational fitness and business performance are related by a mechanism that depends on a dual-nature perspective of organizations (Table 38, Row 2). Organizational fitness, described above as capability for variation, conditions selection pressures on tangible organizational entities that interact with their environments (Durand, 2006).

To support this argument, an organization must be viewed as a collection of entities that interact with the environment, as well as a collection of entities that enable the organization to replicate its performance (Hodgson, 2001; 2003). Differently expressed,

an organization is the sum of its resources and capabilities, as well as its environmental interaction (Jones 2004, 2005). This perspective reinforces the view that current functionality and the history of an organization are intricately related (Boyd & Richerson, 1985; Levitt & March, 1988; Baum & Singh, 1994; Kogut & Zander, 1996; Jones, 2005).

The dual-nature perspective enables the association of organizational fitness with an *upward* variation process, and business performance to be linked with a *downward* selection process. Performance results from the capability to exchange and transform tangible resources, e.g. Beer (2003), McCarthy (2004), Voelpel, Leibold, & Mahmoud (2004). Higher order interactive entities select lower order entities. Thus capability to vary ongoing routines (Nelson & Winter, 1982), resources, and procedures, determines the form of the organization that interacts with the environment and that is subject to variable selection pressures.

By viewing fitness in genealogical terms, and performance in ecological terms, the two concepts can be non-tautologically linked. This is an important contribution, because in existing studies organizational fitness and business performance are frequently both conceptualized in terms of context-dependent selection of tangible entities such as products and services. As a result, the relationship between fitness and performance has been open to criticisms of circular reasoning and a tautological trap of not defining fitness independently of actual survival (Mills & Beatty, 1979; Byerly, 1986; Mathen & Ariew (2002); Ariew & Lewontin, 2004). Thus this study extends the research domain of organizational fitness by utilizing a dual-hierarchy theory (Volberda & Lewin, 2003; Durand, 2006) to separate fitness constructs (in terms of variation) from performance constructs (in terms of selection).

This empirical study explores the link described above between organizational fitness and business performance specifically for SMEs (Table 38, Row 2). By restricting the focus to smaller firms, links between fitness and performance may be more clearly assessed. This is because there is literature which suggests that relationships between fitness and performance may be different for large firms and SMEs. Managers of corporate firms vicariously anticipate selection by the competitive environment and buffer sub-units from external selection (Campbell, 1994; Volberda & Lewin, 2003). Corporate managers are better able to restrict competition by seeking positional advantage through merger, acquisition, and alliances (Lawrence & Lorsch, 1977; Barnett et al., 1994). The result is that large organizations are protected from

selection pressures that might otherwise weed out unfit smaller firms due to size, structure and market position.

This study identifies two dimensions of survival and growth performance in SMEs (Reynolds, 1987; Cooper et al., 1994; Hall, 1995; Chrisman et al., 1998; Wolff & Pett, 2006). Further, this study confirms research that assumes survival performance precedes growth performance (Churchill & Lewis, 1983; Scott & Bruce, 1987; Chandler & Jansen, 1992; Audretsch, 1995; Audretsch et al., 2004). The results of these studies are extended here to a New Zealand setting.

Can a SME improve its organizational fitness?

This study explores the interplay between an evolutionary perspective and a strategic management perspective (Table 38, Row 3). An integrative approach finds expression with model development that preserves the authenticity of the two distinct theories. “The juxtaposition of different theoretical perspectives brings into focus contrasting worldviews of social change and development” (Van de Ven & Poole, 1995:511). Stronger and broader explanations of organizational fitness result from the approach adopted here of interrelating evolutionary and strategic perspectives (Poole & Van de Ven, 2004; Voelpel, Leibold, & Mahmoud, 2004). Further, the quantitative method presented has sought to provide empirical evidence, in contrast to previous studies of organizational fitness that have been restricted to proposing theoretical models.

This study identifies that dynamic capabilities of knowledge acquisition, assimilation and transformation (Table 38, Row 3) are positively related to growth fitness for SMEs (Cohen, 1990; Eisenhardt & Martin, 2000; Zahra, 2002; Jansen et al., 2005). Gray (2006) identified a positive link between knowledge acquisition, assimilation and growth-orientation for SMEs, and this study corroborates and confirms this link for SMEs in a New Zealand setting. Further, this study demonstrates that for SMEs, knowledge acquisition, assimilation and transformation can be assessed subjectively rather than with traditional ratio of R&D expenditure to sales (Cohen & Levinthal, 1990; 1994; Levinthal, 1994; Lane & Lubatkin, 1998; Zahra & George, 2002). The finding is particularly relevant for SME research, since many SMEs do not have clearly identified or disclosed R&D expenditure as do large firms. Thus the study contributes to an emerging research stream which has suggested there are influences other than a firm’s prior level of related knowledge on the coevolution of a firm’s knowledge

management and its knowledge environment (Van den Bosch et al., 1999; Van den Bosch, Van Wijk, & Volberda, 2003; Jones, 2004).

Finally, this study contributes to research on relationships between combinative capabilities and organizational survival fitness (Voelpel, Leibold, & Tekie, 2003; Beer, 2003). Dynamic coordination capabilities, socialization capabilities and systems capabilities are shown to be positively linked with survival fitness of SMEs. That is, the survival fitness of SMEs is associated with their abilities to integrate individual knowledge and routines (Kogut & Zander, 1996). The value of individual knowledge is only realized if there is integration at a collective level so that new firm-level competencies are generated (Daft & Weick, 1984; Hitt & Tyler, 1991; Grant, 1996a; Brown & Eisenhardt, 1997; Pavlou & El Sawy, 2005). Existing research on combinative capabilities has largely focused on work units in large firms, (e.g. Van den Bosch, 1999, Pavlou & El Sawy, 2005). This study extends the research domain slightly by measuring combinative capabilities for a different population of small firms.

MAJOR FINDINGS

Growth Fitness of SMEs

This study finds that organizational growth fitness is a second-order construct reflected by constructs of knowledge acquisition, knowledge assimilation and knowledge transformation. Knowledge acquisition is the capability to acquire externally generated knowledge. Knowledge assimilation is the capability to analyze, process, and comprehend information obtained from external sources. Knowledge transformation is the capability to blend existing and acquired knowledge to develop new knowledge (Szulanski, 1996; Zahra & George, 2002; Jansen et al., 2005).

The finding that organizational growth fitness is a second-order construct supports research e.g. Cohen (1990), Eisenhardt & Martin (2000), Tsai (2001), Zahra (2002), Jansen et al. (2005), Gray (2006) that capabilities of knowledge acquisition, assimilation, and transformation are positively correlated with each other and with potential for growth. Thus a second-order structure for growth fitness makes theoretical sense, and this finding provides empirical support for the existence of a nomological 'network' (Straub et al., 2004)

The finding provides support for several related streams of research. First, a knowledge management stream (Boisot, 1998; Hansen et al., 1999; Zollo & Winter, 2002) hypothesizes a link between information structuring and cognitive variety (how

well a firm can see opportunity). Second, a systems perspective that internal diversity within the firm is a fundamentally important source of exploration that drives learning. A SME with high growth fitness has “internal possibilities of choice or response that it can bring into play” (Allen, 2001:150). Third, a complexity perspective that capability to generate internal variety is positively related to developmental learning⁶¹ (Aldrich & Ruef, 2006). These related ideas are supported by the finding here that capability to generate variety within a firm is associated with information structuring.

Survival Fitness of SMEs

This study finds that organizational survival fitness is a second-order construct positively associated with coordination, socialization, and systems capabilities. Coordination capabilities reflect the extent of participation by individuals in organizational decision making (Lawrence & Lorsch, 1967; Hage & Aiken, 1969; Hage & Dewar, 1973) as well as the degree of decentralization (Van den Bosch et al., 1999). Socialization capabilities are indicated by the presence of tacitly understood processes that enhance sharing knowledge with colleagues, understanding each others’ responsibilities, and relying on the group system (Weick & Roberts, 1993; Pavlou & El Sawy, 2005). Systems capabilities measure the degree to which rules are observed within the firm (Deshpande & Zaltman, 1982; Jaworski & Kohli, 1993), and the use of systematic procedures for day to day operational procedures (Nelson & Winter, 1982).

Survival fitness is comparable to a second-order construct of *reconfigurability*, the ability to deploy superior new configurations of functional competencies (Pavlou & El Sawy, 2005; 2006). Reconfigurability is also associated with capabilities that include coordination and socialization (collective mind), which resonates strongly with the concept of survival fitness in this study. However, reconfigurability measures the ability to *deploy* new configurations; survival fitness is conceptualized here as the capability to *generate* new configurations, an important distinction. Further, a reflective second-order model is utilized in this study, in contrast to the formative model of Pavlou & El Sawy. Coordination, socialization and systems capabilities vary together, and are hypothesized here as non-substitutable. For example, a lack of socialization capabilities is not compensated by superb coordination capabilities. The reflective construct of

⁶¹ Developmental learning is inferential and vicarious, and not limited to trial and error or direct experience (adaptive learning)

survival fitness deployed here thus differs subtly from the reconfigurability concept of Pavlou & El Sawy.

Interestingly, this study found that routinization, measured by repetitious tasks and environments with very few unexpected and novel events, is not a distinguishable one-dimensional concept for SMEs. This finding does not agree with prior research (Jansen et al., (2005). Perhaps the reason for the disagreement in findings is that Jansen et al. studied organizational units of large multi-unit financial services firms with branches in various countries. The unit of analysis here was different (SMEs that are not part of a larger corporation). Routinization may thus be a factor for multi-unit financial services firms, but was not found to be a measure of a SMEs organizational fitness.

Business Performance of SMEs

This study finds that business performance of SMEs can be measured in terms of two constructs, growth performance and survival performance. *Growth performance* is the change in business and financial volume relative to the market. *Survival performance* is profitable financial performance. The identified constructs corroborate findings of meta-analyses of small business performance measurement (Friedlander & Pickle, 1968; Schwenk & Shrader, 1993; Murphy et al., 1996).

The finding confirms that organizational performance of SMEs is multidimensional, that growth and profitability are positively related, and that survival performance positively influences growth performance.

Multidimensional. The research findings confirm that a one-dimensional concept of performance is not appropriate for SMEs (Dollinger, 1984; Stuart & Abetti, 1987; Bhargava, Dubelaar, & Ramaswami, 1994; Man et al., 2002), and that two dimensions of survival and growth performance are appropriate (Reynolds, 1987; McCann, 1991; Cooper et al., 1994; Hall, 1995; Chrisman et al., 1998; Wolff & Pett, 2006). For example, Hall (1995) concluded that survival and growth are distinguishable performance dimensions for small U.K. firms, and this conclusion is confirmed here in a New Zealand setting. Similarly, two performance dimensions for manufacturing SMEs were identified by Wolff & Pett (2006); this study extends their finding to other types of SMEs. Thus the result for business performance reported here adds to existing empirical evidence that profitability and growth are distinguishable concepts for small business (Cragg & King, 1988; Chandler & Jansen, 1992; Peel & Bridge, 1998).

Positive relationship. This study confirms growth and profitability of SMEs are positively related, e.g. Chandler & Jansen (1992), Wolff & Pett (2006). No evidence

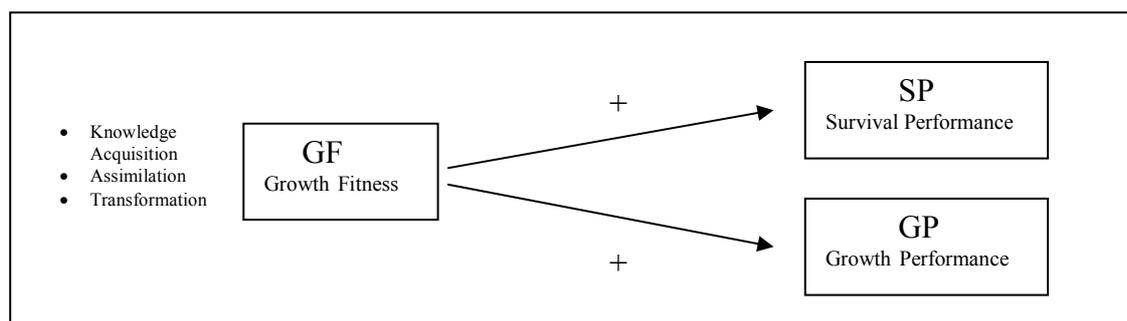
was found that SMEs pursue short-term profitability and neglect growth, intentionally (Birley, 1987; Birley & Westhead, 1990) or because of the influence of an industry sector where scale efficiencies are relatively unimportant (Audretsch, 1995:449) (p.449). Further, the findings here did not support the idea that SMEs pursue growth performance and ignore short-term profitability, perhaps because of environmental conditions (Covin & Slevin, 1989), or lifecycle stage theories that at different times there might be a different emphasis on growth versus profit (Churchill & Lewis, 1983; Scott & Bruce, 1987).

SME profitability was confirmed by this study to be a precursor to growth. Expressed differently, expansion is found to be subsequent to profitability for SMEs (Churchill & Lewis, 1983; Scott & Bruce, 1987; Audretsch, 1995; Audretsch et al., 2004). SME financial efficiency and profitability precedes the development of superior internal organizational processes relative to competitors and the marketplace⁶².

Growth Fitness and Business Performance

This study finds that growth fitness is positively related to growth performance, and positively related to survival performance for SMEs (Figure 28). Dynamic capabilities for production of variety within the firm positively influence business performance for SMEs. This is an exciting result. Knowledge acquisition, assimilation, and transformation enable a SME to generate internal variety. In turn, the capability to produce internal variety influences both profitability and business growth.

Figure 28: Growth Fitness and Business Performance



This finding supports literature that associates knowledge management with competitive advantage (Kogut & Zander, 1992; Grant, 1996a; 2003; Teece, 2003).

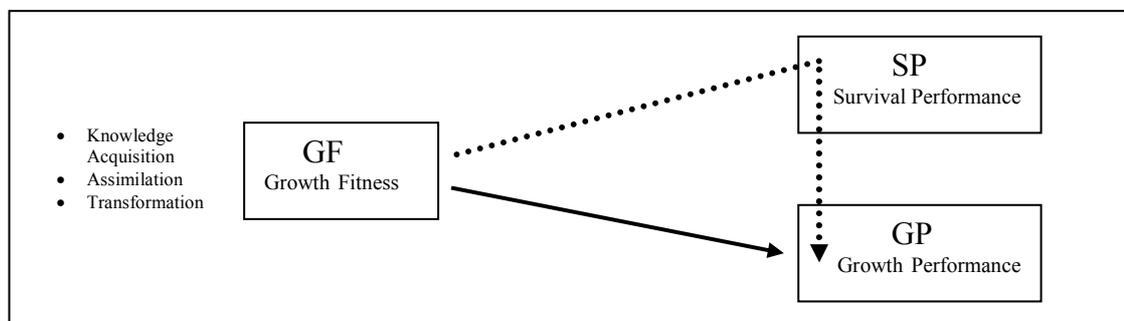
⁶² It was not the focus of this cross-sectional study to empirically test for direction of causality. Causal flows may be hypothesized depending on the research objectives. "The critical factor is that the model be grounded in theory to the extent possible" (Keats & Bracker, 1988:45)

McCann (2004) has discussed a similar idea: agility and resiliency depend on a firm's ability to learn and relearn, acquire new knowledge, and interpret findings. Thus a constant stream of new ideas and possible choices ultimately enhance competitive advantage (Beinhocker, 1999), which may in turn lead to firm performance (Porter, 1985; Barney, 1991; Jennings & Beaver, 1997).

Further, the relationship between SME growth fitness and business performance is not moderated by five firm characteristics or contextual variables, namely size, age, contextual ambidexterity, administrative intensity, and ownership. This finding is interesting because the five manipulated firm-level variables were expected to have different effects on SME business performance (Birley & Westhead, 1990). Thus SME growth fitness as defined in this study is relatively context-free. The influence of the immediate environment⁶³ on growth fitness is secondary to the internal resources and capabilities of the firm (Penrose, 1959). Eisenhardt & Martin (2000) have suggested that although dynamic capabilities are idiosyncratic in their details and path dependent in their emergence, some have significant commonalities across firms, and the finding here provides support for this perspective. Organizational dynamic capabilities may be more homogeneous and substitutable than has usually been assumed. The finding here resonates with Hall (1995) who found in a survey of small U.K. firms that the immediate environment in which a firm operates did not have the expected large impact on its survival or growth performance.

Further, the relationship between SME growth fitness and growth performance is partially mediated by survival performance. That is, the total effect of growth fitness on growth performance consists of a dominant direct effect (solid arrow, Figure 29) and a secondary (indirect) effect (dotted arrow).

Figure 29: Partially Mediated Effect of Growth Fitness



⁶³ None of the contextual variables controlled for the broader external environment.

Thus survival performance partially accounts for the relationship (as an intervening variable) between growth fitness and growth performance (Baron & Kenny, 1986; Sekaran, 2003; Hair et al., 2006). When the translational concept of survival performance is removed, the effect of growth fitness on growth performance is reduced markedly, but still remains significant. Thus capability for variety within the firm influences growth performance directly and also indirectly through a consequence of increased survival performance. This partially mediated relationship is found to be invariant across levels of selected firm-level variables (Baron & Kenny, 1986:1179).

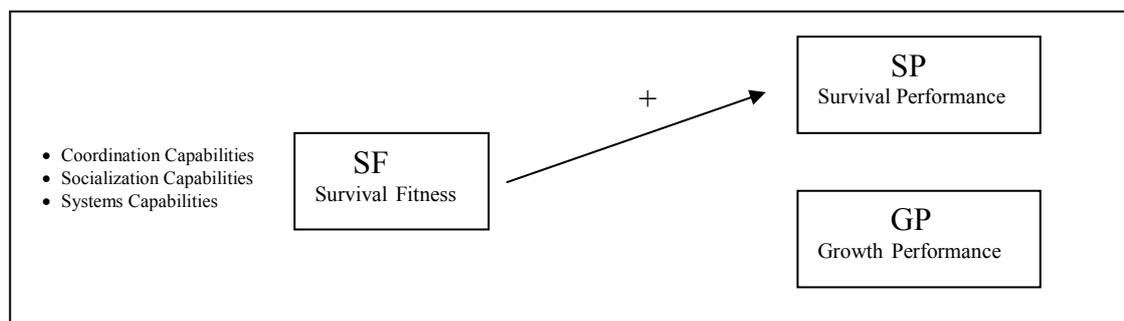
In summary, organizational capability for variety generation within the firm, enabled by knowledge management, is positively associated with higher levels of both profitability and growth for SMEs.

Survival Fitness and Business Performance

Survival fitness was found to be positively related to survival performance. Combinative capabilities that generate firm-level variety (change in organizational form) positively influence profitability for SMEs. Again, this result was exciting.

Equally interesting, this study finds (as hypothesized) that survival fitness has no direct impact on growth performance (Figure 30).

Figure 30: Survival Fitness Related to Survival Performance



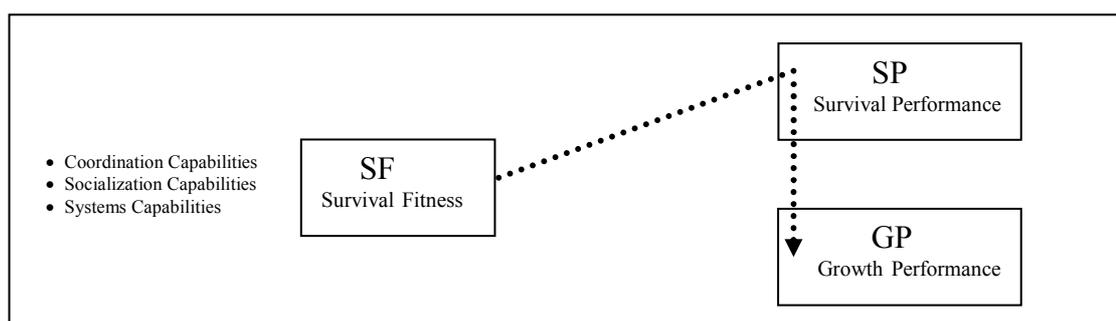
Prior research has identified that it is advantageous for a SME to have the capability to change its organizational structure (Dodge & Robbins, 1992; Chandler & Hanks, 1993; Barth, 2003). The significant relationship found here between survival fitness and survival performance, develops this idea further. Capability to generate variety at the firm-level positively influences SME survival performance (profitability). If an organization's capability for rearrangement (structural, procedural, strategical) is low, it has little capability to influence market variation and retention. This lack of influence

ultimately implies that selection pressures are greatest for properties that it cannot and has not adopted (Durand, 2006). The nonsignificant relationship between survival fitness and growth performance suggests that capability to generate variety at the firm-level by knowledge sharing does not significantly influence SME growth performance. In sum, it was found here that combinative capabilities enable profitability but have little direct effect on growth in financial or business volume.

Further, this study found the relationship between survival fitness and business performance was not moderated by several performance contingencies. This result supports coordination theory claims that dependencies and mechanisms for managing them are general and found in a variety of organizational settings (Crowston, 1997). Ability to generate alternative resource configurations by way of imitation and experimentation fosters the emergence of differential firm performance, regardless of industry differences (Ketchen et al., 1997; Zott, 2003). Weick & Roberts (1993) noted: “a smart system does the right thing regardless of its structure and regardless of whether the environment is stable or turbulent” (p.377). This result suggests that for SMEs, ability to coherently reconfigure organizational resources and capabilities explain sustained profitability (Hansen & Wernerfelt, 1989; Grant, 1991; Powell, 1992; Sanchez, 2003; Tallman, 2003).

Further, this study found that the relationship between SME survival fitness and growth performance was positively mediated by survival performance (Figure 31).

Figure 31: Fully Mediated Effect of Survival Fitness



The indirect effect of survival fitness on growth performance was found to be more significant than a direct effect. SME growth performance is not directly influenced by development of knowledge sharing capabilities, but these capabilities may indirectly influence growth through improved sustainable profitability. The indirect effect of survival fitness on growth performance may provide an explanation for the contradictory findings to those of Jansen et al., (2005), who concluded that combinative

capabilities strengthen a firm's absorptive capacity (and by implication its growth performance).

In summary, a collective capability to generate a variety of new configurations, enabled by combinative capabilities, is directly associated with higher levels of profitability and indirectly associated with higher levels of growth of SMEs.

IMPLICATIONS

Implications for Theory

The findings of this study imply that organizational fitness is a *non-causal, multi-dimensional* phenomenon. Further, organizational fitness can influence the business performance of *boundedly rational SMEs*. Organizational fitness is enabled by *dynamic capabilities* of knowledge management, rather than *routinization*. The findings of the study also have implications related to *innovation*. The theoretical implications mentioned above are highlighted as eight italicized terms, and each is discussed next in turn.

Non-causal. In this study, organizational fitness is associated with the capability to produce variations. An implication that follows from this conceptualization is that fitness may influence performance indirectly rather than directly. Expressed differently, generation of variation does not cause selection of those variations, but may influence the selection process (Durand, 2006). A SME has freedom to take autonomous actions, but consequences of variations are not linked to their intention. Campbell (1969) stated that the source of variations, whether they are intelligent or random, is irrelevant; the more numerous and heterogeneous the variations “the richer the opportunities for an advantageous innovation” (p.73).

Thus organizational fitness is not implied here as a necessary and sufficient cause of business performance. In this strong sense, fitness is non-causal. However, in a weaker sense organizational fitness indirectly enables performance, when complemented by superior strategic management of variations that are offered for selection. This restricted view of a causal relationship means organizational fitness does not suffer tautologically in terms of superiority of performance (Eisenhardt & Martin, 2000) or in terms of causation of performance (Durand, 2000; Powell, 2000). Relationships discussed in this study are not deterministic but rather describe an increased likelihood that an effect will occur (Shadish et al., 2001).

Two important debates in the strategic literature are whether or not competitive advantage (Peteraf, 1993; Barney, 1995; Durand, 2001; Powell, 2001) and market demand (cf. Teece, Pisano & Shuen, 1997) are each necessary and sufficient conditions for competitive returns. This study contributes to this debate by exploring whether “the conjunction of competitive advantage *and a capable organization* is sufficient and necessary to lead to superior returns” (Durand, 2001:867, added italics). A capable organization in terms of this study is one that has a degree of growth fitness, and has a degree of survival fitness. The implication here is that a conjunction of growth fitness and competitive advantage can explain superior business performance. Further, a conjunction of survival fitness and market demand can lead to superior business performance.

Multiple Dimensions. The identification of two distinct aspects of organizational fitness for SMEs has implications for theory. Existing studies have generally assumed that organizational fitness is a unidimensional concept, and consequently that organizational fitness may be improved by a single set of factors. For example, Larréché (2002) measured twelve fundamental capabilities that contribute in an aggregated sense to a firm’s competitive fitness, and Beer (2003) identified a set of capabilities that enables comprehensive organizational fitness. However, several recent studies (Schwaninger, 2000; Davenport et al., 2006; Helfat et al., 2007) have hypothesized multiple aspects of organizational fitness.

The finding of this study that there are two aspects of organizational fitness for SMEs implies that capabilities that enable growth fitness are different to those that enable survival fitness. Growth fitness is related to capability for variation at an internal, capability level, but survival fitness is linked with capability for variation in organizational form. Thus different dynamic capabilities are appropriate for variation at each of these levels. First, at a resource/capability level that exists within the firm, the ability to learn is an important source of fitness (Levinthal & March, 1993; Simonin, 1997). A collective capability to acquire, assimilate and transform organizational knowledge (Kogut & Zander, 1992; Grant, 1996a; 2003; Teece, 2003) is central to organizational growth fitness. Second, at an organizational level, survival fitness is related to capability of variety generation by identity renewal and reconfiguration of activities (Durand, 2006; Siggelkow & Rivkin, 2006). Combinative capabilities of coordination, socialization and systems capabilities foster capability to produce variation in organizational form. The findings here imply that future studies of organizational fitness of SMEs should adopt a multidimensional perspective of

organizational fitness. Further, the approach to measurement of organizational fitness should not be limited to a single set of measures. The multidimensional nature of organizational fitness found here implies that different capabilities that are measured appropriately capture a more complete assessment of two separate aspects of organizational fitness.

Performance. A relatively common practice in previous studies has been to create a single index for SME performance measurement. An aggregated product of importance and satisfaction scores has been widely used as a measure of a firm's overall business performance e.g. Naman & Slevin, (1993). The findings of this study imply that measurement of SME performance should not reflect a unidimensional perspective (Lewin & Minton, 1986; Weinzimmer et al., 1998). Growth performance and survival performance are two distinguishable dimensions of SME business performance. External and internal selection processes together determine the survival and growth of SMEs (Burgelman, 1991).

A further implication of this research for business performance is that selection pressure is specific to each firm and is not an immutable, exogenous condition. As noted by Durand (2001), the selection mechanism, whether at the firm level or at a level within the firm, does not operate by comparing any one variation with some hypothetical 'gold-standard'. The selection mechanism chooses optimally among presented variations. Variation implies a multiplicity of elements, whether it is technological variation characterized by multiple standards, techniques, and processes, or any other form of variation.

Bounded rationality. The integrative approach adopted in this study implies that evolutionary and strategic approaches have overlapping perspectives of managerial intention (Barnett & Burgelman, 1996). Management theory (firms differentiate themselves to reduce competition) and evolutionary theory (firms are different because bounded rationality prevents them from becoming identical) are simultaneously viable (Barney, 2003a; Wernerfelt, 2003). This study supports suggestions that a theme of bounded rationality links adaptive and developmental learning (Aldrich & Ruef, 2006).

Under bounded rationality, actors use imperfect representations to form mental models with simplified causal, temporal, and interactional relationships (Simon, 1991; Ethiraj & Levinthal, 2004). The implication here is that bounded rationality does not negate the possibility of intention. Forward-looking cognitive choice that resonates with strategic management (understands then acts), and evolutionary backward-looking experiential processes (acts then interprets), are part of the same 'intelligence of action'

cycle (Gavetti & Levinthal, 2000). Cognition is altered as a result of prior choices, and can therefore be considered as a form of experiential learning; in turn the accumulation of experiential wisdom is affected by cognition. Thus the learning process encompasses behavioural and cognitive change (Argyris & Schön, 1978/1996; Crossan, Lane, & White, 1999; 2000; Vera & Crossan, 2003). In sum, if organizational change is the joint outcome of adaptation and environmental selection (Volberda & Lewin, 2003), then it is implied here that conceptualization of organizational fitness must include both evolutionary and strategic management perspectives.

Dynamic Capabilities. This study has implications for strategic theory that contemplates organizational fitness as an enabler of business performance. Dynamic capabilities that foster capability for variation must be embedded in the SME, particularly context-free dynamic capabilities that promote knowledge creation and integration within the firm (Spender, 1966). SMEs will likely benefit by investing in capacity to access and absorb external knowledge (Cohen & Levinthal, 1990) and systematically impose structure on information (Boisot, 1999, 2002). SMEs will also benefit by investing in capacity to integrate individual's specialized knowledge (Grant, 1996a; 1996b; Kogut & Zander, 1996). Dynamic capabilities such as coordination, socialization, and systematic capabilities enable the diffusion of organizational knowledge.

The implication is that a SME needs to have the capability to manage information and knowledge, both tacit and explicit, better than the market (Grant, 1996). Superior knowledge management depends on employee access to, and integration of, knowledge within and external to the firm. A collective utilization of individual knowledge for the accomplishment of common goals (Durand, 2001) rests on the assimilation and integration of new knowledge (Henderson & Cockburn, 1994).

Related to this implication, a SME must develop a strategic view of selection pressure, and use antecedents of organizational fitness to reduce selection pressures or pass them on to competitors. Decisions by strategic managers are able to modify a firm's own selection pressures, or indirectly modify the selection pressure borne by competitors. A way of increasing the odds for a firm to achieve superior business performance consists of modifying competitors' perceptions and "displacing the locus of selection toward new capabilities or resources" (Durand, 2001:407).

How can a SME influence selection pressures – if not the process – so as to increase the odds of its success? It is the capability to generate variation that transfers the selective pressure from a firm to its competitors. The implication is that SMEs must

address creation of variety on two levels: a capability to renew current knowledge (growth fitness) and capability to disseminate new knowledge (survival fitness). Asset orchestration describes the management of both functions of dynamic capabilities: search and selection on the one hand, configuration and deployment on the other (Helfat et al., 2007). The more dynamic a firm's resources (capability for variation), the lower the selection pressures on a SME will be relative to its competitors.

Routines and routinization. “A routine is an executable *capability* for repeated performance in some *context* that has been *learned* by an organization in response to *selective pressures*” (Cohen et al., 1996) (p.683, original italics). If routinization is measured simply as the extent to which unexpected and novel events occur each day as inputs are converted into outputs (Withey et al., 1983), this constrained perspective of routinization is not associated with SME survival fitness. For example, Hannan and Freeman (1984) discussed ‘reproducibility of structure from day to day’ resulting from reliable, non-variable routines (p.154). The implication of the findings of this study is that routinization as reproducibility is not associated with survival fitness for SMEs (although possession of superior operating routines may be associated with selection).

A SME requires search routines in order to implement future strategy, and to escape from any adverse influences of its current organizational trajectory (Levinthal & March, 1993). The fewer search routines engaged in by a firm relative to its competitors, the more the firm will be forced to adhere to the current trajectory, and the higher will be the selection pressure on the firm. Superior potential to conduct search routines sets the conditions for changes that are controlled by the firm, rather than changes that are controlled by an external selection mechanism. Although organizational fitness enables a trajectory to be altered, it does not enable a firm to anticipate which strategic resources are likely to provide it with a superior trajectory.

Innovation. How novelty is accounted for is a fundamental issue in organizational science. Witt (2000) promoted the concept of methodological individualism: novelty is created and disseminated by individuals and not by the firm as a collective⁶⁴. Witt implies that the behaviour of the firm is linked to that of the entrepreneur, that is, individual behaviour shapes organizational behaviour.

However, the findings of this study have a different implication for innovation: firms can shape individual behaviour. A deliberate effort to improve a system by innovation

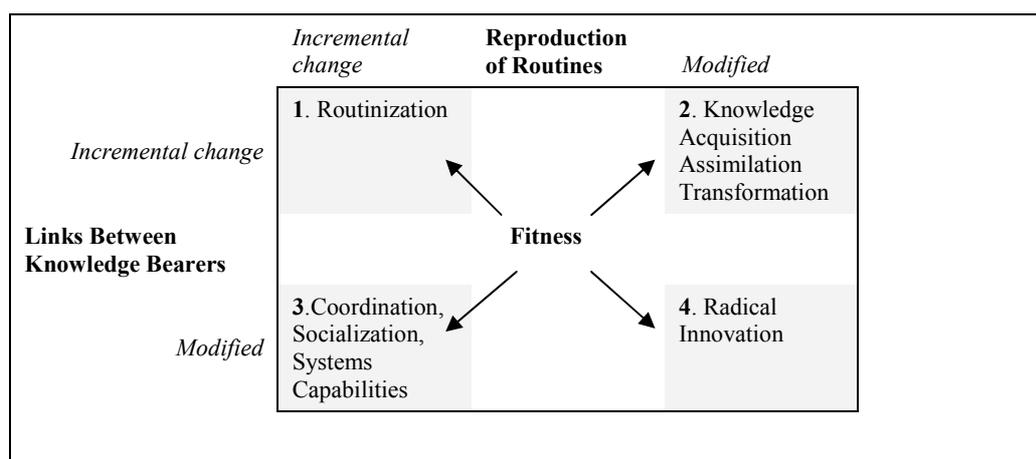
⁶⁴ Organizational behaviour results from the interests and beliefs of organization members. Thus groups and social organizations have no ontological reality; references to firms are simply “convenient summaries of individual behaviour” (Campbell, 1994) (p.24).

usually involves *intrapreneurship* rather than entrepreneurship (Jones, 2005).

The difference between entrepreneurship and intrapreneurship is the context of the act, that is, selfish innovation versus innovation on behalf of the firm. Carrier (1996) defined intrapreneurship as the “process of creating new business within established firms to improve organizational profitability” (p.6), and argued that intrapreneurship is essential for innovation (leading to improved flexibility, competitiveness and reactivity). Intrapreneurship is “essentially a collective effort that requires high levels of collaboration to achieve successful transformation” (Jones, 2003b:143). In this study, the implication is that SMEs can shape the environments in which they operate by means of organizational fitness (Espejo & Schwaninger, 1993). Innovation is associated here with the notion of a strong network of intrapreneurs. The more the organization can be characterized by a strongly-coupled network of autonomous, innovative people, the more it can influence the selection pressures it faces.

A suggestion for future research is that the link between organizational fitness and innovation (Barnett & Storey, 2000) might be explored in more depth. For example, Henderson & Clark (1990) have suggested that innovation may involve modification of routines or modification of the links between knowledge bearers. This leads to four types of innovation: incremental, modular, architectural, or radical. The ideas of Henderson & Clark can be juxtaposed with enablers of organizational fitness identified in this study in a two dimensional array (Figure 32).

Figure 32: Linking Fitness and Innovation



In Figure 32, organizational routines are knowledge components which may be modified or left unchanged (see across the top of array). The manner in which routines are integrated into a coherent whole may be modified or left unchanged (see left side of array). Routinization (cell 1) corresponds to a notion of incremental change: existing

routines, and the architecture that links them, are refined under a routine process of repetition. Growth fitness (cell 2) might be associated with the notion of modular innovation: new design concepts and the way in which they are implemented are acquired and assimilated, but modules are still largely linked as per the existing architecture. Survival fitness (cell 3) might be related to architectural innovation: routines are left relatively unchanged, but the way in which these routines are linked together evolves as a result of coordination, socialization and formalization. Cell 4 of the array in Figure 32 is radical innovation, and reflects success that depends on the “synthesis of unfamiliar technologies in creative new designs” (Henderson & Clark, 1990:14).

Figure 32 suggests that organizational fitness proposed in this study derives mainly from the evolutionary and dynamic capabilities literatures (cell 2 and cell 3), and sits between the inertia approach of population ecology (cell 1) and the complexity literature (cell 4). This framework thus neatly locates the four lenses for viewing organizational fitness described in Chapter 2. Links between SME fitness and innovation may perhaps be explored using this framework as a starting point.

Support for the array of Figure 32 is provided by Collis (1994), who identified three categories of organizational capabilities. The first category, static capabilities, is resonant with replication. The second category, dynamic capabilities, is resonant with fitness; a third category of creative capabilities is related to *complexity-absorbing* (Boisot & Child, 1999; Lengnick-Hall & Beck, 2005) enablers of fitness. Creative capabilities provide an avenue for future research. Exploring creative capabilities may allow a perspective of organizational complexity to be incorporated in an expanded integrative approach for organizational fitness. That is, insights of a complexity lens for viewing organizational fitness identified in the literature review (Chapter 2) may be included to enrich the perspective of organizational fitness further. Under a complexity perspective, parts form an interdependent unity with the whole. Henderson & Mitchell (1997) stated that “reciprocal interactions at multiple levels of analysis between the market environment and firm capabilities shape business strategy and performance, while interactions between strategy and performance, in turn, shape both organizational capabilities and competitive environments” (p.6). Small enterprises are simultaneously social creations and creators of social meaning (Allaire & Firsirotu, 1984). Thus links between organizational fitness and complexity (Kauffman, 1993; Anderson, 1999; Dooley & Van de Ven, 1999) may be explored in future research. In particular, the idea that the fittest organizations are those that exist on the boundary of structure and chaos

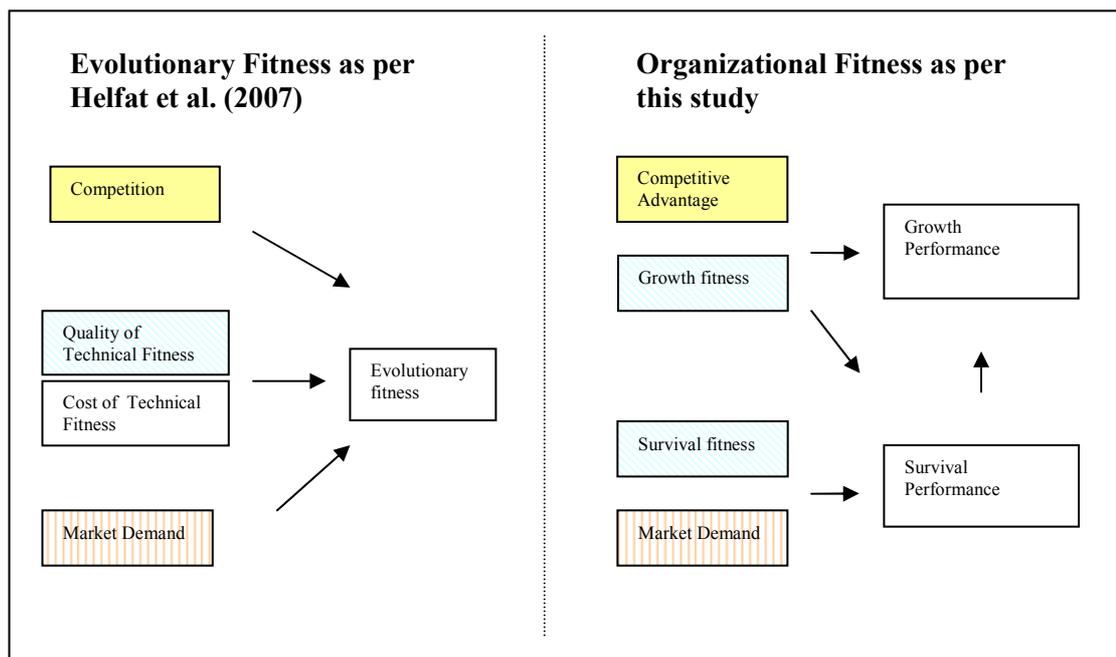
might explain organizational-environment coevolution. Coevolutionists propose multi-directional causality, and mutual, lagged, and nested effects (March, 1994; McKelvey, 1994; Lewin, Long, & Carroll, 1999; Eisenhardt & Galunic, 2000; Nelson, 2001; Volberda & Lewin, 2003; Henderson & Stern, 2004).

Implications in the Context of Recent Research

Davenport et al. (2006) suggested that organizational fitness is the ability to self-organize quickly and effectively in the face of change, and is also the ability to adapt to the dynamic environment. The implications of the current study are somewhat different to those of Davenport et al. The findings here imply that capability for variation enables organizational fitness. First, at a level within the firm, fitness is assessed by the capability to acquire and transform knowledge, rather than the ability to keep pace or reorganize faster than competitors (cf. Davenport et al. p.427). Second, at the firm level, fitness is assessed by the capability to share and coordinate knowledge, rather than being well-suited for the current environment (cf. Davenport et al. p.427). Thus the implications of this study place less emphasis on reaction to the competitive environment and environmental context. A subtle, but important difference in implications is that Davenport et al. suggest organizational fitness is *measured* by ability to shape the environment, whereas this study implies organizational fitness *enables* capability to shape the environment.

A model recently proposed by Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece & Winter (2007) was reviewed in Chapter 2. The left half of Figure 33 shows the model of Helfat et al. (2007), and the right half shows the two models developed in this study. Concepts that are similar for both models are shaded the same colour, so as to emphasize commonalities between the two approaches.

Figure 33: Research Models Compared with Helfat et al. (2007)



Source: Helfat et al. (2007:8)

Figure 33 shows that the conceptualization of fitness in this study overlaps with a *quality* dimension of technical fitness proposed by Helfat et al. A quality dimension concerns technical fitness regardless of the cost of creating and utilizing a capability. Organizational fitness in this study resonates strongly with Helfat et al.'s concept of a context-free *technical fitness* (p.11). Both models conceptualize that growth presupposes survival, and both agree that dynamic capabilities can alter the resource base of a firm. However, there are some differences between the two models that result in different implications for SMEs.

First, Helfat et al. propose that fitness applies to dynamic capabilities, reflecting their degree of suitability for the current environment. In contrast, fitness is treated in this study as a property of a SME, not a property of the dynamic capabilities of a SME.

Second, Helfat et al. suggest that SMEs might *use* technically fit dynamic capabilities to influence the market and promote evolutionary fitness. "Firms whose managers better understand the extent to which an organization can use its dynamic capabilities to influence the environment will end up with greater evolutionary fitness" (p.12). Greater evolutionary fitness for Helfat et al. implied survival and growth. Their conceptualization implied a degree of managerial foresight that must accompany efficient use. The implications of this research are different. Although comparatively fit SMEs have an increased likelihood of superior performance, there are no guarantees. The stance adopted here, in comparison to that of Helfat et al., is that managers cannot

predict which specific variations will exert a relatively greater influence on selection pressures. That is a matter of chance. Managers should develop capability for blind variation. Increased capability for variation can reduce individual selection pressures. In the conceptualization proposed by this study, active management of specific dynamic capabilities to improve their environmental 'fit' is not proposed.

Implications for Business Practice of SMEs

SMEs do not have the size or resources to influence the selection process by creating multi-unit structures, forming alliances, creating monopolistic situations, mutual forbearance as do larger firms (Barnett, Greve & Park, 1994). Instead, they should focus on influencing selection pressures to achieve greater likelihood of improved business performance (in contrast to circumventing the selection process). They can do this by improving their organizational fitness, which contributes to variant possibilities of their market. The industry that is realized from this market selects properties offered by SMEs. It chooses between presented and possible variations. Organizational fitness can thus transfer selection pressures on to those firms who have not and cannot offer these variations. Organizational fitness is thus indirectly linked with performance. SMEs should focus on amplifying capability for variety, not dampening selection pressures, the strategy often adopted by large firms. SMEs hurt from competition but learn as a result: they develop better with competition than multi-unit structures because they don't protect position at the expense of learning.

This research finds that there is a positive relationship between organizational fitness and business performance for SMEs under a variety of contingencies. The finding has implications for the business practice of SMEs that are relevant because the research was empirical in nature, relied on ownership experience and feedback, and was based on a sound theoretical framework (Covin & Slevin, 1989). The conclusion here is that dynamic capabilities which foster capability for variation must be embedded in the SME, particularly context-free dynamic capabilities that promote knowledge creation and integration within the firm (Spender, 1966). These dynamic capabilities include:

- Knowledge acquisition, the capability to sense what knowledge and routines are relevant and to acquire those (Zahra & George, 2002). For example, SMEs should actively collect information about competitor's activities and industry information through informal means, regularly approach advisors for expert knowledge, and regularly organize meetings with customers (Szulanski, 1996; Jaworski & Kohli, 1993; Jansen, Van den Bosch, & Volberda, 2005).

- Knowledge assimilation, the capability to analyse, comprehend, and internalise information and routines (Zahra & George, 2002). For example, SMEs might develop an ongoing program of refining products and services, make more use of feedback from suppliers, distributors and the business network, improve the speed of analysis of changing market demands, and understand new opportunities to serve customers more rapidly (Eisenhardt & Martin, 2000; Kennerley & Neely, 2003; Jansen et al., 2005).
- Knowledge transformation, the capability to blend existing routines with newly acquired routines to develop new routines (Zahra & George, 2002). In this regard, SMEs should emphasize timely recognition of useful external knowledge, rapid uptake of market opportunities, and regular sharing of practical experiences. These are all indicators of knowledge transformation (Jansen et al., 2005).
- Coordination capabilities, the delegation of decision-making authority and extent of participation throughout an organization (Jaworski & Kohli, 1993). SMEs' coordination capabilities are evidenced by encouraging employee participation in decisions to adopt new programs and the hiring new staff, expecting some degree of consensus for decisions concerning business strategy, and allowing employees to take some action before seeking approval from a supervisor (Hage & Aiken, 1967; Dewar, Whetton & Boje, 1980; Deshpande & Zaltman, 1982; Dess et al., 1997; Jansen et al., 2005)
- Socialization capabilities, the ability to produce a shared ideology that offers members an attractive identity as well as collective interpretations of reality (Van den Bosch et al., 1999). Socialization capabilities are indicated when employees are encouraged to communicate with anyone they need to, when there is ample opportunity for informal talk among individuals from different parts of the firm, when contact is easy between employees, and when supervisors are accessible to all employees (Jaworski & Kohli, 1993; Jansen et al. 2005).
- Systems Capabilities: the capability to establish patterns of organizational action (Galunic & Rodan, 1998; Van den Bosch et al., 1999). The study identified that employee tasks should have a written set of rules; written job descriptions; written records of performance; clear operational procedures; and systematic procedures for day to day operational activities (Deshpande & Zaltman, 1982; Jaworski & Kohli, 1993; Jansen et al., 2005).

Finally, the findings of this study imply that constrained routinization is not associated with SME survival fitness. SMEs that reported high levels of employees performing repetitive activities, with most of their daily work following routine

procedures, and employees performing the same task from day to day (Withey et al., 1983) did not report superior business performance.

LIMITATIONS OF THE STUDY

Several limitations of this study merit discussion. First, the data used for empirical analysis were assessments by owners of SMEs. Although a number of precautionary steps were taken to limit concerns regarding single-informant data, the issue of common method bias that results from single-informant design cannot be totally ruled out. Preliminary analysis (Harman's one-factor test) found no evidence of common-method bias, but a further test for common-method variance bias using SEM indicated the possible presence of a method factor (details of the procedure is presented in Appendix I, Table 49). Thus correlations between predictor and criterion variables may be overstated, and should be interpreted cautiously.

Second, inference is mainly limited here to descriptive causation rather than explanatory causation. Descriptive causation considers the whole rather than the parts, whereas explanatory causation is molecular (e.g. takes into consideration each individual's thoughts and motivations). This study tested whether a descriptive causal relationship varies in strength or direction under Condition A versus Condition B (then the condition is a moderator variable that *explains* the condition under which the effect holds). However, only a limited and somewhat arbitrary selection of conditions was tested. Further, the use of a high/low split to define moderation is a weak form of moderation (Covin & Slevin, 1989). Finally, this study did not test competing links provided by alternative theories. In summary, causal statements are mainly descriptive. Shadish, Cook & Campbell (2002) noted that it is unrealistic in social sciences research to expect full causal explanation.

A third limitation is that data were collected only from New Zealand SMEs, and the sample that was used here was found to be slightly biased toward larger manufacturing SMEs. However, these limitations do not affect generalizability greatly because the theoretical base drawn on likely resonates more with respondents from industries like manufacturing and retail.

Fourth, interaction effects have not been fully considered in this study. For example, the main effect of survival fitness on business performance was considered separately to the effect of growth fitness on business performance. Moderator variables were only altered one at a time. Context-dependent mediation was tested in this study. That is, the studied examined if an explanatory mediator of a causal relationship in one context

mediated in another context. However, contexts were dichotomized, and only tested in isolation.

Fifth, this study explored theoretical relationships between organizational fitness and business performance, as well as measurement of those constructs (Chau, 1997). New constructs were developed for inherently difficult-to-measure constructs such as growth and survival fitness and perceived survival performance. Although the results presented here confirm the research hypotheses, the study must be considered as exploratory to some degree. For example, there is recognition that many widely used constructs in the organizational and strategy literatures are more accurately represented as formative-indicator constructs rather than as reflective-indicator constructs (Podsakoff et al., 2003). That is, for some constructs it makes more sense conceptually to view causality flowing from the measures to the construct rather than vice versa (Bollen & Lennox, 1991; Nunnally & Bernstein, 1994; Chin, 1998a). This may be the case for the dynamic capabilities associated with organizational fitness, and even for the higher-order construct of organizational fitness itself.

This study did not provide an overall combined model that contained both survival fitness and growth fitness. There is scope to test an overall combined model with both survival fitness and growth fitness that might be addressed in future research. A suggestion for further study is that organizational fitness is explored with a formative second-order model. Relative contributions of survival fitness and growth fitness to overall organizational fitness might be evaluated. This approach does not require survival fitness and growth fitness to vary together; thus a firm may have differing fitness at each level. A further advantage of a formative approach is that other levels (for example an intra-firm level) might be added to the model. A formative second-order model specifies a second-order construct as emergent. To this end, Partial Least Squares analysis (PLS) might be useful. PLS is an alternative variance-based approach to SEM (Fornell & Bookstein, 1987; Chin & Newsted, 1995; Chin, Marcolin, & Newsted, 1996; Chin, 1998b; Haenlein & Kaplan, 2004). A PLS approach maximizes the variance of the dependent variables explained by the independent variables using iterative algorithms (Chin, 2001; Gefen & Straub, 2005), and is a relatively distribution-free approach.

The choice between PLS and SEM depends on the research emphasis: PLS is more suited for application and prediction, whereas SEM methods are preferable for theory testing and development (Anderson & Gerbing, 1988; Chin, 1998b; Gefen et al., 2000). PLS has been applied in a wide variety of studies including small firm growth

(Davidsson, 1991); strategic management research (Hulland, 1999); consumer dissatisfaction (Fornell & Bookstein, 1987) and marketing research (Diamantopoulos & Winklhofer, 2001). In PLS the relation between indicator and construct may be specified as formative or reflective, and analysis of *effect size* is possible to quantify the magnitude of a relationship (Austin et al., 1998). PLS might thus facilitate further research into an organizational fitness construct that incorporates growth fitness and survival fitness.

A final limitation of the study is that the quantitative, non-experimental and cross-sectional nature of the design further constrains the nature of causal statements. A weakness in the quantitative method adopted here is that the social world is frozen into structured immobility and the role of human actors is downplayed. That is, a quantitative approach may exaggerate the influence of a deterministic set of forces operating in the environment (Morgan & Smircich, 1980). A correlational, cross-sectional study simply observes the size and direction of a relationship among variables at a point in time. Because of the cross-sectional design, only partial analyses of models are presented (Davidsson, 1991: 411). A series of investigations is required to confirm the organizational fitness constructs that underlie the measurement items utilized here. Clark & Watson (1995) warned: "Construct validity cannot be inferred from a single set of observations, whether these pertain to a measure's factor structure, correlations with other measures, differentiation between selected groups, or hypothesized changes over time" (p.310). Future research could address this limitation. A longitudinal study that gathers a mix of primary and secondary data over multiple time periods may provide some advantages, especially when measuring constructs such as growth performance (Chandler & Lyon, 2001).

In conclusion, this study makes a contribution to research on organizational fitness by (1) developing an evolutionary model that accommodates a strategic management approach for viewing organizational fitness; (2) exploring aspects of organizational fitness that are motivated by an integrative approach; (3) defining growth fitness in terms of the capability to generate variety within the firm; (4) defining survival fitness as the capability to generate variety in organizational form; (5) developing measurement and structural models that relate organizational fitness to business performance dimensions of profitability and growth; and (6) examining a large sample of SMEs in an empirical study.

A multivariate technique has been used to examine the relationship between organizational fitness and performance for New Zealand SMEs, and a synthesis of ideas from several literatures has been presented. By stretching the body of knowledge slightly, the study makes a contribution to the literature pertaining to organizational fitness and business performance of SMEs.

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Appendices

APPENDIX A: SME PERFORMANCE MEASURES

Table 39: Performance Measures of SMEs

Study	Units of Analysis	Context of Study	Performance Construct	Measures	Comments
(Gadenne, 1998)	Owner-managers of 369 small (less than 50 employees) firms in Queensland.	Effect of various management practices of small firms across different industry groups.	Performance defined by comparing profits generated with the amount of assets invested in the firm. "Reflects the efficiency of the firm's allocation of resources", p.37)	<ul style="list-style-type: none"> Return on Investment. Growth in ROI. 	Found a common factor across 3 industry groups: financial leverage. Small firms that start (and remain) undercapitalised were less successful.
(Schwenk & Shrader, 1993)	14 studies of small business that have examined the effects of strategic planning on performance.	Meta - Analysis comparing effect sizes and correcting for sampling error	Objective indices of performance rather than measurement of manager's satisfaction.	<ul style="list-style-type: none"> Sales or Revenue Growth ROS, ROA or ROI 	Found that formal planning is generally beneficial for small firms
(Covin & Slevin, 1989)	344 small and independently owned firms, primarily manufacturing and in business for at least five years.	Investigation of effective strategic responses to environmental hostility, under different organizational structures.	Degree of importance and current satisfaction with current financial performance. Scores were combined to form a weighted average performance index.	<ul style="list-style-type: none"> sales level, sales growth rate, cash flow, return on equity, gross profit margin, net profit from operations, profit to sales ratio, ROI, and ability to fund business growth from profits 	Performance was found to be positively related to an organic structure in hostile environments. This was linked to an entrepreneurial strategic posture and a competitive profile. Instrument is an adaptation from (Gupta & Govindarajan, 1984).
(Hall & Young, 1991)	Random sample of 182 small firms with Official receiver reports in the London area in 1973, 1978, and 1983.	Comparisons of Owner's perceptions and Receiver's perceptions of reasons for failure. Descriptive study.	Failure as a result of compulsory liquidation or creditors' voluntary liquidation	<ul style="list-style-type: none"> Undercapitalisation 15% Poor debt management 9% Poor accounting 7% Relied on few customers 6% Lack of product demand 6% Competitors 6% Inferior Product 6% High Interest rates 6% Inaccurate costing 6% Disagree with partners 6% 	Receiver's perspective, four main measures: <ul style="list-style-type: none"> Undercapitalised 15% Poor accounting 11% Operating costs 11% Excessive Pay 5% (Other reasons less than 5% responses).
(Cragg & King, 1988)	179 owner-managers of small independent metal goods manufacturers in England.	Examination of the relationships between factors important for success in small firm performance.	Self-reported financial performance as a measure of success. Excluded other measures of company health such as staff morale and employment creation.	<ul style="list-style-type: none"> Sales revenue change (1 year and 5 year) Profit as a percent of Sales Net profit before tax in three categories: increase, same, decrease 	Found mixed support that small firm financial performance was related to planning and market-oriented activities and owner characteristics.

Study	Units of Analysis	Context of Study	Performance Construct	Measures	Comments
(Maes et al., 2003)	218 Belgian small construction companies having from 6 to 50 employees. Owner-managers.	Tested the one year lagged effects of owner-manager human capital and management practices on profitability.	Profitability ratio of net return on equity.	<ul style="list-style-type: none"> Normal net profits (excluding exceptional profits) Equity Four internal factors either yes/no or three point Likert Single human capital factor 	Found that owner-manager human capital characteristics and management practices have an impact on profitability.
(Begley & Boyd, 1987)	239 randomly selected members (Chief Executives) of the Smaller Business Association of New England.	The relationship of entrepreneurial attributes to firm performance. Do they distinguish founders from managers?	Financial performance (profit) Achievement motivation, Locus of control, Propensity for risk-taking, Ambiguity tolerance, Restlessness.	<ul style="list-style-type: none"> 8 ordinal categories used Growth rate (yearly trends over five yrs, 'decreased' to 'increased 30% or more') ROA (5 years) <5% to >50% Liquidity: assets/liabilities, <1 to >3 Validated attributes scales 	Firm age and size also measured. Authors noted that liquidity more relevant to small firms than ROA. Response categories recommended by Small Business Assoc of New England.
(Verreynne, 2005b)	477 NZ small firm owner-managers with less than 100 employees	How a typology of different modes of strategy-making relate to performance.	Degree of importance and satisfaction with current financial performance. Scores were combined to form a weighted average performance index.	<ul style="list-style-type: none"> sales level, sales growth rate, cash flow, return on equity, gross profit margin, net profit from operations, profit to sales ratio, ROI, and ability to fund business growth from profits 	The simplistic, adaptive, intrapreneurial and participative modes of strategy-making exist in SMEs. The simplistic mode is most strongly related to performance, which was measured using an instrument adapted from (Gupta & Govindarajan, 1984)
(Miller, 1988)	89 managers of SMEs in Quebec Randomly selected Wide variety of industries	Relationships of Porter's business strategies to firm structure and environment.	Successful vs unsuccessful firms. Successful definition: scored above the mean on three financial performance measures.	<ul style="list-style-type: none"> ROI (5 year mean), objective Growth in net income, objective Profitability compared to competitors for last 5 years, subjective rating 	Nine firms that had mixed high and low performance indicators were deleted from sub group and interaction analyses. Success related to more detailed analysis, explicit strategies, longer planning horizons.
(Sapienza et al., 1988)	34 small electrical manufacturing firms in same geographical region: owner/entrepreneur.	Can subjective evaluations of firm performance replace objective as per (Dess & Robinson, 1984).	Overall financial performance	<ul style="list-style-type: none"> Return on sales and average sales growth (objective) Return on sales and average sales growth (subjective): firm's standing relative to competitors 	Used a three year retrospective period of performance. Quintiles were used as ordinal categories.
(Duchesneau & Gartner, 1990)	26 fruit juice distributors were chosen, all less than 7 years old. 30% of the population. Half were failed firms.	How new venture performance is related to entrepreneur traits, and firm processes and behaviours prior to / after start-up.	Survival (non-discontinuance) versus failure/ inferior profits.	<ul style="list-style-type: none"> Classification (successful/unsuccessful) based on self-reported pre-tax profits and owners salaries combined for preceding 12 months 	Successful firms more flexible, participative and adaptive, and clear, broad business idea. Nearly all purchased firms failed A mix of interviews and long questionnaire was used

Study	Units of Analysis	Context of Study	Performance Construct	Measures	Comments
(Chandler & Jansen, 1992)	134 small businesses, with a median of six employees, 2 – 25 years old.	Necessary competencies for effectiveness in entrepreneurial, managerial, technical-functional roles of business founders.	Two separate dimensions: 1. Profitability 2. Growth.	1. Sales and earnings 2. Sales growth and perceived market share All measures were requested only in broad categories.	84 manufacturing, and 50 service (restaurants, plumbing, rest homes, security systems). 38 firms matching data obtained from second source.
(Peel & Bridge, 1998)	150 managers of SMEs in the manufacturing sector of the UK, excluding micro firms with < 10 employees	Intensity of strategic planning, firm objectives, changes in environment, the use of capital budgeting.	Overall perceived performance in two dimensions: perceived goal-centred performance and perceived profitability	<ul style="list-style-type: none"> How successful a firm is in achieving its primary goals relative to competitors How profitable relative to competitors Ordinal Scale questions 	Profit improvement perceived to be most important objective, followed by sales growth. Detailed planning positively associated with importance of stakeholder objectives; the use of formal investment appraisal techniques, higher level of perceived environmental change
(O'Gorman, 2001)	SMEs in the wholesale sector in Ireland	In-depth case analysis of two companies tracked over a 20 year period.	Sustainability of growth	<ul style="list-style-type: none"> Total business turnover Sales 	
(Bhargava et al., 1994)	139 independent cooperative unions (each equivalent to a strategic business unit) in India	Does a DEA frontier of the measures of performance show greater stability, concurrent and predictive validity than individual measures of performance.	Marketing Performance: market share, effectiveness & efficiency components, elasticity.	<ul style="list-style-type: none"> Market share Growth in market share % Contribution margin per Rupee % Growth in sales volume per % growth in market 	Concluded that contribution margin (efficiency) is the best indicator of performance.
(Kara, Spillan, & DeShields, 2005)	Owners and managers of 153 retail enterprises from 3 states of USA	Market orientation in small-sized service retailers is positively associated with performance.	Market Orientation	<ul style="list-style-type: none"> Intelligence generation and dissemination Responsiveness 	
(Walker & Ruekert, 1987)	Not applicable	Marketing activities that are likely to distinguish high and low performing firms.	Business Performance: a) Effectiveness, b) Efficiency and c) Adaptability.	<ul style="list-style-type: none"> Growth of market share ROI % new products introduced to total sales 	Also recommended market share and profitability measures
(Keichen et al., 1997)	33 primary research studies	A meta-analysis of 40 original tests of the organizational configurations – performance relationship.	Organizational Configuration Membership	<ul style="list-style-type: none"> Inductive/deductive configuration Breadth of variables Sample industry Time frame 	Found that a firm's performance is partially explained by its configuration.

Study	Units of Analysis	Context of Study	Performance Construct	Measures	Comments
(Dubelaar et al., 2002)	Pharmacy Assoc. Members NZ (354) and NSW Australia (336)	Develops and tests a composite set of measures for retail productivity including exogenous factors.	Productivity: an inferred construct assumed to "represent management's ability to convert inputs into outputs (Pharmacy & Retail performance) in the circumstances" (p. 424)	<ul style="list-style-type: none"> • Sales, margin, # transactions • Labour: # employees • Size: selling space, # checkouts • Assets: value of facilities, dollars invested in store • Inventory: dollar value • Local demand: economic potential, general demand • Money-based competition: price, advert spending, deal buying 	Found important to include both demand and competition in the model of productivity.
(Shrader et al., 1989)	97 small business CEOs. Random sample stratified by industry type. Response rate 84%.	Relationship between strategic planning and performance contingent on environmental uncertainty.	Strategic planning categorized into three classes; and Operational planning (computed by weighting individual planning scales)	<ul style="list-style-type: none"> • Ordinal scales as per (Wood & LaForge, 1981) with questions similar (Lindsay & Rue, 1980). • Performance: sales, employees profits • Uncertainty: suppliers, political customers, competitors, technology. Likert scales. 	Functional areas for operational planning were budgeting, marketing, HR, inventory, sales, with 3-5 items each.
(Davidsson & Klofsten, 2003)	114 knowledge-based small firms less than 10 years old. Mail and telephone survey. Response rate 36%.	Formal operationalization of the Business Platform Model (Klofsten, 2002) . Establishment of the reliability and validity of the instrument.	Success is determined by how well a firm builds and maintains its business platform. The platform is attained by securing a resource stream and ability to utilize the resources.	<ul style="list-style-type: none"> • Forced-choice format. Relative degree of agreement on a five-point scale between two contrasted statements. • Eight dimensions: business idea, product, market, organization, core group expertise, drive/motivation, customer relations, other relations. 	Authors caution that although the instrument showed good potential as an action-oriented tool, firms should be assessed at various points in time to examine its predictive validity.
(McGee & Peterson, 2000)	255 drugstore owners self-selected from a random sample of 700 (response rate 39%).	Insight was sought into the multidimensional character of distinctive competencies that need to be developed by small independent retailers to remain competitive.	The interplay between distinctive competencies and sustainable competitive advantage. Several competency constructs and one performance construct measured.	<ul style="list-style-type: none"> • Service Image: customer service, complaints handling, store image • Control of retailing programs • Action Ability: employee training, awareness of strengths, plans into action • Performance: Gross profit, Net income, overall success 	Found that high quality service image, action ability and control of retailing programs were positively correlated with performance.
(Aragón-Sánchez & Sánchez-Marín, 2005)	1351 General managers of Spanish SMEs. Stratified sample: Industry (manufacturing, service, construction) and size (10-50; 50-250)	SME strategic orientation (Miles & Snow, 1984) is related to a resource-based view of management traits. Consequences in terms of firm performance.	Qualitative overall performance indicator. Five point scale; from 1 (much worse than rivals) to 5 (much better). Average result.	<ul style="list-style-type: none"> • Experience in the business • Ability to provide quality products/services • Capacity to develop new products and processes • Manage and work in a group • Workforce productivity 	Found that prospector orientation outperformed analyzers and defenders in this order, for all industries. A second quantitative measure, ROI, did not give significant results.

Study	Units of Analysis	Context of Study	Performance Construct	Measures	Comments
(Kargar & Parnell, 1996)	47 Senior executives of small commercial banks in North Carolina, U.S.A.	Empirical study that examines strategic planning effectiveness. A firm's ability to adapt to environmental changes is positively associated with planning characteristics.	Satisfaction with Planning. Two dimensions: satisfaction with concrete financial outcomes and satisfaction with the contribution of strategic planning to overall firm effectiveness.	<ul style="list-style-type: none"> ● Predictions of trends ● Management development ● Improving performance ● Direct financial impact ● Improving ability to evaluate alternatives and avoid mistakes ● Improvement of budget process 	All scales were (1 – 5) Likert; Much Deterioration to Much Improvement. Results show a link between 7 planning traits and planning satisfaction.
(Birley, 1987)	160 firms between 2 and 6 years old in the industrial sectors of agriculture, service, manufacturing and transport.	Examine the extent to which initial employment size alters. Whether those firms that survive and grow have any identifiable traits.	The primary measure of growth used was that of employment.	<ul style="list-style-type: none"> ● Sales level and profits previous year; forecasted sales. ● Age, Industry 	No growth in employment evident, except an increase in clerical staff. Growth in sales in early years is not an indicator of growth in employment, rather improved customer base.
(Ambler & Kokkinaki, 2002)	531 firms of all sizes in the UK with an identifiable marketer or finance officer. Qualitative interview and postal survey. Response rate 25%, skewed to marketing.	How firms assess marketing performance, and the relations between measurement practice, performance and the firm's orientation.	Marketing performance. Marketing performance = sales – costs + the increase in brand equity. (This last term was found to be poorly measured).	<ul style="list-style-type: none"> ● End user thoughts and feelings ● End user behaviour, Trade Customer ● Relative to competitor ● Innovation, Financial ● Customer and competitor orientation 	Internal financial measures are seen by management as more important in assessing marketing performance than market measures. Customer, competitor orientation positively correlated with performance.
(Cooper et al., 1994)	1053 entrepreneurs and their firms tracked over a 3-year period. All firms less than 18 months old represented all industries and all areas of the United States.	Prediction of new venture performance based on start-up factors. General human capital, Manager know-how, Industry specific know-how and Financial capital relate to 3 performance outcomes: failure; survival; growth.	Growth in employment. Firm was placed in growth category if achieved 50% extra employment as well as added 2 employees. If firm discontinued, placed in failure. Otherwise, survival.	<ul style="list-style-type: none"> ● Performance (category) 	Most resource variables were significant in expected directions for performance, and did not differentiate on whether a firm grew or survived. Claimed useful prediction of new firm performance.
(Reynolds, 1987)	548 managers of U.S. establishments less than 8 yrs old, autonomous, all industries, 25% rural, median 5 employees.	Are the factors related to societal contributions of new firms such as jobs, sales and exports, the same as the factors related to firm survival.	Societal contributions. A one year follow-up also conducted to determine firm survival	<ul style="list-style-type: none"> ● Gross sales revenue, Out-of-state exports, Job creation ● Initial performance and Rate of development: one year's sales growth rate ● Four types of firm: Low start/ Low growth. Low start/ High growth etc. ● Nonsurvival classified after verbal confirmation or no possible phone contact 	Age and emphasis on financial matters are very important for survival, not societal contributions. Development pattern dominant for societal contributions, also significant for survival. Nonsurvival related to retailing.

APPENDIX B: PERFORMANCE MEASUREMENT

Table 40: Performance Measurement Systems

Model Name	Approach	Description
Business Performance Improvement Resource (BPIR) Model	Business Excellence / Quality	Adaptation of the American Productivity and Quality Process Classification Framework. Information is classified in terms of 232 processes. • http://www.theBPIR.com
Malcolm Baldrige Model	Business Excellence	Comprehensive framework used as the basis for numerous national business excellence/quality awards. Self-assessment against detailed and comprehensive criteria. Seven major criteria with pre-assigned weights to score performance. • www.quality.nist.gov
European Foundation for Quality Management (EFQM) Model	Business Excellence/ Quality	Model views five constructs as enablers of performance and four constructs as outcomes which in turn affect the enablers. Provides the framework for national quality awards in Europe. • http://www.efqm.org
Bell-Mason Model	Business Diagnostic	Used at four different growth stages; provides a systematic multi-dimensional graphical evaluation (radar graph) of a venture across 12 dimensions. • http://www.nanyang.com.au
Tableau de Bord	Cooperative Performance Scorecard	System based in France for identifying four main phases: the context of the organization; what has to be done; how to do it; whether performance met expectations. Rivals Balanced Scorecard approach. • http://scorecard.nodesway.com
Capability Snapshot	Evaluation and improvement of organization.	Internally, management and employees and externally, customers and stakeholders, provide perceptual measures of the firm's fundamental elements and essential capabilities. • http://www.capsnap.com
Six Sigma	Business Measurement and Improvement	Analysis to measure and improve a firm's operational performance by identifying and eliminating "defects" in manufacturing and service-related processes. • http://www.isixsigma.com
Market Effectiveness Capability Assessment (MECA)	Benchmarking the fundamental capabilities of firms.	Comparison of capability profiles annually enables managers to assess their firm's progress. Identifies indicators and capabilities affecting performance. • http://www.corvaltec.com
Business Platform Model	Fundamental set of attributes that a small firm should possess in order to survive and potentially grow	Eight firm-level cornerstones. For firm survival, four of the cornerstones must be achieved at a high level, the remaining four cornerstones need to be at least at intermediate level. See Klofsten (2002)
Balanced Scorecard (BSC)	Supplements financial measures with drivers of future performance	The BSC assesses organizational performance from four perspectives: financial, customer, internal business process, and learning and growth.

Please answer each question.	Strongly DISAGREE			Strongly AGREE		
	1	2	3	4	5	6
Employees are often checked for rule violations	<input type="checkbox"/>					
Most of the important tasks that employees undertake have a specific rules manual	<input type="checkbox"/>					
Each employee has a complete written job description that is regularly updated	<input type="checkbox"/>					
Our firm keeps a written record of everyone's performance	<input type="checkbox"/>					
Employees have to follow clear operational procedures at all times	<input type="checkbox"/>					
If employees have a problem, they are supposed to go to the same designated person for help.....	<input type="checkbox"/>					
Most of the tasks which our firm performs are the same from day to day	<input type="checkbox"/>					
In our firm, most of the work that is done each day just follows routine procedures	<input type="checkbox"/>					
Basically, employees perform repetitive activities in doing their jobs	<input type="checkbox"/>					
Our firm regularly promotes its business strengths to the market	<input type="checkbox"/>					
We have an effective system that is used for in-house staff training.....	<input type="checkbox"/>					
Overall, our firm uses systematic procedures for its day to day operational activities	<input type="checkbox"/>					



75% Already Completed !!		Strongly DISAGREE			Strongly AGREE		
		1	2	3	4	5	6
Our management works as a team to support the overall objectives of the firm	<input type="checkbox"/>						
Our management sometimes causes people to waste resources on unproductive activities	<input type="checkbox"/>						
Our people often end up working at cross-purposes because they are given conflicting objectives ..	<input type="checkbox"/>						
Our firm encourages its people to challenge traditions and current practices.....	<input type="checkbox"/>						
Management is flexible enough to allow the firm to respond quickly to changes in markets	<input type="checkbox"/>						
If there is a shift in our business priorities, the firm can evolve rapidly to meet the change.....	<input type="checkbox"/>						
Our firm is achieving a high level of customer satisfaction	<input type="checkbox"/>						
Our firm is achieving a high level of employee satisfaction	<input type="checkbox"/>						
The financial stakeholders of our firm are very satisfied	<input type="checkbox"/>						

Please turn to final page =====>

Please make **two ticks for each row**- a tick for level of your firm's performance, **and** a tick for how important each aspect is to you.

	Performance					Importance		
	Decreasing significantly	Decreasing slightly	Holding its own	Increasing slightly	Increasing significantly	Not so important	important	Very important
EXAMPLE:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Monthly Cash Flow (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gross Profit Margin (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Return on Capital Invested (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Owner's Earnings (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Sales Revenue (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Net Worth of the firm (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Number of Fulltime Staff changing (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Change in Market Share of your firm (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales from Repeat Customers (last two years)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- How **many** people work in the firm, including yourself? _____
(two half-time workers = 1 full-time)
- How many **years** has the business been operating? Under 5 years 5 - 9 years 10 - 19 years 20+ years
- Who **owns** the business? I am the Owner Family Owned Investors Trust
- How many owners **actively** work in the executive team? _____
- What is the main **activity** of the business? (please tick one only)

Wholesale/retail trade	<input type="checkbox"/>	Education/health and community	<input type="checkbox"/>
Manufacture industrial goods	<input type="checkbox"/>	Agriculture/forestry/fishing	<input type="checkbox"/>
Manufacture consumer goods	<input type="checkbox"/>	Personal services	<input type="checkbox"/>
Finance and insurance/property	<input type="checkbox"/>	Transport/storage	<input type="checkbox"/>
Construction	<input type="checkbox"/>	Other	<input type="checkbox"/>

Thank you for your time.



How Fit is your Business?



Dear Business Owner,

If Grant Dalton mentions that the *Emirates Team New Zealand* are at peak **fitness** for the Americas Cup in Valencia, what does he mean? Overall team fitness on the Black Boat involves more than just adding up individual crew fitness; it has something to do with collective ability to take on the challenge of competition. Also, **fitness** and **performance** are two different things; you might not win - even if you are fit.



My name is Stuart Young. I am a senior lecturer at AUT University, and I am doing PhD research on the fitness of small and medium-sized NZ businesses. I am investigating whether the fitness of a organization is related to its business performance.

Please, can you help me? I am trying to find out which factors affect the fitness of NZ firms. I am enclosing a questionnaire that I hope you will kindly complete. I have a grant from the Foundation for Research, Science and Technology to conduct this research. After speaking with small and medium-sized business owners over two years to get practical ideas, I am now surveying firms throughout NZ.

By completing the enclosed questionnaire – it takes 15 minutes – you will be helping me to make a contribution to research on business in NZ. I want to help raise the profile of the very important small and medium business sector in New Zealand.

I do not request any confidential information. There are no risks to your firm since **every reply is completely anonymous** – there are **no** codes, names, and numbers on the questionnaire that might identify your firm.

- I enclose a self addressed **freepost** envelope for you to please return the completed questionnaire.
- If you are interested to receive an executive summary of the results, please email me: syoung@aut.ac.nz.

Thank you for your time, I appreciate your help.

Sincerely, Stuart Young



Please note your participation is voluntary. Completion of the questionnaire will be taken as giving consent to participate.

Any concerns regarding the nature of this project should be notified to the Project Supervisor, Dr Andrew Ensor. Address: AEnsor@aut.ac.nz Phone: 921 9999 Ext 8485.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEK, Madeline Banda, madeline.banda@aut.ac.nz, 921 9999 ext 8044.

APPENDIX D: PRELIMINARY DATA ANALYSIS

Table 41: Correlations of Constructs

Correlations											
	Adapt	Align	Ambidex	SP	GP	PIndex	Assim	Acquire	Trans	System	Social
Align	.00	1.00									
Ambidex	.71	.71									
SP	.13	.13	.18								
GP	.11	.12	.16	.00							
PIndex	.17	.17	.24	.79	.61						
Assim	.47	.23	.50	.13	.22	.24					
Acquire	.13	-.04	.06	.12	.14	.18	.00				
Trans	.32	.15	.34	.06	.12	.12	.00	.00			
System	.15	.04	.13	.16	.19	.24	.27	.24	.04		
Social	.38	.18	.39	.12	.07	.14	.18	.04	.39	.00	
Coord	.34	.00	.24	.06	.13	.13	.17	.29	.33	.00	.00
	.00	.94	.00	.23	.01	.01	.00	.00	.00	1.00	1.00

Table 42: Correlations Controlling for Potential Common Method

Correlations										
	SP	GP	Assim	Acquire	Trans	System	Social	Coord	Adapt	
GP	-.17**	1.00	-.03	.00	-.09	.04	-.14**	-.07	-.20**	
Assim	-.14**	-.03	1.00	-.31**	-.48**	.01	-.19**	-.20**	.10*	
Acquire	-.02	.00	-.31**	1.00	-.22**	.11*	-.16**	.14**	-.15**	
Trans	-.16**	-.09	-.48**	-.22**	1.00	-.22**	.19**	.12*	-.01	
System	.00	.04	.01	.11*	-.22**	1.00	-.26**	-.25**	-.17**	
Social	-.08	-.14**	-.19**	-.16**	.19**	-.26**	1.00	-.31**	.09	
Coord	-.14**	-.07	-.20**	.14**	.12*	-.25**	-.31**	1.00	.04	
Adapt	-.15**	-.20**	.10*	-.15**	-.01	-.17**	.09	.04	1.00	
Align	.02	.01	.06	-.16**	.01	-.10	.04	-.16**	-.26**	

** · Correlation is significant at 0.01 level

* · Correlation is significant at 0.05 level

APPENDIX E: EFA RESULTS

Note: For clarity, only loadings > 0.40 are shown.

Table 43: Component Loadings for Survival Fitness

Rotated Component Matrix			
	Component		
	Systems	Socialization	Coordination
decisions policies			.706
decision staff			.730
decision strategy			.579
action approval			.691
talk anyone		.700	
opportunity talk		.852	
contact need		.879	
managers accessible		.765	
written rules	.806		
job description	.692		
record performance	.665		
clear procedures	.775		
systematic procedures	.736		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 44: Component Loadings for Growth Fitness

Rotated Component Matrix			
Variables	Component		
	Assimilate	Acquire	Transform
information competitors'	.448	.570	
industry information		.642	
regular knowledge		.749	
meetings customers		.553	
understand opportunities	.767		
analyze market	.779		
feedback network	.704		
program refining	.715		
recognize useful			.776
share experience			.851
advantage opportunities	.431		.426

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 45: Component Loadings for Business Performance

Rotated Component Matrix		
	Component	
	Survival Performance	Growth Performance
Monthly Cash Flow	.678	
Gross Profit Margin	.785	
Return on Capital Invested	.831	
Earnings of the Owner	.805	
Net Worth of the firm	.672	
Total Revenue (Sales)	.486	.569
Fulltime Staff		.687
Market Share		.732
Sales from Repeat Customers		.684

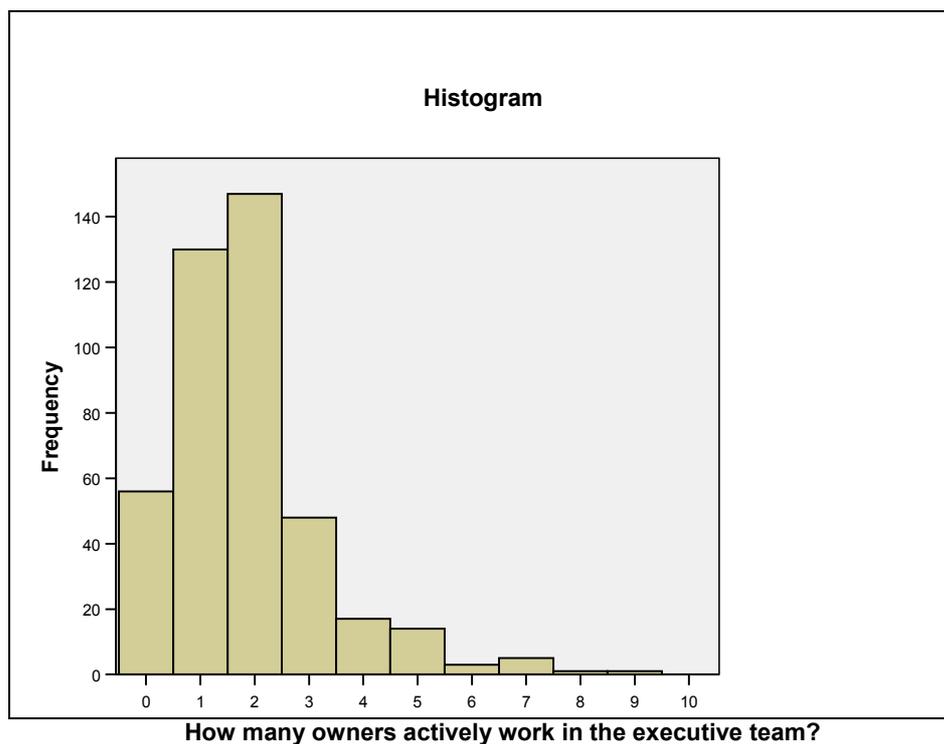
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 46: Component Loadings for Ambidexterity

Rotated Component Matrix		
	Component	
	Adaptability	Alignment
unproductive activities		.852
conflicting objectives		.838
challenge traditions	.746	
respond quickly	.877	
business priorities	.835	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

APPENDIX F: ACTIVE OWNERS



APPENDIX G: CONFIRMATORY FACTOR ANALYSIS

Table 47: CFA Coefficients for Business Performance

Item	Perceived Business Performance		Growth Performance GP		Survival Performance SP	
	Pattern	Structure	Pattern	Structure	Pattern	Structure
bbp1	.802	.802	0	.268	.236	.236
bbp2	.732	.732	0	.245	.215	.215
bbp5	0	.247	.741	.741	0	.526
bbp7	0	.135	.404	.404	0	.287
bbp8	0	.206	.616	.616	0	.437
bbp9	0	.186	.558	.558	0	.396
bbp6	0	.258	.440	.708	.378	.690
bbp4	0	.211	0	.508	.716	.716
bbp3	0	.239	0	.578	.814	.814
bbp2	0	.217	0	.524	.738	.738
bbp1	0	.203	0	.490	.690	.690

1. The structure coefficients were computed using AMOS v 7.0. I specified 'all implied moments' as output (Graham et al., 2003).
2. Pattern coefficients constrained and not estimated in the models are presented as "0".
3. Structure coefficients of the cross-loaded item, *bbp6*, are in **bold**.

APPENDIX H: MODERATION OF INDIRECT EFFECTS

Table 48: Indirect Effects of Growth Fitness on Growth Performance

GF	Weight of Growth Fitness on:		SP	GP	KQ	KA	KT	(SMC)
Size2	Small SMEs	2		.30	.86	.88	.80	.58
		1	.26	.26	.87	.87	.80	.61
	Large SMEs	2		.27	.71	.83	.91	.50
		1	.30	.23	.70	.83	.92	.53
Age2	Young SMEs	2		.24	.79	.81	.93	.52
		1	.27	.21	.79	.80	.94	.55
	Older SMEs	2		.34	.80	.88	.78	.56
		1	.30	.29	.79	.90	.76	.59
Intens2	Low Admin Intensity	2		.34	.79	.86	.88	.42
		1	.29	.30	.79	.86	.88	.46
	High Admin Intensity	2		.19	.80	.84	.80	.65
		1	.30	.15 ns	.81	.84	.79	.67
Ambi2	Low Ambidexterity	2		.30	.87	.88	.85	.54
		1	.16	.27	.87	.88	.86	.56
	High Ambidexterity	2		.30	.77	.84	.64	.52
		1	.30	.26	.79	.84	.62	.54
Ownr2	Multiple Owners	2		.26	.80	.75	.72	.60
		1	.37	.20	.78	.79	.70	.62
	Single Owner	2		.32	.79	.93	.93	.47
		1	.18	.30	.80	.92	.94	.49

APPENDIX I: COMMON METHOD VARIANCE

Method effects are increasingly tested by means of confirmatory factor analysis techniques (Kenny & Kashy, 1992). To investigate the presence of common-method variance, the fit of two measurement models is compared. First, a model is estimated by adding a ‘same-source’ factor to the indicators of the model constructs (e.g. Podsakoff et al., 2003). When a constrained model (same-source factor-loadings are zero), and an unconstrained model (same-source factor loadings estimated freely) are compared, this represents a significance test for the effects of a same-source factor.

For example, a growth fitness measurement model was specified with five factors: *knowledge acquisition*, *knowledge assimilation*, *knowledge transformation*, *survival performance* and *growth performance*. These five factors were all allowed to correlate freely with each other. Next, this model was constrained by adding a ‘method’ factor that loaded onto each measured variable in the model (MacKenzie, Scott, & Podsakoff, 1993; Williams & Anderson, 1994; Netemeyer et al., 1997).

The difference between the *constrained* model (method loadings are constrained to zero) and an *unconstrained* model (method factor loadings are estimated freely)⁶⁵ represents a significance test of the effects of the common method factor. Results are summarized in Table 49.

Table 49: Common Method Variance Tests

Model	Constrain to Zero?	GFI	Chi-square	df	Δ Chi-square	Δ df	p
1. Growth Fitness	No	.91	361.5	160			
	Yes	.95	215.8	144	145.7	16	< .001
2. Survival fitness	No	.93	338.3	197			
	Yes	.94	264.3	176	74	21	< .001

For both models, the chi-square difference was significant, which indicated the possible presence of a method factor (see Table 49).

Growth Fitness. For the unconstrained growth fitness model, path estimates for the common factor were significant. However, indicator loadings on their hypothesized factors remained significant. There was only a small degree of attenuation, approximately 15% on average. Further, correlations between knowledge acquisition, knowledge assimilation and knowledge transformation all remained statistically

⁶⁵ Note that MacKenzie, Scott, & Podsakoff constrained several factor loadings within constructs (never across constructs) to be equal for estimation for identification purposes.

significant and greater than 0.5 in magnitude even in the presence of the common method factor. Thus the potential presence of a method factor was not considered to be problematic for this model.

Survival Fitness. For the unconstrained survival fitness model, path estimates for the common factor were mostly significant. However, almost all indicator loadings to their hypothesized factors remained significant. Indicator loadings were only attenuated by approximately 5% on average. The exception was for two of the *systems capabilities* items, *c15* and *c16*, which became nonsignificant ($p > .05$). These items evaluated whether written records and job descriptions were kept of employees' performance. A correlation of 0.46 between *coordination* and *socialization* remained significant at the 5% level, and was attenuated only slightly from 0.52 in the constrained model. The path between *systems capabilities* and *socialization*, was only 0.16 in the constrained model but remained significant at the 10% level. The path estimate between *coordination* and *systems capabilities* was attenuated to the point of insignificance ($p = 0.14$) in the presence of the common method factor. Thus there is some possibility of bias due to common method variance for this model. As discussed in Chapter 6, common method variance may cause a correlation between two self-report measures to be due to other causes than a real underlying relationship.

APPENDIX J: CORRELATIONS

Table 50: Growth Fitness Measures

	K2	K3	K4	K5	K7	K8	K9	K10	GF1	GF2
K3	.378									
K4	.178	.259								
K5	.318	.325	.198							
K7	.336	.318	.058	.330						
K8	.287	.344	.102	.246	.632					
K9	.287	.257	.067	.301	.451	.571				
K10	.378	.220	.097	.285	.487	.491	.441			
GF1	.289	.193	.152	.258	.399	.360	.290	.407		
GF2	.337	.251	.214	.315	.413	.458	.317	.402	.599	
GF3	.109	.176	.125	.131	.299	.269	.206	.318	.482	.361

Table 51: Survival Fitness Measures

	C1	C2	C3	C4	C7	C8	C9	C10	C14	C15	C16	C17	C24	SF1	SF2
C2	.406														
C3	.341	.289													
C4	.407	.331	.302												
C7	.247	.205	.167	.336											
C8	.337	.227	.289	.305	.594										
C9	.273	.201	.197	.276	.538	.751									
C10	.237	.155	.215	.157	.358	.543	.611								
C14	.074	-.002	.171	.010	-.008	.076	.105	.083							
C15	.257	.126	.211	.142	.142	.154	.164	.115	.485						
C16	.209	.157	.246	.117	.074	.110	.103	.068	.399	.582					
C17	.103	-.024	.173	-.045	-.069	.027	.021	.087	.528	.367	.361				
C24	.172	.010	.138	.012	.054	.150	.133	.140	.517	.342	.342	.517			
SF1	.483	.268	.232	.272	.324	.379	.325	.331	.117	.179	.180	.076	.197		
SF2	.437	.241	.338	.244	.298	.351	.327	.414	.128	.182	.124	.141	.216	.626	
SF3	.329	.159	.208	.175	.271	.322	.316	.318	.137	.111	.113	.080	.141	.334	.410

Table 52: Business Performance Measures

	bpp1	bpp2	bpp3	bpp4	bpp5	bpp6	bpp7	bpp8	bpp9	PBP1
bpp2	.538									
bpp3	.539	.608								
bpp4	.456	.508	.611							
bpp5	.509	.396	.419	.375						
bpp6	.476	.490	.555	.528	.564					
bpp7	.252	.166	.178	.182	.299	.243				
bpp8	.363	.257	.354	.232	.415	.432	.306			
bpp9	.303	.335	.285	.212	.388	.350	.255	.418		
PBP1	.115	.193	.184	.200	.153	.184	.097	.217	.225	
PBP2	.107	.161	.187	.192	.179	.195	.048	.139	.160	.587

Note: Correlations > .103 are significant at 5% level