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A REVIEW OF THE LITERATURE ADDRESSING
THE ROLE OF EXTERNAL KNOWLEDGE
AND EXPERTISE AT KEY STAGES OF
BUSINESS GROWTH AND DEVELOPMENT.

FINAL REPORT

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1. LIST OF ABBREVIATIONS

AIM	Advanced Institute for Management Research (www.managementresearch.org)
AMAP/DAI	Accelerated Microenterprise Advancement Project (www.microlinks.org) Development Alternatives Inc.
CEO	Chief Executive Officer
CMM	Capability Maturity Model
DTI	Department of Trade and Industry
EIS	Enterprise Investment Scheme
HQS	High-Quality Strategy
HRM	Human Resource Management
KTP	Knowledge Transfer Partnerships
LCS	Low-Cost Strategy
ProMM	Project Management Maturity Model
R&D	Research and Development
SFLGS	Small Firms Loan Guarantee Scheme
SIBBP	Support to Implement Best Business Practice
SME	Small and Medium-Sized Enterprises
TBS	Time-Based Strategy
TCS	Teaching Company Scheme
t/o	Turnover
TQM	Total Quality Management
UNIDO	United Nations Industrial Development Organisation
VCTs	Venture Capital Trusts

2. EXECUTIVE SUMMARY

This report presents the findings from a review of the empirical and theoretical literature addressing the states and stages of business growth and how these can be influenced by external interventions.

Anecdotally, owners and managers of young and growing businesses speak of being at ‘this stage of the business’ or, of being in ‘need of something to help move the business to the next level’. This view is reflected in a large literature dedicated to the development and growth of organisations. The issue of development and growth is addressed principally through the adoption of biological or ‘organismic’ (Levie and Hay, 1998) metaphors, such as ‘life cycles’ as organisations are described as passing through a series of stages invariably starting with birth, continuing through a sequence of transitions (sometimes marked by trauma or crisis) and culminating with maturity, reinvention or revitalisation (mostly), or death (occasionally).

This perspective on organisational development and growth has considerable intuitive appeal and continues to be widely used in both academic studies and in practitioner literature. However, in recent years the perspective has been challenged as an appropriate way of thinking about development and growth. It has been argued that the assumptions underpinning the life cycle perspective (linear, sequential, deterministic and invariant) do not pertain to organisations.

Over the years life cycle models have become more sophisticated. Their early forms were largely conceptual and descriptive in which stages of life cycle were conceived in terms of a narrow range of organisational variables (principally age, size and rate of growth). Later iterations have refined these early models (adding stages), contextualised them (particularly in high-tech and high growth sectors) and mapped onto them unique configurations of management problems that are argued to pertain to particular stages. However, empirical support for many of the contentions of the literature is weak.

The thesis we present in this review is that a more appropriate conceptualisation of organisational development and growth is one in which organisations face problems and crises. We develop a framework to assist in identifying the impact of interventions by using two dimensions. The first dimension is the space of key growth issues that firms face. We propose a typology of key issues likely to be faced by all growing businesses. If interventions are to help firms to grow, they must provide the right knowledge or support in a form that the firm can utilise. Drawing on the knowledge management literature, we introduce, as the second dimension, the concept of absorptive capacity, the state of a firm regarding its ability to absorb and use different types of knowledge, and we propose a typology of maturity stages of absorptive capacity. Together these two dimensions provide a framework to examine firm growth issues and to analyse the effectiveness of different interventions on firms in different states within this framework.

3. INTRODUCTION

3.1. Background

The importance of knowledge to business growth has, in recent years, become well-established. The organisational learning perspective posits that firms will actively seek knowledge recognised to be absent but felt to be essential to help meet its strategic objectives (Von Krogh, 1998). However, it has been noted that much of the organisational learning literature focuses on how organisations learn from their own experiences at the expense of learning from others' experiences (Huber, 1991).

Some studies indicate that the evolutionary stage of the organisation impacts learning. For example that at an early stage of their development biotechnology companies depend on other firms for their learning (Oliver, 2001), or that learning facilitators differ according to evolutionary stage (Hanssen-Bauer and Snow, 1996). We note that little work in the growth literature reflects the potentially critical importance of type and role of knowledge, learning and innovation in models of growth stages. Block and Stumpf (1992) called for researchers to address the question of the learning requirements of practicing entrepreneurs at each stage of their venture life cycle. However, since that call there seems barely to have been a response. On the basis of a cited reference search (Web of Science 19 March 2005), only seven academic papers have been found that cite Block and Stumpf's paper (Delmar and Shane, 2003; Gartner and Vesper, 1994; Henry, 2004; Henry, Hill and Leitch, 2003; Katz, 2003; Steier and Greenwood, 2000; Sexton, Upton, Wacholtz and McDougall, 1997), and these do not directly address the issue of knowledge requirements. It is this gap that this review seeks to address.

3.2. Overall objectives of the review

A significant part of the DTI's activity is concerned with enhancing business access to, and use of, external sources of knowledge and expertise. It is understood that research on the need for and effectiveness of different types of knowledge at different stages of firm development is needed to synthesize the somewhat piecemeal evidence that has accumulated in both the academic and practitioner literatures. Such a synthesis is important both in influencing and providing an evidence base for DTI policy in this area, and in clarifying those areas where understanding of firms' knowledge needs and uses is thin (and hence more research is needed).

The overall aim of the proposed research is to draw together the empirical and theoretical literature addressing the extent to which business performance trajectories require and can be influenced by external knowledge inputs and the contingencies in terms of business lifecycle positioning that affect the requirements for and impact of knowledge inputs. Output from academic and practitioner journals and the grey literature will form the basis of our review. More specifically the research addresses the following questions:

1. How can we define 'key stages of business growth and development'?
2. To what extent is businesses' demand for and use of external sources of knowledge and expertise linked to key decisions at different stages of growth and strategic development?

3. What impact on these decisions does new knowledge and expertise from external sources have? And what impact do these decisions have on firm performance?
4. What gaps exist in our knowledge relating to an understanding of the factors which influence business demand for external sources of knowledge and expertise?
5. Policy implications

4. MODELS OF STAGES OF BUSINESS GROWTH AND DEVELOPMENT

4.1. Fundamentals of stages models

Lippitt and Schmidt (1967) open their paper in the Harvard Business Review with the line "As a business organization goes through the stages of birth, youth and maturity, it faces a predictable series of organizational crises". They continue, "Like people and plants, organizations have lifecycles". These sentences exemplify the assumptions that underpin much of the work concerning organisational stage and life cycle models and also their putative value for academic research and as heuristic devices for practitioner and policy communities. In more recent years, though, the idea that firms have predetermined lifecycles in the sense suggested by Lippitt and Schmidt (1967) has been challenged by a perspective that argues that organisations do not have even approximately predictable life cycles.

Mapping life cycles of organisations is an endeavour aimed at categorising the growth patterns and problems of organisations in a systematic way (Churchill and Lewis, 1983). Stage models are alluring because they simplify myriad facts associated with transformational change, and reduce the complex to a uniform, appealing, predictable and deterministic pattern (Stubbart and Smalley, 1999). Nevertheless, they can be criticised for their failure fully to take into account the effects of context and history, and they imply progress along unidirectional, designated, linear paths. That is not to suggest that these models have been of little value as they appear to have had significant input into providing important insights into understanding organisational behaviour and have had significant implications for policy and practice. However, given that organisations vary, apparently so widely, it might be surprising to discover that they, as they are purported to have by these models, have so much in common in terms of experiences and problems at different stages of their development. Life cycle models essentially purport to be theories of how organisations evolve and change, but they say little about the knowledge resources required in order to effect that change and maintain the evolutionary trajectory.

The view that organisations progress through various stages of 'life' is not new. Indeed, the idea that organisations can be defined, in some sense or other, by beginnings and endings finds some support from Bessant's (2003) observation that only one firm out of the Fortune 100 index actually made it from the beginning to the end of the 20th century. One of the questions that researchers have attempted to address is how to conceptualise the space in time, between their very beginnings and some later point that might be marked by 'maturation', 'revitalisation' or 'death', that organisations occupy. For some it is a bumpy ride and distinct phases are quite clear, for others, progression through time is less clear. The challenge that stage theorists have set themselves has been, amongst all this variance, to identify and model patterns and regularities in organizational development that pertain across organisations.

There have been several important reviews of the literature, and it is not proposed to repeat these here. Summaries of models can be found in Cameron & Whetten (1983), Hanks and Watson (1993), Levie and Hay (1998), McMahon (1998) and Quinn and

Cameron (1983). These provide evidence of a set of common underpinning assumptions about lives of organisations, but also a lack of integration across studies and conflicting conceptualisations of life cycles and stages. Furthermore, they indicate a body of literature that is, in its early phase, largely conceptual and descriptive. Later scholars, assuming the ontological status of stages, have sought to identify management issues pertaining and unique to stages or phases of the life cycle (e.g. Kazanjian and Drazin, 1990). Whilst these studies have been successful in identifying a series of important managerial challenges in growing businesses, the extent to which configurations of these problems can be neatly mapped onto models of growth and development has yet adequately to be demonstrated.

The life cycle literature deals predominantly with small, new or rapidly growing firms, particularly in the high technology sector, and the papers that informed this review are detailed in table 1. A separate body of literature addresses large firms, and assuming maturity, investigate causes of and propose responses to rigidities of organisational process and practice (Aislabie, 1992; Dougherty and Cohen, 1995). Predominantly, life cycle models are underpinned by two significant assumptions, first that firms grow linearly and, second, that this growth can be categorised into discrete stages. The implication is that firms follow the same growth pattern, and face unique management problems as they grow and become more complex (Sexton et al, 1997). The multistage models have in common the assumptions that predictable patterns exist in the growth of organisations and that these patterns, as they unfold over time, can be thought of as discrete stages and that each stage has a set of defining critical characteristics (Quinn and Cameron, 1983) and some models argue that certain conditions must be satisfied in order for the organisation to transition to a next phase. As these models have emerged over time, the strength of their asserted implications have been relaxed as their underpinning assumptions have increasingly been challenged and, the growing realisation that there is little empirical evidence to support these assertions. Indeed, the more credible papers in the genre are those that test the models and find them wanting.

Some models have been criticised for narrow conceptualisation of the phenomenon, typically dimensionalising it with the variables ‘size’ (small to large), ‘age’ (young to mature) and ‘rate of growth’ (people, turnover, profitability) of the organisation. Churchill and Lewis (1983), for example, defined the stages of their model in terms of an index of size, diversity and complexity. By way of a further, and more recent, example Rutherford et al. (2003) first review organisational life cycle models, and note the tendency for stages to be defined in terms of age, size and rate of growth, and subsequently operationalize, for their own study, ‘stages’ in terms of sales growth.

Early models described movement across or through stages in terms of such organisational variables and, so, transitions were defined according to changes in numbers of employees, increase in turnover etc. Such conceptualisation engendered a rather tautological set of development studies in which researchers pre-defined growth stages according to these organisational variables and then sought to force data into the model. In these studies, the definition of stages relies heavily on the description of organisational variables and not the contextual contingencies that might alternatively define stages. That is, stage becomes confused with or articulated only in terms of organisational and structural variables. Stubbart and Smalley (1999; 279) neatly capture this deficiency of some models: “you can’t explain your teenage son’s

defiance of authority by the fact that he is a teenager, if defiance of authority is one of the characteristics that defines teenager”. Grounded in a seemingly unshakable faith in the ontological status of stages of growth grounded in these organisational variables, researchers embarked on a quest of finding precisely the right configurations of data that fitted the stages. The conceptual foundations of many of them, that phases in the life of an organisation are best conceptualised in terms of size (employees, turnover and profit), have been challenged in alternative frameworks that conceptualise stages in terms of the nature, problems and diversity of organisations.

The field can be characterised by two metaphoric approaches, development as a journey and, development as a biological/evolutionary process. The journey metaphor is an interesting perspective on organisational life cycles, though it is less commonly used. Journeys have starting points and destinations, and the underpinning logic of the perspective is to attain organisational viability, for example Churchill and Lewis’s (1983; 40) seminal five-stage model viability is assessed at each of the stages. The fifth stage is described as ‘success’ at which point the organisation has “...arrived. It has the advantages of size, financial resources, and managerial talent”.

The assumption of the biological/evolutionary models is that useful parallels with organic life cycles can be drawn. As the organisation progresses from one stage to the next, necessary more sophisticated capabilities are required (Miller and Friesen, 1983) and, as firms increase in size and complexities, managers face a number of unique problems (Sexton et al, 1997). It is intuitively appealing to combine the view of organisations changing in identifiable ways seemingly commensurate with growth over time with the tangible experience of organism growth (Levie and Hay, 1998). From an evolutionary perspective, it is argued that entities which exist in environments wherein the rate of change exceeds their own capacity to change face extinction. So it is that organisations, subject to external and uncontrollable forces, can be conceived of as having to change over time to survive. Some researchers have chosen to delineate this march through time and the changing form or nature of the organisation in terms of a series of stages, phases, life cycle or states. Initially, the models generated by these researchers appeared to conceive of the apparent stages organisations progressed through as in inherent quality of the organisations detached, as it were, from the environments in which they existed and operated.

The organismic development analogy brings with it three main propositions about the nature of corporate growth. The first is that just as in growing organisms, distinctly different 'stages' of development can be identified in the growing organisation. The second is that the order in which growing organisms undergo these recognisable stages is predetermined and thus predictable. The third is that just as all organisms of the same species undergo the same sequence of developmental changes as they grow, so all organisations undergo essentially the same sequence of developmental change as they grow (Levie and Hay, 1998). Extrapolating these propositions to the world of organisations suggests the following set of underpinning assumptions: 1) Change is a ‘programmed’ process and all subjects begin at the first stage and move relentlessly towards a known final stage, 2) Change movements are orderly, predictable and time consistent 3) The maturational logic of biology indicates a unidirectional pattern of movement 4) Stage models often imply progress, 5) Stage models minimise the effects of context 6) Structural change is predetermined and invariant; 7) Events

relating to the transitions of organisations are predetermined and not subject to the will or influence of human beings.

In their recent review of the 'stages of growth' literature, Levie and Hay (1998) have argued powerfully that organismic models of growth are fundamentally flawed and have little or no empirical support when tested on large samples. As Vyakarnam et al. (2000) point out, it is in the nature of organisations to experience expansion and contraction over time, and so the unidirectional linear implications of organismic biological models are inappropriate. Adizes (1979; 5) stretches the biological metaphor to breaking point, likening his 'Go-Go' stage of development to an infant "with a vision but a horrendous appetite". Levie and Hay (1998) conclude that only the first of the principals of the organismic perspective, that organisations pass through or experience qualitatively different and clearly identifiable 'phases', 'stages', 'archetypes' or 'configurations' at different times, is supported by the empirical evidence, but only in as much as these are defined by sets of problems but not by sequence. Support for the second two propositions, that these stages occur in a set sequence and that all organisations follow that sequence, is, at best, weak. What they do not do, however, is perform any sort of analysis on the constitutive characteristics of the "clearly identifiable 'phases', 'stages', 'archetypes' or 'configurations'" and it is on the basis of such an analysis that others have attempted to define stages (e.g. Hanks and Watson, 1993).

As table 1 illustrates, there is little agreement about the numbers of stages or, indeed, the constitutive components of stages. They assume that problems that are significant in terms of a stage are significant to all firms in that stage. Hanks et al (1993) provide a useful overview of the literature, attempting to draw together its disparate threads, particularly with regard to the questions 'what constitutes a stage' (a unique configuration of variables related to organisation context and structure (pp7)), and 'how many stages are there?' Through a comparison of stage content of models describing from between three and ten stages, they discover a reasonably consistent pattern of organisation evolution as organisations move from start up through phases of expansion to maturity and subsequent diversification or decline. Much of this work has, though been either theoretical or conceptual in nature, or grounded in empirical models of questionable validity.

Methodologically, two principal approaches can be identified, and these can be thought of in terms of the historical development of the life cycle perspective. First, there is a set of longitudinal studies in which, over a period of time (typically 3-5 years) cross sections of organisational members are surveyed, interviewed and observed, and archival data interrogated to induce models of organisational growth. Exemplars of this type would include Kazanjian (1988), Kimberly (1979) and Quinn and Cameron (1983), see table 1.

Second is a series of hypothetico-deductive studies in which configurations of multiple variables form the basis for allocating sample members into previously specified stage categories. Smith et al (1985) and Gupta and Chin (1993), for example, surveyed CEO's across 15 growth, demographic, structural and operational indicators as the basis for allocating into one of three stages categories. Hanks et al (1993) used cluster analysis to identify six stages operationalized as unique configurations of organisation context and strategy. Subsequent studies have then

sought congruence between these emergent stages models and organisations' structural patterns (e.g. Kazanjian and Drazin, 1990), levels of functional specialisation (e.g. Hanks and Chandler, 1994), and problem type (e.g. Dodge and Robbins, 1992; Hanks and Chandler, 1994; Smith et al., 1985). As can be seen in table 1, cluster analysis techniques are frequently used to identify patterns of variables as a basis for determining whether or not discrete life cycle stages exist. However, most methods of cluster analysis are deterministic and will produce cluster solutions regardless of any natural structure existing in the data and different methods will produce different solutions based on the same data (Aldenderfer and Blashfield, 1984; Arabie and Hubert, 1996). Real theoretical or conceptual importance is not gifted to the data by the process of cluster analysis, whether or not these exist is the consequence of subsequent interrogation of the clusters and characteristics of and between groups made by the analyst in the context of the data. Invariably, though researchers bring to the analysis an assumption that clusters actually do exist in the data (Milligan, 1996).

Taken as a whole, the results of these studies are inconclusive with only moderate support for the thesis that structural, functional or problem type patterns are congruent with stages models. Most recently, this approach has been applied by Rutherford et al. (2003) in a study of 2,903 SMEs testing the proposition that Human Resource problems vary over the organisations' life cycles. Their finding that there was little support for a life cycle configuration based on age, size and growth variables implies that alternative explanations for the emergence of HR problems are necessary rather than ones grounded in the OLC.

The bulk of empirical work has concentrated on the birth, development maturity phases and, Hanks et al. (1993) conclude that there is still much taxonomic work to be done to answer questions about how many stages there are and whether or not there are contingencies that affect the number of stages and, indeed do all organisations progress through the same series of stages. However, unlike biological evolutionary models or the evolutionary model of organisation theory as proposed by Aldrich (1999) stages models are not governed by notions of struggle, variation, selection and retention (Stubbart and Smalley, 1999)

Nevertheless, life cycle models persist in being framed in terms of age or size of the organisation in spite of the plethora of literature that is critical, both of its empirical basis (limited) and practical use by practitioners or in policy making (Cameron and Whetten, 1983; Levie and Hay, 1998; Quinn and Cameron, 1983). Firms do not grow equally at a regular pace, yet some studies assert that development and growth stages can be defined in temporal chunks. Abetti (2000), for example, suggests that each of the three phases (start up, high growth, maturity) lasts approximately three years. On the other hand, Greiner (1998) suggests that stages last between three and 15 years. Such studies are infrequent, and absolute period of time does not appear to have been significant in empirical studies, only the fact that within the period of study there has been some observable change in state from time A to time B – say in terms of organisational size (Weinzimmer, Nystrom and Freeman, 1998). With regard to the last point, there is an indication of the contingent nature of stages, that is different types of organizations experience different sets of stages. This observation may simply be an artefact of the data as the overwhelming focus of studies is high tech and manufacturing businesses.

Many of the studies that utilise or identify states tend principally to do so in the context of rapid growth high technology companies or, newly formed companies (Kazanjian and Drazin, 1990). High or rapid growth companies have been subject of much interest not only because of the contribution they make to economies, but also because they experience extreme manifestations of pressures that accompany growth and the commensurate requirements for adaptation and change (Nicholls-Nixon, 2005). Bailey and Grochau (1993) propose a four stage model of organisational development for non-profit organisations. Some authors make a distinction, which is argued to be particularly important in the world of SMEs, and that is between family and non-family owned businesses. Family owned businesses are argued to have distinctive characteristics, such as a strong identification between individuals and the business itself and, the challenge of establishing a balance between family and business concerns. Mitra and Pingali (1999) argue that this makes growth path selection particularly important between success-growth and success-disengage as family firms are driven by different factors. So, perhaps the language of interventions for this category of business is not necessarily about moving to a 'next level', but about maintaining what they have got. This is a criticism of the universal deterministic models.

Revisiting his model 26 years after its first publication, Greiner (1998) asserts the continuing validity of its propositions: that organisations transition through phases as they grow, the duration of phases, that transitions between phases do not occur smoothly, that crises are path dependent and that managers have difficulty believing that solutions to previous problems may now be the cause of new problems, and that there is frequently great resistance at senior levels. He does concede, though, that the phases are not as clearly demarcated as the original paper implies, recognises the need to reconfigure the characteristics of individual phases and, even introduce a new sixth stage. Furthermore, he speculates a four-phase stages model for the service sector. Yet earlier, Tushman et al. (1986; 43) in an empirical test of Greiner's model had found that individual firms appeared to follow their own particular sequence of punctuated stages and that there were no patterns in the sequence of frame breaking stages.

Life cycle models, which tend to conclude with maturity, as opposed to death, can be thought of as being of one of two types. The first is the one that describes a relatively smooth progression through the various stages, almost algorithmic inevitability as a function of size, growth rate and age. The other type presents a much more stochastic view in which the progression from one state to the next is marked by a critical event of some sort. Greiner's (1972) model exemplifies this type, in which progress is marked by a revolution or crisis which precipitates a jump to the next phase. Typically, each of the phases is characterised by a particular management style and, the revolutionary phases by a predominant management problem. Mount et al. (1993) argue that in order to manage growth, it is necessary to understand that growth does not occur according to a linear, smooth evolutionary pattern, but rather through alternate periods of evolution and revolution punctuated by crises. Each revolutionary period breeds the next crisis, and solution of the crisis generates the next period of evolutionary growth. The various stages of evolution are described, and guidelines offered on how management can anticipate and control the ensuing revolutionary crises. This perspective of path dependency and predictability is an echo of several models, of which the exemplar is Greiner (1972).

This perspective reflects, in some respects, Lewin's (1958) more generic model of social change, of transitions between phases of stability and instability, of unfreezing, change, freezing. Change results from disturbances in the force field sustaining organisational stability. Whenever forces favouring change are greater than forces resisting it, the organization will move from one state to another. Unplanned change movement can be induced via unfreezing the old equilibrium and then refreezing around a new one. At these 'crises' one of two things might happen. First, managers adapt previous practices to the new conditions and create conditions for future growth or, they fail to adapt previously successful practices and the company will either stagnate or, face extinction (Abetti, 2000). However, by stressing the maturation logic implicit in organismic models, a role for managerial choice and decision-making in the context of organisational growth is denied. Greiner's (1972) model comes in for criticism by (Stubbart and Smalley, 1999) precisely for this reason. Greiner asserts that managerial choices are determined by past rather than prevailing conditions or deliberations on future implications of current strategy. By emphasising the inflexibility of stages, the role of managerial choice and capacity to influence is under-emphasised.

Other studies define the transition between phases in terms of dominant problems that management need to address (Kazanjian, 1988; Smith, Mitchell and Summer, 1985) or critical junctures (Vohora, Wright and Lockett, 2004), which is a refinement of the notion of crises and revolution implicit in the models of Greiner (1972) and Churchill and Lewis (1983). As organisations move from one stage to the next they undergo a transformation (on salient dimensions) in their design characteristics enabling them to face new tasks or problems that growth elicits (Kazanjian and Drazin, 1990). This transformation can be construed in terms of the acquisition of new knowledge. Organisational theorists have noted that as organisations pass from phase to phase, state to state then things begin to change such as strategies and structures (Hanks and Chandler, 1994).

Survival in dynamic competitive environments, whether by growth, remaining static or retrenching, brings with it a range of management challenges. As firms encounter problems, managers must develop competencies in supervision of subordinates and delegation of authority and responsibility, in short they must have the ability to change the nature of their role (Shim, Eastlick and Lotz, 2000).

Similarities can be identified in the nature of the problems that businesses face. Miller and Friesen (1984) suggest situational, strategic, structural and decision making variables. Scott and Bruce (1987) identify a series of key issues that managers must address in phases of business growth, these include: the role of top management; management style; organization structure; product and market research; systems and controls; major sources of finance; cash generation; major investments, and; product-market issues. Further, Dodge et al.'s (1994) study marks something of a departure from conventional approaches to the study of life cycles in organisations in that their research is underpinned by the assertion that organisations respond to their environments on the basis of perceived problems or concerns. That is, they do not have a deterministic perspective of organisational problems and issues grounded on a sequence of stages through which organisations unerringly pass. Instead, they identify a set of core problems that organisations face and which are argued to persist without

substantial change: customer contact, pricing, cash flow, human resources, leadership/direction, organisation structure and accounting systems.

Table 1: Lifecycle literature reviewed

Study	Stages N=	Stage labels	Stage characteristics	Rationale	Theoretical (T) or Empirical (E) and Context	Country	Observations
Lippitt and Schmidt, 1967	3	Birth, youth, maturity	Birth (to create a new organisation & become viable), youth (to gain stability & reputation, and develop pride), maturity (to achieve uniqueness and contribute to society). In effect the 3 stages are characterised by six crises	"Like people and plants, organizations have life cycles"	T Not given	USA	Suggest knowledge needs for each of the 6 crises. 1) Creation - clearly perceived short term objective, 2) Survive - communicate short term objectives 3) Stabilise - prediction & long term planning 4) Reputation - Whole exec team on board with planning & goals 5) Achieve uniqueness - setting objectives & sub unit management 6) Earn respect - fit into wider society
Filley and House, 1969	3	Traditional/craft firm, dynamic growth, rational administration	1) single owner/founder promoting a single product/innovation, 2) increased sales, market share, number of employees 3) growth slows, formalisation of processes and objective setting	Not given	T Not given	Not given	Different factors important at different stages but, all apply at different times with different levels of importance: 1) markets & products 2) resources and operational systems 3) management systems 4) corporate culture 5) markets and products 6) culture, management and operational systems, and resources 7) all six.
Steinmetz, 1969	4	direct supervision, supervised supervision, indirect control, divisional organization	1) Increased complexity, pressure on time. Need to familiarise self with bureaucratic requirements (tax, legislation etc), inadequate supervision, outgrowing premises 2) expansion, recruitment & increased income, but also rigidity of thinking, disloyal staff, overhead growth, emergence of the 'informal organisation', diseconomies of scale, production problems 3) grow or be absorbed, increasing overheads, disloyalty, diminishing rates of return, top heavy	No clear provenance, appears to be drawn from a sigmoidal model of growth	T Not given	Not given	General thesis that life becomes more complicated as the organisation grows, though no discernible pattern of problem type associated with any of the stages, though different factors important at different stages, e.g. in stage 1 record-keeping, legislative obligations etc

Greiner, 1972	5	Creativity, direction, delegation, co-ordination, collaboration	Each stage is followed by a 'revolution' or transitional phase arising from a major organisational problem (does this imply that a major organisational problem precedes the transition from one phase to another	From an analysis of recent studies five key dimensions emerge as essential for building a model of organisation development (pp38)	T Not given	USA	Organisations face a predictable series of crises (revolutions) that are largely path-dependent. Prescriptive model. In 1998 suggests 4 phases for the services company
Adizes, 1979	1 0	Courtship, Infancy, Go-go, Adolescence, Prime, Stable, Aristocracy, Early bureaucracy, Bureaucracy, Death	At every lifecycle passage a typical pattern of behaviour emerges, such as risk & cost, vision & appetite, planning & co- ordinating etc	Organisations have lifecycles, just as living organisms do	T Not given	Not given	Organisations change emphasis on four activities 1) Producing results 2) Acting entrepreneurially 3) administering formal rules and procedures 4) Integrating individuals into the organisation. Organisations start with a focus on entrepreneurialism but over time become increasingly rigid and formalised emphasising stability, rules and procedure
Kimberly, 1979	2	Birth and early development, Institutionalisation	1) Role of the entrepreneur 2) Internal social control, managing relationships, building structures and processes	Growth described in terms of numbers of people (students) and budget	E Lifecycle of a medical centre	USA	Factors that lead to success at birth are not the same as those during institutionalisation
Galbraith, 1982	5	Proof of principle, Model shop, Start up/volume production, Natural growth, Strategic manoeuvring	Described in terms of tasks, people, reward, process, structure and leader	These are the stages of 'a typical venture'	T Technology ventures	Not given	Asserts predictability of stages but that managers too frequently maintain inappropriate organisation designs for the stage that they are in.

Churchill and Lewis, 1983	5	Existence, survival, success, takeoff, resource maturity	See findings	Stages differentiated by changing importance of structural and functional characteristics (e.g., financial, hr, business systems, owner's personal goals, managerial and delegative abilities) i.e. by management decision making, complexity of organisational structure, operational systems, strategic planning, owner involvement.	E CEO reflections based on knowledge of Greiner's model, participants in a management programme. 83 successful SMEs t/o \$1m - \$35m	USA	Series of decisions to be made, revolving around exist or fail. 1) Existence: obtaining customers and delivering the product. Simple organisation, owner driven. The owner is the business. 2) Survival, the emphasis shifts from existence to the relationship between revenue and expenses. Company may choose to remain at this stage. 3) Success - the organisation can either grow or disengage, the latter in order to maintain the status quo. Functional management takes over, and professional systems introduced - particularly those with an eye to the business's future as opposed to its current conditions, 4) Take off, principal problems are how to grow rapidly and how to finance it. Responsibilities are delegated and cash is needed. 5) Resource maturity - objective is to consolidate and control finances.
Quinn and Cameron, 1983	4	Entrepreneurial, collectivity, formalisation and control, elaboration of structure	1) Marshalling resources 2) Informal communication and structure 3) Formalisation of rules 4) Elaboration of structure	Derived from a synthesis of nine extant models	E Development centre in a department of mental hygiene	USA	Major criteria of effectiveness change in predictable ways as organisations develop through their life cycles, e.g. that in entrepreneurial/collectivity stages flexibility and resource acquisition are most important.
Miller and Friesen, 1984	5	Birth, growth, maturity, revival, decline	Birth (becoming a viable entity - young, dominated by owners & have simple & informal structures), growth (distinctiveness established, rapid sales growth, amassing resources, functionally based structure, authority delegated, maturity (becoming more bureaucratic and stable, goal is efficient functioning), revival (diversification and expansion, complex & heterogeneous markets), decline (encroaching stagnation)	Synthesis of previous models inferred from conceptual literature	E 161 periods of history in 6 corporations with 20+ years' existence. Mixed sectors manufacturing, transport, services, airlines chemicals, utilities	USA	Some evolutionary patterning but, wide variety of transition paths open to companies & evidence of regression. Over lengthy periods, firms often fail to exhibit the common life cycle progression extending from birth to decline. Also, the amount of time spent by organizations in any one period can vary considerably. Found that much organisational growth and change was discontinuous in nature, but that these changes were 'by no means connected to each other in any deterministic sequence' pp 1177

Smith et al, 1985	3	Inception, high growth, maturity	Firms classified into 3 stages by cluster analysis (model fitting) based on 15 indicators of life cycle stage representing growth, maturity, structure, decision style and formalisation	Phases defined in terms of functional and structural characteristics in growing organisation (structure, reward system, communication process and planning, formalisation adherence, method of decision making, make up of top level staff, organisational growth rate, organisational age and size)	E Electronics manufacturing, 27 companies	Not given	Defines 3 top level management priorities and makes some suggestions about these priorities' relative levels of importance across three stages of organisational lifecycle
Tushman et al, 1986	2	Convergence and upheaval	Some organisations capable of sustaining long periods of equilibrium followed by sharp, widespread changes when their environments shift	Long periods of convergence giving support to a basic strategy, punctuated by upheavals - concurrent and discontinuous changes that reshape the organisation. Synthetic study modelled on Greiner	E Mixed sample - large and small organisations in minicomputer, cement, airlines & glass industries	USA	Most successful firms did undergo transformation under crisis, but did not follow Greiner's or any particular sequence
Scott and Bruce, 1987	5	Inception, Survival, Growth, Expansion, Maturity	At the transitions between the 5 stages, crises tend to occur, draws on Greiner and Churchill & Lewis. Firms progress from informal owner-managed organisations through formalised bureaucracy to diversified conglomerates	Develops Churchill and Lewis	T Not given	Not given	Suggests five stages and four crisis points, acknowledges managerial choice and possible hybridising of stages

Kazanjian, 1988	4	Conception and development, commercialization, growth, stability	1) Resource acquisition and technology development, focus is on idea creation and development. Structure and process virtually non-existent 2) Production start up, vendor relations, facilities and field support. developing the product/technology for production - moving beyond the prototype. Build the org's task system, emergence of functional groups 3) Sales growth, market share growth, internal organisation mechanisms. The problems associated with manufacturing, distributing and selling in volume 4) Profitability, internal controls, future sources of growth. Growth rate slows to a level consistent with market growth	This differs from linear models in that it explicitly links stages to 'dominant problems'	E Technology based new ventures (n=105)	Not given	The theoretical role of dominant problems is important in defining stages and understanding transitions between stages. However, empirical link between dominant problems and stages, in this study, is not strong.
Hasenfeld and Schmid, 1989	6	Formation/entrepreneurial, Development/collectivity, Maturation/formalisation, Elaboration of structure, Decline, Death	See labels	Synthesis of previous models with the addition of 'decline' and 'death' stages	T Human service organisations	Not given	Proposes a life cycle model and examines implications for leadership, relations with environment, internal structure and service delivery system
Kazanjian and Drazin, 1990	4	Conception & development, Commercialisation, Growth, Stability	Application of synthesis of existing models but, seeks to describe characteristics in terms of 'dominant problems'	Self categorisation where stage is defined in terms of configurations of problems that managers face (contextual variable)	E 105 technology based ventures, average employees fewer than 300, less than 15 yrs old	Not given	Centralization of decision making decreased as the firms moved to higher stages, while formalization of decision making increased in higher stages. Role specialization in the functional areas of manufacturing and marketing increased by stage. However, specialization in the engineering and technology functions remained high across all stages.
Beatty and Ulrich, 1991	4	Entrepreneurial, growth, maturity, decline	None given	None given	T Mature organisations	USA	A lifecycle, with each evolving stage raising change challenges. Proposes strategies for change for mature organisations.

Cosier, 1991	3	Creative/entrepreneurial phase, Maintenance and Administration, Creative/Mature	1) Small scale, novel operations 2) Cost controls, efficiency and bureaucracy 3) Responsiveness to environmental changes	Synthesis of previous models	T Office of the Secretary of Defense	USA	Recommendations for modification of OSD based on life cycle analysis
Dodge and Robbins, 1992	4	Formation, early growth, later growth, stability	1) Turning an idea into a business entity 2) Establishment - uncertainty, short-term orientation, positive growth 3) Growth slows, direct competitors appear, expansion/stability decisions 4) Becomes a small bureaucracy & decisions for future need to be made	Synthesis of previous models. Assessed independence of problems and also tested uniformity of distribution of problems over the lifecycle. Four general phases appear common to all.	E 364 clients of Small Business Institute. Mixed sectors.	USA	Marketing problems dominate, then management then financial issues. Not all businesses have the same problems, external environmental problems are more important early in the life cycle, with internal problems becoming more critical as the business grows and develops pp33
Gupta and Chin, 1993	3	Inception, high growth, maturity	See Smith 1985	Adopts Smith's 1985 model because of its multidimensional way of determining growth stages	E 105 CEOs	Canada	Organizations in the high growth stage of their organizational life cycle perform significantly more analysis and innovation when faced with environmental challenges than do those in their maturity stages.
Hanks et al, 1993	6	A,B,C,D,E,F	A: young and small firms, indicative of start ups. B: Slightly older than A and expanding. C: Younger than B but larger and suggesting late expansion or early maturity. D: Bigger, seemingly maturing or diversifying. E and F do not fit traditional life cycle models. Tend to be old and small, possibly lifestyle or 'disengaged' firms	Stages identified by cluster analysis. The underpinning assumption is that lifecycle stages are underpinned by unique configurations of variables (age, size, current growth rate, vertical differentiation, structural form, specialisation, centralisation) relating to organisational context and structure.	E 133 high technology organisations	USA (Utah)	Provides reasonably strong evidence in support of the life cycle construct. However, questions remain over discreteness of clusters generated which might simply be illustrating evidence of firms choosing to do business in different ways and not of 'stages'.

Bailey and Grochau, 1993	4	Entrepreneurial, team-building, bureaucratic, from here the organisation can stagnate, die or renew	1) create, plan, identify products & services: risk-taking, excitement and spontaneity 2) expand and develop personnel and product/service 3) define & systematise roles, relationships & procedure	Identify critical life cycle transition points	T Not for profit	Not given	Evolutionary changes within each unit must be recognized and addressed to ensure that a balanced fit is maintained between executive director & the board as the organization evolves over time.
Terpstra and Olson, 1993	2	Start up, Growth	Start up = first year of operation	Constrained by data source	E 115 fast-growing companies, ranged from computer services, construction, pharmaceuticals and medical, telecoms, publication and media	USA	Identifies 10 different problem types: obtaining external financing, internal financial management, sales/marketing, product development, production, general management, HRM, economic environment, regulatory environment. The findings indicated mixed support for previous research linking types of dominant problems to different stages of organizational development.
Dodge et al, 1994	2	Initial development and later development	Argue that, depending on stage and level of competition (none or intense), different task environments, characterised by problems faced, will pertain.	Avoids inconsistencies of previous models but attempts to retain descriptive richness	E 645 small firms	USA	Findings contradict much of the relevant literature that describes stages of the organizational life cycle in terms of the deterministic sets of problems that can be anticipated as an organisation makes the transition from one stage to the next. But, that is not to deny that organisations face sets of problems.
Eggers, Leahy and Churchill, 1994	5	Conception, survival, stabilisation, growth orientation, rapid growth, resource maturity	Incorporate stages that recognise managers have stay or grow path alternatives	Adopts a modified Churchill & Lewis typology	E CEO respondents in mixed industry sample at different stages of growth	USA	Claims to validate the Churchill and Lewis model, but have to modify it. Propose 'phases of management' rather than 'stages of growth'

Hanks and Chandler, 1994	4	Start up, Early commercialisation, Later growth, Maturity	Based on Hanks 1993	Based on Hanks 1993 (3 contextual variables - age, size, growth; 5 structural variables - organisational levels, structural form, formalisation, specialisation, centralisation)	E 133 high tec firms	USA (Utah)	Argues that managers' focal problems or priorities are reflected in added specialised functions across life cycle stages.
Flamholtz, 1995	7	New venture, Expansion, Professionalisation, Consolidation, Diversification, Integration, Decline	Key tasks need to be accomplished to move through the different stages (identify market niche, develop products, acquire necessary resources, develop operating systems, develop management systems, develop organisational culture)	Synthesis of previous work	T Not given	Not given	Identifies key transition issues (see characteristics)
Gudmundsson, 1998	7	Start up, new entrant, transitional, interim-major, modulation-major, mega-carrier, global-carrier	An evolutionary path in terms of total revenue and mass (i.e. ability to sustain periods of losses)	Determined by revenues and mass: Start up = pre-operational, new entrant = revenue of up to \$99m, transitional \$100-\$499m, interim-major \$500-\$999, modulation-major £1bn+ After which it becomes defined by geographic coverage.	E Airlines	USA	New entrants focused on niche strategy, and had cost advantages. 'Transitionals' placed increased importance on logistics systems and planning, suggesting greater organisational complexity as it grows out of earlier niches. Interim-majors emphasise cost and debt reduction

Mitra and Pingali, 1999	6	Existence, survival, success-disengage, success-growth, takeoff, resource maturity	Owners can exert and implement a strategic preference and so choose alternative paths of growth	Eight factors which can distinguish the growth stages of small firms are identified by cluster analysis (managerial orientation, managerial goals, current business strategy, human resource policy, customer orientation, customer base, current management style, managerial capacity)	E Auto ancillary companies in an industrial unit	India	Recognises possibility of management choice and divergent future paths
Shim et al, 2000	5	Existence, Survival, Take-off, Success, Maturity	Adopts Churchill & Lewis	Finds supporting evidence for 5 stage framework from cluster analysis	E 416 Hispanic-owned retail & service businesses	USA	Management of business resources, entrepreneurial talent and marketing and sales diminished with progression through stages. HRM issues increased with progression. Managing external/environmental factors - which were the most important factor across all stages. Strategic management factors unaffected by stage. As firms grow, managers must develop competencies in supervision of subordinates and delegation of authority and responsibility. They must have the ability to change the nature of their role as the business grows. Two management factors had largest f-ratios in identifying clusters, management decision making style and formal operational business system development.
Abetti, 2000	3	Start up, High growth, Maturity	1) Informal - everybody pitches in, 2) Functional - change from a doer to a manager 3) Business units - increasing levels of management	Asserts that there are 3 stages in the first 9 years of an organisation's life	E Technology intensive companies (started up) in New York region by RPI Incubator. First 9 years of life.	USA	Accelerated growth does not follow a smooth, predictable pattern, rather periods of evolution and revolution punctuated by crisis. Suggests that each phase lasts approximately three years. Each revolutionary period breeds the next crisis, and solution of the crisis generates the next period of evolutionary growth.

Beverland and Lockshin, 2001	4	Pre-birth, Start up, Expansion, Growth	1) Resource gathering 2) Production 3) Brand building 4) Rationalisation	Stages a function of: 5 years' growth, demand levels, stage of development of industry's products, level of diffusion of knowledge of industry's products, 5 years' plant capacity, current price levels for products, growth in types of distribution channels, industry advertising expenditure	E Wineries	New Zealand	Mid-range life cycle theory describing key challenges (gain resources, survive, gain distribution channels, systematise and plan) at each stage
Rutherford et al, 2003	4	No growth, low growth, moderate growth, high growth	See findings	Number and characteristics of stages derived empirically from self-organised-mapping technique	E 2,903 family businesses, less than 500 employees from 12 industry sectors (agriculture - biotech - wholesale)	USA	No growth - Highest levels of recruitment problems. Low growth - lowest levels of training and recruitment problems. Moderate growth - retention issues most problematic. High growth - high development problems and lowest levels of retention problems. Training problems peak in high growth firms and lowest in low growth firms, compensation problems peak in moderate growth firms and lowest in high growth firms, recruitment problems peak in no growth firms and lowest in low growth firms. Firm age is not a significant indicator of stage. The proposition that HR problems in small firms varied over the OLC only partially supported. SOM analysis did not uncover a traditional life cycle with respect to HR problems, but size and growth variables do define stages

The origins of this 'problems perspective' can be traced back to Kazanjian (1988; 1989) whose work appears to mark a transition point between conceptualisations in terms of path dependent deterministic models of growth and development to a more cognitive approach that conceives of managers as thinkers with the capacity to strive to achieve individual and organisational goals (Smith, 1995).

Kazanjian (1988) argued that the problems that businesses face occur sequentially (and in this sense maintains a foot in the determinist camp) and tend to cluster into recognisable configurations that must be addressed (which defines his cognitivism) that define a number of stages that businesses must pass through if growth is to remain viable. In this way, the resolution of one set of problems leads to the emergence of another set. Consequently, he persists with the notion of organisational stages but endows 'dominant problems' the theoretical roles of defining life cycle stages and as a device for helping understand the transitions between phases. Whilst we recognise the notion of 'dominant problems' the empirical evidence in support of their theoretical role defining life cycle stages is weak. We propose, therefore to develop the notion of dominant problem and apply it as a dynamic model of organisational problems that organisations encounter during their lifetimes.

Nicholls-Nixon (2005) conceives this as a question of alignment. Although her research directly addresses issues of rapid growth firms, the finding that there will always be a gap between the demands of the environment and organisational systems and structures would appear generalizable to other dynamic contexts. She identifies six categories of the nature of transitions experienced by rapidly growing firms: transitions in the firm's personnel, business model, organisation/management structure, financial management, and external environment and role of the CEO/Entrepreneur. That is, managers need to find some way to ensure that *order can still emerge* so that the venture does not spin out of control. Consistent with Lichtenberg (1990), Nicholls-Nixon (2005) observes that managing growth may have less to do with passing through a series of pre-determined stages than with creating an infrastructure that enables periods of self-organised change to occur, and so commends management action should be focused around four key areas: capturing and sharing information; building relationships; managing organisational politics, and; leadership style. As she says, "Although there is no one best management approach, it is clear that major changes in systems, structures and capabilities are required in order to cope with the increased complexity that accompanies fast growth" (pp79).

Part of the putative power of the stages models is in their power to predict and anticipate the potential problems as well as the managerial needs of growing companies (Shim et al, 2000). However, support for a clearly identified set of problems that pertain at different stages of an organisation's life, where lifecycle is conceived in terms of the organisational variables earlier mentioned is limited and does not sustain cross-case comparisons. Shim et al (2000) test the propositions that more advanced stages of business growth (in the Churchill and Lewis model) will be characterised by less persistent problems relating to availability of business resources, entrepreneurial talent, changes in the external environment. Their general proposition

is that, as businesses grow, they become increasingly complex and increasing demands are placed on owners and managers to develop their competencies in each of the identified areas of significance (and different studies suggest different sets of significant factors). It was found that, as the Hispanic-owned businesses of their study grew, problems involving the management of business resources, entrepreneurial talent and marketing and sales diminished. However, managing external/environmental factors was not affected by growth stage which was found to be the most important factor across all stages. Indeed, little support for the relationship between a firm's longevity and its stage of business growth was found, undermining the validity of the construct as a basis for defining business growth stages, confirming Bailey and Grochau (1993) and later confirmed by Rutherford (2003), that stages appear not to be correlated to the chronological age of the organisation.

In order to determine the most appropriate form of assistance, intervention or support policy for small business, previous researchers have attempted to identify a series of discrete life cycle stages defined either in terms of organisational variables or in terms of the nature, type or configurations of sets of problems. There is, though, little empirical evidence to support the proposition that relates problem sets to stages in the life of a business. The assumption that there is a correlation between problem and stage appears flawed. It is probably safe to assume, however, that organisations exist in time and that at different periods certain problems will predominate. But that is not to say that these problems will not recur in the future or, indeed, that they are in any sense predictable.

In fact, there seems to be a general acceptance in more thoughtful papers e.g. (Kazanjian, 1988; Kazanjian and Drazin, 1989; Miller and Friesen, 1983) that stages can only give a very stylized 'prototypical' picture and do not provide a general model applicable to any firm; also there appears to be a growing acceptance that the stage idea involves multiple dimensions (Hanks et al 94), which implies that a linear sequence of growth stages is not possible. Overall, the impression is that modern thinking is moving away from the idea of a fixed linear sequence of growth stages to a more multidimensional concept of firm states, where 'crises' or issues can occur at different points and can recur throughout the growth trajectory of the firm, though "Theorists have been unable to see alternatives to the deterministic organismic paradigm, and therefore it has remained dominant despite disconfirming empirical evidence" (Levie and Hay, 1998; 25).

Miller and Friesen (1984) undertook a study designed to examine the predictions of the stages models that 1) each stage manifests integral complementarities of variables (environment, strategy structure, decision making processes); 2) each stage is qualitatively different from each other stage in terms of configurations of these variables, and; 3) organisations proceed sequentially through the 5 stages. Their basis for applying a five stage model is that "Five crude life stages seem implicit in the conceptual literature" (Miller and Friesen, 1984; 1162).

Concluding on the sequence of stages, whilst they find that some of the sample did present long term evolutionary patterns that were roughly in line with the life cycle literature, there were many exceptions and, consistent with other studies (e.g. Tichey, 1980) there is a wide variety of transitional paths open to organisations. Importantly,

they also provide evidence of regression, firms moving back down the sequence - which negates an organismic metaphor. They conclude that "firms over lengthy periods often fail to exhibit the common life cycle progression extending from birth to decline. Also, the amount of time spent by organizations in any one period can vary considerably" (Miller and Friesen, 1984; 1176). An interesting observation is that the variables environment (situation), strategy, structure and decision-making methods configure into gestalts, and these differ one from another, but whilst these configurations are internally coherent, they are not connected to each other by any deterministic sequence. Further, structures, strategies, situations and decision making methods can become more complex in organisations, but age alone does not confer greater complexity. Firms that do not grow and diversify, but simply get older, they argue, are less likely to encounter these challenges (Miller and Friesen, 1984).

Even a two stage model has been demonstrated to be a poor predictor of the problems affecting 645 small firms "our findings contradict insofar as small businesses are concerned, much of the relevant literature that describes stages of the organizational life cycle in terms of the deterministic sets of problems that can be anticipated as an organisation makes the transition from one stage to the next" (Dodge et al, 1994; 131). But, that is not to deny that organisations face sets of problems, and it might be configurations of these sets of problems that can determine the sorts of knowledge inputs for growing organisations.

Stages and life cycle models are predicated on the assumption that that firms grow in the same way. As this review has demonstrated, and consistent with other reviews, empirical evidence does not support this assumption: there are incongruities between models both in terms of numbers of stages proposed and also the characteristics used to define stages (Hanks and Watson, 1993). Further, the empirical evidence in support of the proposition that stages of development are associated with unique configurations of problems is not strong.

Having reviewed the original empirical work, we have found it wanting. Going back to the empirical foundations of two significantly influential models of growth Greiner (1972) and Churchill and Lewis we recognise them as providing empirically shaky foundations for a subsequent large and influential body of literature. Greiner's model emerges from a methodologically unspecified "analysis of recent studies". Churchill and Lewis (1983) build on Greiner's model with their own empirical study of the experiences of participants in a management education programme. Based on their understanding of the Greiner model, respondents were asked to indicate which phases they had passed through, what changes had taken place and to speculate about the events leading to and causing these changes. The design of the research, it might be argued, inevitably leads to a validation, or at least reinforcement of the Greiner model. As Rogers (1983; 177) has noted, when one goes looking for examples of unitary factors that influence, one usually finds what one is looking for: "When investigations are designed with the concept of re-invention in mind, a certain degree of reinvention is usually found".

It seems that one of the principal limitations of stages models, at least as they pertain to the life of organisations, is that they seductively imply an inexorable positive progression through the stages to a point of 'arrival' with each stage reflecting the "operation of a latent mechanism that governs the formation, growth, transformation,

and maturity of stages” (Stubbart and Smalley, 1999; 279). This review would appear to suggest that there is little empirical evidence in support of this contention and, so, stage models are best regarded either as useful metaphors to assist in conceptual discussions or, descriptive devices that represent emergent patterns or clusters of correlated characteristics, factors, or composite variables (Stubbart and Smalley, 1999).

Nevertheless, the concept of life cycle has proved useful not least of all because of the suggestion that neither products nor organisations necessarily survive forever and stress the need for constant innovation if the organisation is to survive (Hurst and Zimmerman, 1994). However, Hurst and Zimmerman (1994) go on to suggest that managers have found the concept not always useful in trying to make sense of what is happening in their own organisations particularly as they tend to focus on the organisation from its birth to some notion of maturity at the expense of the more radical higher order transformational change that takes place during organisational renewal. The review thus far has demonstrated, also several empirical and conceptual limitations implicit in the life cycle and stages approaches. Nicholls-Nixon (2005) usefully provides a useful summary of the literature (table 2). Having highlighted its limitations, we briefly propose how we propose to move forward.

In an empirical test of the Churchill and Lewis model, Eggers et al. (1994) find it necessary to add a sixth stage and also note that some firms regress back to previous stages. Indeed, they conclude (pp 137) “...due to our findings revealing individual company differences in developmental progression, we believe using ‘stages of growth’ is no longer an appropriate term to this process, and may be misleading”. They suggest a change of research emphasis from ‘stages of growth’ to ‘phases of management’, which are not necessarily linked by a set sequence. It is apparent that the ‘phases of management’ are characterised by configurations of problem variables (Dodge et al, 1994; Miller and Friesen, 1984).

The observation that different organisations exhibit different patterns of 'being' as opposed to progressing inevitably through a pre-determined sequence of stages is demonstrated in Gudmundsson’s (1998) study. In the USA between 1978 and 1989 88 jet operating airlines were formed of which 83 failed. Of those that failed, some operated for a short period of time, whilst others attempted to reorganise and then failed. This evidence suggests that it would be unreasonable to accept the normative and deterministic propositions that are implicit in many of the organisational life cycle models.

Some issues remain significant at all times for some organisations; others rise and fall in importance. Human resource management problems, for example, have been demonstrated to be a category of issue whose pre-eminence varies over, but not because of, time (Rutherford et al, 2003). Consequently, it is difficult to disagree with Levie and Hay’s (1998) conclusion that all the recent large scale empirical evidence indicates that firms do *not* develop according to

Perspectives on Growth	Key insights
Venture growth is characterized by a series of life cycle stages; rapid growth is often one of these	<ul style="list-style-type: none"> ● Firms evolve through a predictable life cycle, but these stages are not always linear. The time spent in each phase varies considerably among firms.

stages	<ul style="list-style-type: none"> • Different success factors are associated with different stages of growth. • Each of the various stages of the life cycle is preceded by a crisis. Survival and success depend on managing these crises. • Firms should focus on developing strategy in the relatively stable phases so that they can cope with the challenges and turmoil of the transition phases.
Rapidly-growing ventures face unique managerial challenges	<ul style="list-style-type: none"> • These challenges include: instant size; a sense of infallibility; internal turmoil; and need for extraordinary resources to support growth. • Effective responses include: instilling a clear sense of vision; making organizational changes in advance of a crisis of performance; and holding onto past practices while getting bigger. • Growth produces increased managerial complexity.
Managing transitions in high-growth firms is critical to success.	<ul style="list-style-type: none"> • High-growth firms need to undertake organizational changes in order to cope with complexity. There is a variety of different approaches, but no one best approach. • There are common patterns in the defining transitions of high-growth ventures. Each has different resource requirements. These resources must be developed ahead of time. • High-growth firms can improve their ability to manage rapid growth by reducing the cycle time between major growth transitions. • Transitions cannot always be managed from the top. They can also occur through a self-organized process.

Table 2: Managing venture growth: how our understanding has evolved (Source: Nicholls-Nixon (2005))

a pre-set sequence of stages; rather, they appear to evolve through their own unique series of stable and unstable states. The empirical evidence appears to support this (e.g. Nicholls-Nixon, 2005), that organisations experience crises during their lifetimes and, these precipitate change: survival and success depend on managing these crises. It is important, then, from managerial and policy support perspectives, that the constitutive characteristics of these crises are well understood.

Stevenson (1983) suggests that firms' management practices range along a spectrum from highly entrepreneurial to highly administrative and that entrepreneurial management, defined as a set of opportunity-based management practices, can help firms remain vital and contribute to firm and societal level value creation. Brown et al (2001) recently operationalized Stevenson's conceptualisation of entrepreneurial management practice and identified six sub-dimensions: strategic orientation, resource orientation, management structure, reward philosophy, growth orientation and entrepreneurial culture.

Although there are a variety of factors that limit firm growth, one of the most important is the managerial capacity problem. This concept argues that a firm's growth is limited by the speed at which it can expand its managerial capacity. The logic is straightforward. Penrose (1959) commented on the process and limits of firm growth. Her theory of the growth of a firm incorporated three factors argued to limit firm growth. These included managerial ability (conditions within the firm), product or factor markets (conditions outside the firm), and uncertainty and risk (combination

of internal attitudes and external conditions). So, in order to be able to manage the problems of growth, individuals must possess the ability to reinvent and redefine their roles. For a firm to grow, it must find new markets, develop new products, or pursue new business opportunities, while at the same time hire new employees and oversee its existing operation. Often, managers do not have the time or resources to accomplish these objectives (Barringer and Neubaum, 1999). Against this backdrop, an interesting question, then, is how do firms that consistently maintain a high growth rate lessen the managerial capacity problem.

It would appear safe to assert that as organisations exist in dynamic environments and develop and implement strategies to survive and to grow, they will face problems some of which they will not have faced before, but the evidence in support of the notion that these problems can be matched with phases of an organisation's life cycle, whose ontological status is uncertain, is questionable. It seems, then, from a management and organisational learning point of view to frame questions relating to growth in terms of the nature of the problems that need to be addressed and, more specifically, what sorts of knowledge do managers need in order to deal with these problems. However our review finds that much small business growth work has been either conceptual or anecdotal (Covin, Slevin and Covin, 1990). Stages of growth have been basically conceptualised as growth (size) periods, with possible organizational structures and important issues latched onto these (Hanks and Chandler, 1994). The seminal work of Greiner (1972) assumes that such stages are divided by crises that drive each stage. There is a background assumption that firms in general pass through the stages in an ordered manner.

So, as firms strive to survive in dynamic environments, they reorganise their systems, structures and resources. These new combinations often require different management practices to achieve success (Penrose, 1959). We are suggesting that the empirical evidence in support of this growth/resource relationship model is not convincing, but that organisational knowledge requirements are conditioned by the nature of the problems that organisations face, not necessarily related to the categories of the various stages models.

These models are underpinned by two significant assumptions, first that firms grow linearly and, second, that this growth can be categorised into discrete stages. The implication is that firms follow the same growth pattern and face unique management problems as they grow and become more complex. They also imply that problems are unique to stages and will not re-occur and, that movement is irrevocably forward. It is true to say that as they grow organisations face problems, some of which they will not have faced before, but the evidence in support of the notion that these problems can be matched with phases of an organisation's life cycle, whose ontological status is uncertain, is questionable.

Unfortunately there appears only to be minimal empirical support for any of this. Most of the work that tries to correlate issues with stages defines issues in the same sort of terms it uses for stages and so obviously reports a relationship without adding to our understanding. Little evidence has been provided for or against the standard 'punctuated equilibrium' model short crises between long stages of calm growth. Neither is there any particular reason to think specific structures are more appropriate at specific growth stages, or that specific issues are more important at different growth

stages (other than trivially obvious ones such as initial funding at start-up stage). One of the best papers on this relationship – (Kazanjian, 1988) - tries to relate issues to stages but in fact finds that all issues are important at all stages of growth.

We note in passing that evidence from service sector is thin.

There is a narrowly focussed literature pertaining to the technology development problems of high tech firms, but this is too narrow to assist with thinking about service firms in particular. This is despite a large literature relating knowledge, learning and innovation to economic success. Work on knowledge management and firm learning has blossomed extensively in the last 10 years in other areas of management and it is clearly overdue to make an important impact here Arnold and Thuriaux (1998).

4.2. A model of firm states

A key objective of growth stage models is to enable the identification of managerial challenges associated with growth (Nambisan, 2002). We have identified that critical amongst these is the notion of managerial capacity to address a range of problem domains, we therefore conclude this section with a model of the managerial dimensions that describe firm states. We synthesise this model of firm states around the concepts of individual, organisation, process and environment (Gartner, 1985) and from the literature previously described. To summarize the various notions of firm states in the literature we base the notion of firm state around these concepts, adding to them in the light of more recent work and terminology, and in particular adding knowledge, learning and innovation to reflect the current importance attached to these topics. The importance of innovation is confirmed by NIESR research, which shows that even if the UK had the same level of capital and skills as France and the US, there would still be a significant productivity gap. Studies suggest that much of this gap is the result of inferior innovation performance (Crafts and O'Mahoney, 2001).

We define:

State = [internal firm characteristics (e.g. organization); external environmental characteristics (e.g. industry growth rate); perceived key issues (e.g. ability to attract key staff); knowledge and learning (e.g. understanding of customer needs)]

Internal firm characteristics and external environmental characteristics are objective components of the state, while perceived key issues and knowledge and learning are cognitive components, reflecting conclusion b) above.

Each of the dimensions itself covers a number of different topics; for example internal characteristics include both the strategy the firm pursues and the organizational structure it exhibits. We therefore require a more detailed typology of aspects for each of the 4 dimensions. We developed typologies from a synthesis of the literature (as per the table 3, below):

Internal firm characteristics	External environmental characteristics	Perceived key issues	Knowledge, learning and innovation
Age	Dynamism	Control issues:	Adapting to a

Size Growth rate Strategy Management (style, owners' skills, diversity, rewards, communications) Resources (finance, skills, culture, systems) Structure (centralized/devolved, generalized/specialized functions, formalization)	Hostility Heterogeneity Finance availability Skills availability Regulations Regional culture	Owner involvement, Delegation, Decision making, Risk taking Strategy issues: Opportunism vs selectivity Overtrading Pricing Expansion Innovation Regulatory issues Understanding customer needs Using networks HRM issues: Leadership Recruitment and training Compensation Workloads Operational issues: Planning Obtaining finance Marketing and sales Product development Operations management Distribution Supplier relations Scaling up the business	changing environment: Recognizing opportunities and threats Competitor intelligence Learning processes Decision making under uncertainty Change management Understanding value to customers Understanding personal limits Functional knowledge: Marketing and sales Financing growth Compensation Hiring and training Management succession
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Table 3: Dimensions of firm states

This four dimensional approach captures the main elements pertaining to firm growth in the literature. But it is self-evidently complex and suffers from the absence in the literature of relationships between the 4 dimensions (other than conjectural relations). As discussed earlier, the literature provides no clear relation between the internal and external characteristics and the issues and knowledge states, Kazanjian (1988) finding that issues persist across different internal and external states. Whereas the internal and external components of firm states have been widely written about, they neither have a direct relationship with the problems facing growing firms nor do they address the ways in which firms obtain new knowledge and change. The opportunity to take a fresh look at how firms address crises and change resides primarily in the key issues and knowledge, learning and innovation dimensions. We therefore focus our review on these 2 dimensions: key issues and knowledge states.

The following two sections develop our thinking on key issues (tipping points) and knowledge and learning (absorptive capacity) states respectively.

4.3. Tipping points

The notion of the ‘tipping point’ entered the management lexicon following the publication of Gladwell’s (2000) influential eponymous book (*The Tipping Point*), though the term has its origins in sociological literature and refers to that dramatic moment when something unique becomes common. The concept has been applied to any process in which, beyond a certain point, the rate at which the process proceeds increases dramatically. At the core of the concept is the notion that ideas, products, messages and behaviours spread like viruses. We use the term to describe those ‘binary occasions’ that challenge the extant operational strategic orientation of an organisation invoking a re-evaluation and reappraisal where the option is to stay the same or fundamentally change. Do something different, not better.

In the management literature, the concept has not been widely used. Where it does appear, it relates principally to informing processes of change management. Kim and Mauborgne, (2003) for example describe the ‘tipping point leadership’ of New York’s chief police officer, William Bratton, who has been successful in turning around an organisation seemingly intractably wedded to the status quo, with a demotivated staff and powerful opposition from vested interests, and limited budget. Tipping point leadership describes the process by which Bratton was able to enthuse and mobilise the energies of a critical mass of people around the notion of change to the extent that it spread like an epidemic.

We view the perceived key issues in the previous section through the lens of crises or ‘tipping points’ that can be expected to be met by growing firms. We do not assume that these tipping points follow any particular temporal order; or that they only occur once in any firm. But all growing firms can expect to meet them for the first time in a relatively early stage of their existence. It may be that the faster a company grows the more rapidly these tipping points are met. They are tipping points because firms have a choice: go through the changes required at the point to grow, or avoid the changes and continue with existing practices. The firm’s response to the tipping points challenge is what determines its growth success.

The typology of tipping points we have constructed according to the above definition and following the perceived key issues identified in the literature is presented below. At each tipping point the firm essentially has a go/no go decision to take: it grasps the challenge and opportunity offered by going through the changes required by the tipping point, or it avoids these challenges by attempting to stick to its present business practices or by reining in its ambitions for growth.

We note that these tipping points are not technologically biased, as is much of the literature reviewed thus far. In addition to the service sector, which is typically not high tech, making up around 80% of advanced economies, studies suggest that successful (growing) firms are more likely to be in the service sectors than manufacturing (eg. Arnold, Allinson, Muscio and Sowden, 2004). The tipping points are:

People management: moving from the founding owner or partners to an employment situation where tasks are delegated and people have to be managed. This tipping point

includes HR issues of Delegation, Leadership, Recruitment and training, Compensation, Workloads. This point may be repeated when there are too many people to be managed directly by the founder, or when geographically distinct offices are set up or different product or functional teams established.

Strategy: moving from an opportunistic approach of accepting whatever work is available to a focussed strategy of targeting and accepting certain specified types of work and client or developing a brand and market position. This point may be repeated when new products are developed, new markets entered, or new competition or business models arise.

Formalized systems: moving from an informal approach to acquiring customers, storing information, controlling expenses, etc to formalized business systems that ensure consistency and reduce the risks of things going unexpectedly wrong. This point may be repeated when existing systems produce errors or prove unable to meet changed requirements, or where their efficiency is below competitors'.

New market entry: either into new customers, new areas or by new products. This includes Adapting or replicating the existing business model to the new market, Scaling up the business and understanding new customer needs. This point is repeated at each expansion event.

Obtaining finance: getting funds to grow. Moving from reliance on initial funders to outside finance providers and the pressures and constraints they will place on the firm. This point is repeated at each significant growth spurt.

Operational improvement: moving from 'if it aint broke don't fix it' toward an understanding of process capabilities and best practices in e.g. Marketing and sales, Product development, Operations management, Distribution, Supplier relations.

4.4. Absorptive capacity

The innovation and knowledge management literature provides a diverse range of viewpoints on issues relating to the 'knowledge state' of a firm. Central to this concept is the idea of 'absorptive capacity', the firm's ability to absorb and put to use new knowledge, it is 'an ability to recognize the value of new, external knowledge, assimilate it, and apply it to commercial ends' (Cohen and Levinthal, 1990; 128). The concept was developed in the context of innovation for which outside sources of knowledge are considered critical, but the usefulness of the concept extends equally well to all questions relating to the identification, assimilation and application of new, external information. The concept 'absorptive capacity' offers important insights into the influence of prior knowledge on learning processes, and its importance to this review is to highlight the degree to which its essential components might be evident in organisations. According to Cohen and Levinthal (1990) absorptive capacity is a firm level construct and an important moderating factor for assimilating new knowledge. The essential components of absorptive capacity are the ability to recognise and assimilate relevant external knowledge, internal levels of prior related knowledge and, the sharing of a common stock of knowledge helps in transfer.

As stated by Liao et al. (2003) it is critical that the firm both have the ability to process new knowledge and also the responsiveness, that is the commitment or will to act on it. These are base criteria for the utility of receiving new knowledge. According to Cohen and Levinthal (1990), each organization has a certain capacity for knowledge acquisition based on its ability to recognize, assimilate and utilize new knowledge. They showed that some organizations have a greater capacity to absorb and exploit knowledge than others and that the development of this capability was related to the organization's level of prior related knowledge.

The ability to evaluate and utilise outside knowledge is largely a function of the organisation's prior related knowledge. Also, intensity of effort is critical in as much as the prior related knowledge needs to have been deeply processed rather than the individual merely and briefly exposed to it. An important conclusion that they draw (Cohen and Levinthal, 1990), and one that has implications for organisations taking on knowledge or, policy makers designing interventions and support programmes, is that an organisation's absorptive capacity is more likely to be developed and maintained as a by-product of routine activity when the knowledge domain that the firm wishes to exploit is closely related to its current knowledge base. "When, however, a firm wishes to acquire and use knowledge that is unrelated to its ongoing activity, then the firm must dedicate effort exclusively to creating absorptive capacity" (Cohen and Levinthal, 1990; 150).

There are several studies that test empirically the role, nature and significance of absorptive capacity as an organisational resource. Resource based theory suggests that resources that are valuable, rare, inimitable and capable of being operationalized by the firm can contribute to competitive advantage (Barney, 1991; Grant, 1991; Wernerfelt, 1984). Knowledge, in its various forms, has been argued to be one such resource (Grant, 1996; Nahapiet and Ghoshal, 1998; Reed and DeFillipi, 1990), and it is in this context that absorptive capacity can be considered an important organisational capability. Merck's rapid reaction to the ground breaking research on

the process of cholesterol formation by Brown and Goldstein in 1972–1974 is an example of the impact absorptive capacity can have on research productivity. Scientists at Merck originally isolated Mevalonic acid, a link in the cholesterol chain, in 1956. However, this research remained on the back burner until research by Brown and Goldstein caused Merck to reconsider the possibilities. By 1975, Merck had reinvigorated the research project and the outcome was Mevacor (Gambardella, 1992).

Absorptive capacity results from a prolonged process of investment and knowledge accumulation within the firm, and its development is path dependent. Firms are more likely to acquire and learn knowledge effectively from outside where they have stronger absorptive capabilities and so the development of absorptive capabilities within the firm is a necessary condition for successful exploitation of external knowledge. Chen (2004) undertook an empirical study of 137 Taiwanese firms across six high tech industry sectors. In terms of firm's absorptive capacity, this study found knowledge transfer performance is positively affected by the explicitness of knowledge and the firm's absorptive capacity. That is, firms are more likely to acquire and learn knowledge effectively from outside where they have stronger absorptive capabilities and so the development of absorptive capabilities within the firm is a necessary condition for successful exploitation of external knowledge. In a study of 122 cases of best practice knowledge transfer Szulanski (1996) found lack of absorptive capacity a major barrier to internal transfer of knowledge. Tsai (2001), in a study of 60 business units, found absorptive capacity to be significantly related to both innovation and performance.

Since its first introduction, subsequent reviews and studies have further developed and dimensionalised the construct absorptive capacity. Subsequent studies have operationalized and elaborated upon the concept. Zahra and George (2002) for example argue that absorptive capacity consists of four distinct capabilities: 1) Acquisition - the search for new knowledge; 2) Assimilation - understanding new knowledge; 3) Transformation - seeing how new knowledge can be used in the context of the firm's issues and existing knowledge, and; 4) Application – implementation of actions enabled by the new knowledge. Martin et al. (2003) further develop these: acquisition – the organisation's dynamic capacity to identify and acquire external knowledge (speed, intensity and direction of knowledge acquisition), assimilation - the organisations routines and processes that allow it to understand and process information from external sources, transformation – the capability to develop and fuse existing knowledge on how the organisation and individuals learn with the newly acquired and assimilated knowledge, exploitation – the capacity and routines of an organisation to use its acquired and transformed knowledge to refine, build on and leverage existing learning competencies.

Minbaeva et al. (2003) demonstrate the importance of having both ability and motivation present in order to optimally facilitate the absorption of knowledge from external sources. This view is similar to Zahra and George's (2002) notion of potential and realised absorptive capacity. On its own, ability is not sufficient, motivation must also be present. Motivation is not dissimilar to the 'readiness for change' scale reported in Fox et al. (1988) that measures a group's willingness to make improvements in procedures and to make efforts toward solving a problem. One of the most important ways that people learn new ideas is by associating those ideas

with what they already know, and so it is easier for knowledge to transfer from a source to a recipient when the source and the recipient have knowledge in common. Consequently, knowledge is more likely to be transferred between people with similar knowledge, training and background characteristics (Reagans and Mcevily, 2003). Rogers (1995) calls this 'homophilic learning', learning from similar others.

According to Cohen and Levinthal (1990), it is impossible to predict what the 'right' level of investment in absorptive capacity is for an individual firm. This depends on individual circumstances. Equally, the concept of absorptive capacity has not been developed in such a way that it is readily amenable to international benchmarking. However, the conceptual development and empirical studies infer or imply a range of organisational knowledge states. Given that absorptive capacity is path dependent, and that one dimension of this 'path' is existing organisational knowledge, organisations ignorant of the state of their own knowledge are likely to have lower levels of absorptive capacity.

Liao et al. (2003) operationalize 'organisational responsiveness' (actions taken in response to knowledge gathered and filtered). They made several observations, that responsiveness of growth oriented SMEs is expected to increase if; 1) They have well-developed capabilities in external knowledge acquisition and intra-firm knowledge dissemination; 2) they have well-developed external knowledge acquisition capability and adopt a proactive strategy (eg prospector companies (Miles and Snow, 1984), and; 3) they face a turbulent environment and have a well developed knowledge dissemination capability. But one of the things that is not clear, at least from this study, is whether or not the type or nature of knowledge gathered or filtered impacts on the firm's responsiveness too.

We conclude from the review of the absorptive capacity literature that organisations have different capacities to absorb new knowledge and this is dependent on state of existing knowledge, the nature of what is being transferred, degree of homophily, the extent of ability and motivation and access to external knowledge. But what we have not had explicated in the literature is what it is that organisations need to learn, when and from whom. Nor, indeed, have we found any metric that helps identify the maturity of their knowledge in take. Nevertheless, the review has provided the impetus to conceive of a framework to describe maturity or capability models of organisations' ability to take on new knowledge. This is the focus of the following section.

5. CLASSIFICATIONS OF KNOWLEDGE STATES

It is widely acknowledged that innovation and knowledge creation are critical drivers of organisational development and growth (Nonaka and Takeuchi, 1995) and previous studies have demonstrated the impact of innovation-related factors on firm growth (Brown and Eisenhardt, 1998; Utterback, 1994).

Maturity models can be used to benchmark an organisation's competence in some particular function (say project management) against a body of knowledge. We propose a model of organisation maturity in being able to identify and utilise knowledge. The usefulness of classifying knowledge states is in describing a generic framework applicable to many organisation types, allowing them to conceptualise and assess (against pre-specified criteria) the maturity and effectiveness of assimilating and applying new and useful knowledge. In effect, this is a capability framework.

Maturity models define a structured route that enables an assessment of current capability, identify gaps and diagnose strengths and weaknesses. They also define the next level of capability to which an organisation can aspire. Rush et al. (2001) propose looking at firms' absorptive capacity according to their positions on two dimensions: awareness of problems and issues (the need to change) and preparedness to change. Within this conceptualisation, they view knowledge states as evolving from an initial unaware/passive state through: 1) an initial awareness of the need to change; 2) a state of searching out triggers for change - picking up demand signals from the market or within the firm about changes needed or picking up signals about potential opportunities raised by new technological developments, then; 3) integrating the search results with existing knowledge and capabilities by recognition of requirements for technology and audit of its current competencies and a comparison of those which it needs to develop or acquire in order to become or remain competitive, to; 4) application of the new knowledge by development of a technology strategy - some clear idea of where to change and why; assessment and selection of the range of technological options available and selection of the most appropriate option; acquisition of the technology and implementation and absorption of the technology within the firm.

These states largely correspond in their essentials to those of Zahra and George (2002) (see above), as do the set of various 'competency levels' models that have been proposed for different managerial functions. These models tend to show generic levels of excellence from a low base up to current excellence, and we discuss three examples below.

First, Bell's (2003) 'competency levels' model for technological innovation in which organisations pass from the point of 'acquiring and assimilating imported technologies', through phases of 'technology deepening and upgrading' and 'closing in on the international technological frontier' to reach a stage where the organisation is 'generating core advances at international frontiers'. This describes a process of moving from low or zero capability, developing minimal capability up to a level of competence, ultimately to become (high) performers.

Other authors propose classifications of knowledge states that can be generally viewed in the light of the Zahra and George framework. Arnold and Thuriaux (1998) describe four degrees of a firm's levels of knowledge relating to technological capability. These degrees of 'mastery' are conceived in terms of boxes which progress from opaque to transparent and closed to open in a series of boxes, starting with a closed 'black box' through stages of 'grey' and 'white' box to an 'unboxed' state at which point a firm is generally able to develop significantly new variants or innovations (see figure 1). Whether the learning is generated internally or brought in from external sources, the aim is to move toward an 'unboxed' state. Arnold et al.'s scheme can be viewed as a base level (black box) with only an awareness of the problem (not of the solution) and so requiring a search for new knowledge and three succeeding levels of understanding which roughly correspond to the assimilation and transformation levels of Zahra and George (2002).

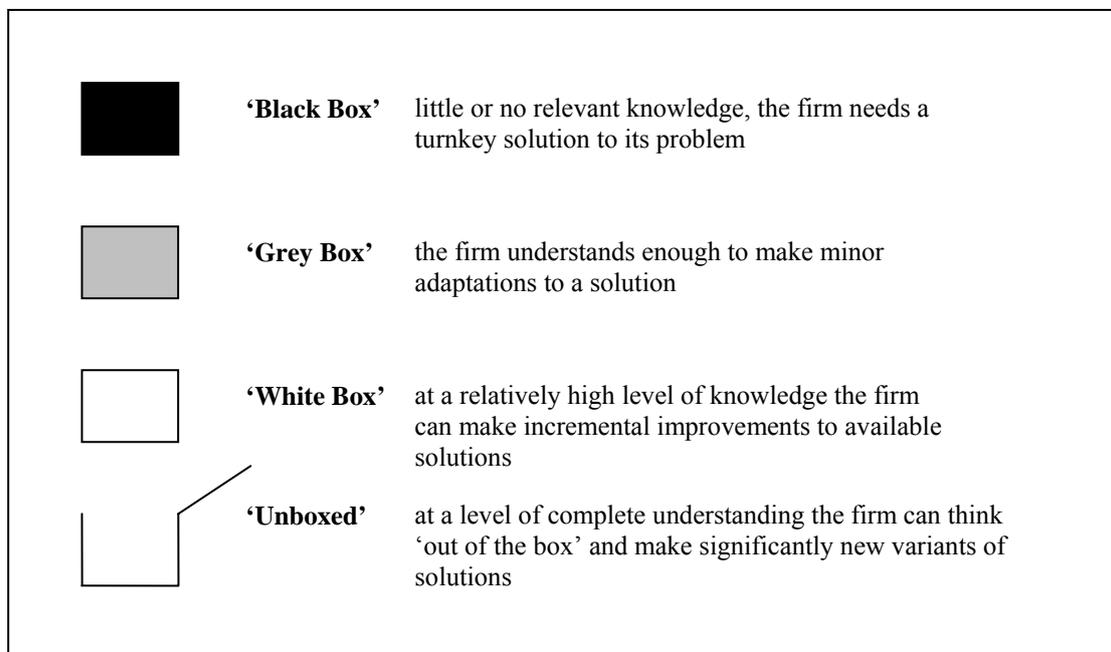


Figure 1: Four levels of technological capability (Source: Arnold and Thuriaux (1998))

Hillson (2003) proposes a model of project management maturity, relating to an organisation's awareness of the effectiveness of its project management practices and describes the Project Management Maturity Model (ProMMM). The model describes four levels of increasing project management capability (naïve, novice, normalised and natural), and each of these levels defined by four dimensions (culture, process, experience and application), see table 4.

Carnegie Mellon's Capability Maturity Model for software is similarly fashioned. The well known Capability Maturity Model is premised on the belief that the maturity of an organisation's software processes influences its ability to meet cost, quality and schedule targets and that it is, consequently, wise to understand what distinguishes mature from immature organisations. The model proposes levels based on the

existence of best practice software development processes to ensure program reliability, and the degree to which a firm sticks to these processes in the face of

	Culture	Process	Experience	Application
Naïve	Members are resistant to change...	...and have no PM processes...	...no experience of using PM...	...and PM is not used in the organisation
Novice	Members are aware and partly convinced of benefits...	...but processes are ad hoc and depend on...	...the experience of a few individuals...	...for patchy and inconsistent application
Normalised	Members recognise the value of PM...	...and have generic and formal processes in place...	...driven by experienced and expert staff...	...and it is routinely and consistently applied across the organisation
Natural	A project based culture imbues the organisation...	...that maintains best-practice processes...	...amongst a well-experienced staff...	...for whom it is second nature and widely applied

Table 4: The levels and dimensions of the Project Management Maturity Model (after Hillson (2003))

environmental disruption. The CMM is underpinned by the notion that product and process improvements are achievable by institutionalising processes consistent with the practices. The Capability Maturity Model delineates the characteristics of a mature, capable process. It identifies the practices that are basic to implementing effective processes as well as advanced practices. It also assigns to those practices associated maturity levels ranging from unrepeatable to a mature, well-managed process. Typically, a path is recommended through the various practices for achieving higher levels of maturity and, therefore, improves an organisation's processes. The CMM consists of five stages: initial, repeatable, defined, managed and optimizing, with similar objectives to the ProMMM, but contextualised in terms of software processes (Curtis and Paulk, 1993).

Finally, TQM practices have been categorized at levels leading up to a 'black belt'. Before being awarded Black Belt status, individuals must demonstrate problem-solving, project management and team leadership skills. The systematic training approach followed typically involves five problem solving-steps of: define, measure, analyze, improve and control (Ingle and Roe, 2001). All of these models include elements specific to the function being categorized, but all of them propose that higher states of knowledge and application are built on experience at lower states. We combine insights from these competency models with the insights regarding knowledge states gleaned from the innovation and knowledge management literatures to synthesize a typology of 4 levels or states of absorptive capacity: 1) Ignorance of key issues, 2) Awareness of key issues; 3) Knowledge and understanding of key issues and solutions, and; 4) Implementation of actions to address key issues. To this we add a fifth factor or 'state' regarding the critical commitment to act component of absorptive capacity; whereas a firm will be in just one of the 4 knowledge states, commitment can be high or low in any knowledge state.

Correspondences with key papers are illustrated in table 5, below. As in the synthesis of key issues in the preceding section of this report, we structure absorptive capacity

states as ‘knowledge tipping points’ that is as important learning that most firms will go through, although not necessarily in a fixed order. The base state is ignorance: the firm does not realize that it is facing important key issues. This is followed by awareness of one or more key issues. Once it is aware of an issue then new knowledge can be actively sought (search) or passively received. Finally implementation of the action must follow to achieve real change. This prototypical ordering of the knowledge states is for illustration; it could be possible for a firm to skip one or more states, e.g. awareness could be followed by commitment to a touted solution although understanding of the issue is largely lacking (we see this far too often). In any case the finding and using of new knowledge must receive commitment from the firm.

Levels of absorptive capacity	Zahra and George, 2002	Arnold and Thuriaux, 1998	Rush et al, 2001	Curtis and Paulk, 1993	Hillson, 2003	Bell, 2003
Ignorance of key issues	-		Unaware or passive	-	Naïve	Low or zero ability
Awareness of key issues	Acquisition	Black box	Awareness	Initial maturity	Novice	Minimal capability
Knowledge and understanding of key issues and solutions	Assimilation	Grey, white and unboxed	Search	Repeatable Defined	Normalised	Competency
Implementation of actions to address key issues	Application - Transformation	-	Application / Integration	Managed/ Optimising	Natural	High performer

Table 5: Capability maturity models

5. A TWO DIMENSIONAL FRAMEWORK FOR FIRM GROWTH

We can now put together the results of our literature syntheses in both tipping points and knowledge states to create a two dimensional framework for the classification of firms' growth states (figure 2) This framework will then be used to structure a literature review of intervention types, in order to help understand how different sorts of intervention can be classified and to identify gaps in intervention programmes.

The framework can be viewed as a two dimensional state describing the tipping point faced by a firm (whether it is aware of its importance or not) and the state of knowledge and absorptive capacity it presently exhibits.

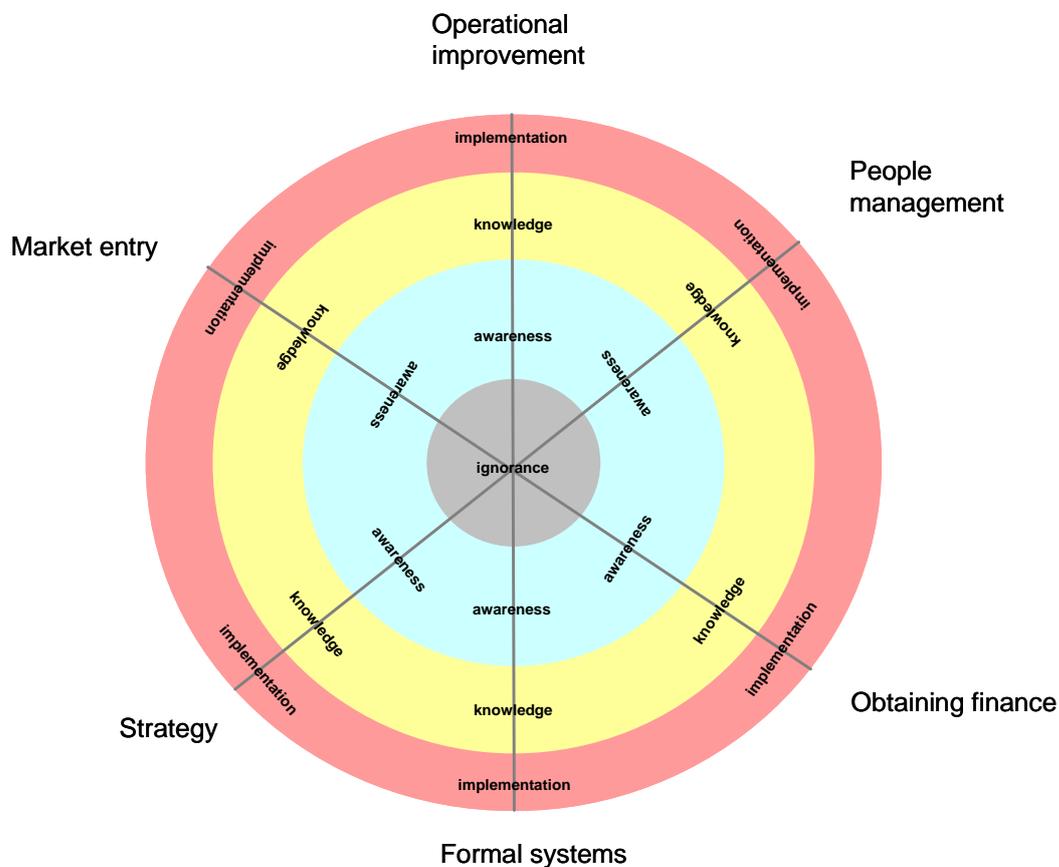


Figure 2: The absorptive capacity/tipping point framework for growth firm states

Any particular firm can be mapped on this framework resulting in a 'spidergram' showing its absorptive capacity against each of the tipping points. If the tipping points are then assessed against the firm for immediacy (i.e. which tipping points does the firm need to address in the near future), this prioritizes one or more of the framework's axes. The firm's need for help (interventions) stand out as the need to raise its absorptive capacity to (at least) the next level on the prioritized axes.

5.1. From states to policy implications

In considering interventions from a DTI perspective, we argue that DTI has a direct impact on the cognitive components (issues and knowledge) by changing firms' understanding and hence enabling innovation. Thus tying interventions to firms' states in terms of their key issues and their absorptive capacity states is more critical than relating interventions to their classical stage of growth as characterized by internal and external dimensions. DTI can, a) understand their issues/help them understand their issues, and/or b) provide intervention to suit.

For any key issue DTI needs to identify processes that can help take firms through the 4 absorptive capacity states. What will enable a firm to move from ignorance to awareness, from awareness to knowledge, and to implement a solution? This typology suggests that simply spreading best practice exemplars or providing sources of technical advice may not be sufficient. Addressing firm ignorance and creating 'burning platforms' for change commitment may be at least as important. In the following sections we look at the suggested interventions in the literature.

6. ABSORPTIVE CAPACITY INTERVENTIONS

We now turn to examine actual and potential interventions that can be made on the two dimensions of the framework: to increase a firm's absorptive capacity or to help it navigate its way through a tipping point. We first examine interventions suggested for the absorptive capacity dimension: to increase the firm's general ability to be aware of issues, to understand and find solutions for them, and to implement those solutions.

Knowledge absorption, a firm's capability to identify and acquire knowledge outside its boundaries can be critical to a firm's successful operation (Zahra and George, 2002), particularly in turbulent environments (Van den Bosch, Volberda and de Boer, 1999).

One of the limitations of the literature on organisational learning is the assumption that an organisation's capability to learn is a static phenomenon. That is, organisations have a certain capability that neither increases nor diminishes, worsens nor improves and that the facility for learning is extended by improving environmental and contextual conditions (e.g. Bapuji and Crossan, 2004; Naot, Lipshitz and Popper, 2004). This can be contrasted with suggestions that the 'evolutionary stage' of the organisation impacts on learning, for example that during the earlier stages of their development biotechnology firms depend on other firms for their learning but at later stages internalised their learning (Oliver, 2001).

The four levels of absorptive capacity conceptualised in the framework were:

- Ignorance of key issues
- Awareness of key issues
- Knowledge and understanding of key issues and solutions
- Implementation of actions to address key issues

Corresponding to these framework levels, interventions that have been suggested or reported in the literature can be divided into three basic types: those that deal with raising awareness, those that deal with collecting and absorbing knowledge and those that deal with help in implementing solutions. The majority of the literature focuses attention on networks as a means both of raising awareness and of absorbing knowledge, and on the insertion of experts into the firm as a means of helping implementation of solutions.

Other interventions are also discussed and both gaps in our knowledge of intervention effectiveness and gaps in our knowledge of potential alternative interventions are discussed.

6.1. Absorptive capacity for awareness

Networks can be a valuable means of raising issue awareness. The relation between absorptive capacity and tipping point issues is noted in the importance placed on Issues Networks to help businesses respond to new and emerging opportunities and challenges, drawing on knowledge and information within the UK's science, engineering and technology base in an AIM study (Pittaway, Robertson, Munir, Denyer, and Neely, 2004). This UK view is backed up by successful experience of network formation in developing countries (Ceglie and Dini, 1999). They cite

examples such as weekly joint discussions organised by an external consultant to support a group of entrepreneurs in analysing their problems, identifying common solutions and outlining a common work-plan.

An alternative approach is to organize internally to be sensitive to arising issues. Arnold et al, (2004) propose the importance of what they call diagnostic capability. This capability involves organising to help identify needs and opportunities; they present it as a practical reaction to the cognitive or 'learning paradox' that those whose capacity is deficient are often unaware of the fact.

The literature on issue awareness is decidedly limited and this is an area where further research could be valuable from a practical policy perspective: awareness is key to further advance up the absorptive capacity ladder and without it tipping point issues are unlikely to get the firm attention that they need if growth is to be maintained. It can be seen from the discussion in the next section that successful networks are likely to be demand driven, and demand needs to be predicated on initial issue awareness.

Similarly government help specifically to encourage issue awareness appears generally lacking. We have not been able to identify any current scheme (other than the general awareness raising effect offered by networks) that assists firms in understanding issues that they are facing or can expect to face in the immediate future. Schemes instead appear to assume that firms know what they want to do and are in place to help them achieve their goals. Arguably, small firms may fail at the issue awareness stage, being overtaken by market or organizational problems before they clearly identify the nature of the problems they are facing (before they get to assimilate and apply). The tipping point issues identified in the framework suggest a list of key issues that all growing firms need to be aware of. Hence they offer a basis for awareness promotion interventions that might add value to small business growth support in addition to the provision of more generic business support programmes.

6.2. Absorptive capacity for knowledge and understanding

The main recommendation in the literature to improve levels of knowledge is to improve the use of networks to suck in external knowledge and expertise. A Study of the Absorptive Capacity of Irish SMEs (Arnold et al, 2004) recommended that for most SMEs absorptive capacity needs improvement, and that this could be tackled if firms recognised the relevance of external knowledge, if they improved external networks, and if they reduced their levels of perceived risk through better information and access to knowledge. Other literature points to the fact that many SMEs are not particularly good at absorbing external knowledge through networks if left unaided: they have been found to be inefficient at gathering diffused technology through the adoption of process innovations (Arnold and Thuriaux, 1998; Oakey and White, 1993). Arnold et al. (2004) report that firms have poor external linkages, need better awareness of innovation and contact with sources of improvement and need more pooling of experience. The available literature vividly bears out that the intervention of an "external agent" that acts as a catalyst to facilitate the emergence of clusters and networks can greatly reduce the significance of the above factors. Navdi (1995) provides interesting examples of successful interventions aimed at fostering co-operative relations within SME clusters drawn from the experience of Brazil, Mexico and India. Humphrey and Schmitz (1995) describe a Chilean program consisting of public incentives which stimulated the establishment of approximately 450 SME

networks with significant results in terms of increase in SME profitability and sales (Dini, 1998).

As noted in the preceding examples, there has been considerable international experience of programmes to create networks; in addition to their use in issue awareness as cited above, many networks have been aimed at the transfer of knowledge within specific sectors; for example the Knowledge Transfer Network scheme (KTN) in the UK illustrates assisted network formation where public funding underpins network creation. Ceglie and Dini (1999) report UNIDO's experience in promoting business development services focused on networking as a strategy to develop small-scale enterprises. Evidence of well performing SME clusters benefiting from strong networks has been extensively reported in literature (e.g. Goodman, Bamford, and Saynor, 1989; Pyke, Becattini, and Sengenberger, 1990; Sengenberger, Loveman, and Piore, 1990).

Ceglie and Dini (1999) report that an important principle in the design and provision of networking development services is demand orientation – networks must serve the issues of which firms are aware. They also note successful experience of large lead-firms playing an important role in terms of direct (financial) support and sensitisation of other SME partners. A further support for the demand orientation viewpoint is found in Bessant and Rush (1995), who in considering the role of consultants suggest that the role of agents to help firms understand their needs is often less one of information transfer than of helping articulate and prioritise issues, ie that the primary need is to crystallize the demand side of the equation.

McPherson et al. (2001) note that people prefer to learn from homophilic networks ('people like us'), The importance of homophily (birds of a feather flock together) is thought to increase as firms move from solution to legitimisation because the more removed from a simple solution something is, the more trust, experience and/or closeness is needed to utilise the benefit. Trust and experience can be expected to be greater within groups than between them (Cross, Borgatti, and Parker, 2001). Similarly, heterophily - the degree to which pairs of individuals who interact are different in certain attributes - is considered a barrier to diffusion. Heterophyllous organizations are less receptive to each other's communication and therefore more immune to learning from each other (Rogers, 1983). Lane & Lubatkin (1998) extended these ideas to relative absorptive capacity. They proposed and found that the firm's ability to learn depends on its similarity with its partners in knowledge bases, organizational structures/compensation policies, and dominant logics. This literature therefore suggests that homophilic networks may possess advantages; however this stream of research focussing on learning process downplays learning content. There is an important issue of whether it is best to construct networks from similar firms, or whether this both raises barriers of competitiveness and limits the breadth of knowledge that can be exchanged. Further research on this point could have important policy implications.

From the above discussion it can be seen that networks are proposed as a major contribution to assist the firm in building knowledge of key issues. However, there is a potential danger of networks not often raised in this literature: networks can become 'talking shops' with little action following. Arnold et al. (2004) note that few networking initiatives tackle the issues of organisation, routinisation or codification

that are given so much attention in the innovation and management literature. The implication is that networks may be only a first step in the firm's absorption of knowledge. Unfortunately there appears to be little reported evidence of rigorous evaluation of networking programmes; anecdotally they are regarded as successes but actual firm performance benefits have rarely been rigorously analysed. This is another area where further research could have important policy implications.

Despite the focus on networks in the literature, networking is not the only mechanism suggested for improving knowledge of key issues.

Daghfous (2004) suggests a number of internal firm actions to enhance absorptive capacity based on communication, culture and rewards:

- Communication across functional boundaries
- Top management commitment to learning
- A culture that is open to change
- Provision of chatrooms, intranets, seminars
- Rewards for knowledge sharing

These issues of internal organization and culture as means of improving absorptive capacity are relatively under-explored and could contribute more to our understanding of effective interventions.

6.3. Absorptive capacity for implementation

The literature addressing implementation actions in respect of tipping points shows a marked focus on the insertion of experts, typically academics or consultants, into the firm to help in problem solution.

A typical example is the range of TCS like schemes found internationally. In a review of such schemes Arnold and Teather (2001) found evidence that the 'best' firms can often sort things out for themselves while the 'worst' firms are unlikely to be helped. Schemes therefore need mechanisms to ensure that firms subsidised are likely to make good use of the subsidy. For example, recipients should have promising management and a desire for innovation and growth.

They also suggest that the focus should be on capability creation (i.e. knowledge and understanding of issues) among less capable firms, with more focus on implementation where customers are already more capable. Examples of implementation assistance via expert insertion include TechStart's focus on university linkage for firms that have limited capabilities, and Knowledge Transfer Partnerships (KTP) that aim to increase the capabilities of businesses, especially SMEs with the capacity to absorb and use new knowledge leading to increased productivity.

Arnold et al. (2004) note that Ireland, the UK, the Netherlands, Sweden and Finland all have schemes focusing on developing firm absorptive capacity through human capital placement. They find that academic linkage programmes are the most numerous type. In most cases, where such schemes have been evaluated, the findings were largely positive (Arnold and Teather, 2001).

A question largely sidestepped in this literature is that of cost-benefit of interventions. If a firm has identified and understood that it faces a specific issue, why would it not pay market rates to employ experts for advice and why should the government to

subsidize industry-academia partnerships? It may be that knowing where to find an appropriate expert is the barrier which interventions should aim to overcome rather than direct provision of expert advice. Or it may be that firms are only willing to pay subsidized rates suggesting that use of experts is not a major factor in implementation of issue solutions. This possibility, that bringing experts into firms may not be the most cost-effective intervention, is supported by alternative suggestions for interventions.

Despite the literature's focus on placement of experts within firms, this is not the only way to improve implementation of response to tipping point issues. Jansen (Jansen, 2000) suggests that it has been mistakenly held that a barrier to implementation is that individuals are resistant to change, and that in fact the obstacles to change and growth reside in organisational structure or performance and appraisal systems that are not aligned with desired new behaviours. As a counterpoint to the notion of 'resistance to change' the idea of 'readiness for change' has begun to emerge (e.g. Fox et al, 1988; Jansen, 2004). Change agents are regarded as coaches and champions for change. Their role is to create and maintain change readiness using a proactive orientation that influences the beliefs, attitudes, intentions and behaviours of the change participants (Jansen, 2000).

Kim (1998) reports on the early growth experiences of Hyundai and suggests that a major driver of tipping point solutions was the proactive construction of crises by the firm itself. The creation of crises was found to drive absorptive capacity and learning in the firm. Evidently the proactive creation of a crisis is a serious organizational event, and Kim suggests that owners are better placed than professional managers to do this. For smaller firms with the owner in direct control this offers an opportunity for increasing absorptive capacity that may not be available to larger firms; hence Kim suggests that it is especially useful as a technique for catching-up firms.

Again further research on this mode of increasing learning and absorption could have significant policy consequences.

6.4. Discussion

The review above shows an imbalance in research and the available literature. There is little rigorous thinking or empirical evidence on the 'foundation step' of absorptive capability: awareness of key issues by the firm. Without such awareness firms may absorb inappropriate 'solutions' and fail to address key business challenges. Firms need to see the issues they face clearly, and not 'through a glass darkly'. The identification of this gap and the support in identifying key awareness issues offered by the framework provides insight into an important area where intervention policy can be defined.

Networks monopolize this literature and further research on alternative means of improving firms' knowledge and implementation capacity, notably in the areas of culture and organization, could provide an enhanced set of intervention tools.

The different treatments of issue awareness and solution networking can be considered in a quasi-economic manner as demand and supply aspects of a knowledge market. A commitment to awareness together with a culture that expects and rewards efforts to communicate and to understand issues is a commitment to the demand side of issue knowledge, whereas network creation is a commitment to the supply side.

Both demand and supply are necessary, but it is not evident that the focus on supply (via networks) is either a balanced or an optimal approach. Indeed, if there is little demand for issue knowledge then it is difficult to see why firms would want to join a network or how they could benefit. This reasoning suggests that successful networks will be based on an existing demand for knowledge, which implies that issue awareness must be developed before networks can be fully effective. Again this is an area where the literature is lacking and further research could lead to a better understanding of how best to stimulate knowledge absorption.

Turning to implementation capability, much trust is placed by the literature in the insertion of experts into firms, without there being much evidence that such a course of action providing good cost-benefits and with an open question of why firms should need economic assistance in using expertise if it truly creates value for them. Further research in this area would have considerable value in helping to determine the value of expert insertion interventions. Again, as with networks, the raising of issue awareness through mechanisms such as crisis creation, provides an alternative potential path for creating demand rather than pushing the supply of knowledge. Given the almost complete absence of research on this point it could provide an interesting area for further exploration.

7. TIPPING POINT INTERVENTIONS

In this section we review interventions suggested in the literature to deal with specific tipping point issues, as mapped out in the framework.

The literature addressing interventions at tipping points tends principally to report on what organisations do rather than on what and how they change. As such the literature is largely prescriptive and based on studies of practice, rather than providing rigorous evaluations of the relative effectiveness of different interventions. The identification of these prescriptions nonetheless reflects the importance of these practices and they can be used as the basis for identifying gaps in the literature as well as for developing policy recommendations.

The types of tipping points identified were:

- People management
- Strategy
- Formalized systems
- New market entry
- Obtaining finance
- Operational improvement.

Below we review the literature on interventions that have been experienced or suggested for issues of each type. We find the coverage of the literature to be uneven. In particular while issues of financing and operational improvement via best practice have attracted wide attention there is little on the specific people management challenges facing a growing firm; while the importance of marketing issues are often remarked on there is little on specific interventions to assist with this type of issue and there is almost a complete absence of literature dealing with issues on formalizing business systems.

7.1. People management

Huselid et al. (1997) identified a dimension of HRM activities termed strategic HRM which includes employee participation and empowerment, communication, team based work design, and development of managers of the organization. Rauch and Frese (2000) note that human resource strategies consisting of training of employees, decision -making involvement, goal communication, and support for personal initiative have been shown to positively affect business success. Minbaeva (2003) notes that managers can improve the absorptive capacity of their organisations by applying specific HRM practices oriented towards individuals' ability (training and performance appraisal) and motivation (performance-based compensation and internal communication). Such prescriptions are summed up by Hornsby and Kuratko (1990) who state that although 'the practice of effective personnel management is one that small businesses need to develop and improve as they expand and grow', yet in practice in small businesses people management often appears only to receive marginal management attention after functional issues relating to accounting, finance, production and marketing.

Unfortunately little is known about the various issues involved in integrating people into start-up firms. Nor has research focused on the question of how to provide a

workforce and develop the necessary policies and procedures to effectively and efficiently expand and grow a firm. In general, human resources management research has been done in large, bureaucratic, highly structured companies. Some research focuses on human capital practices across stages of development (eg., start-up, expansion, consolidation, and diversification) noting for example that the search for talent may vary from recruiting to fit the management team in a start-up to new skills during diversification (Tansky, Heneman and Cohen, 2003).

Some difficulties in adopting good HRM practices are illustrated by Aldrich and Langton (1997) who found in small and medium sized firms that founders’ desires to protect the “family business”, as part of their firm inhibited the adoption of formalized HR practices. At the outset, these firms relied heavily on informal recruiting practices, and they stuck with them as the firm grew older and larger. We found that formal recruiting methods were added as the number of non–family members increased, and that formalization was inhibited by the number of family members employed.

In a similar vein, Hornsby and Kuratko (1990) analysed the frequency of use and efficiency of 40 HR practices categorised under 7 headings (job analysis, recruitment, selection, compensation, benefits, incentive plans and performance appraisal). Their use became more frequent as the number of employees grew. They investigated what managers perceived as the most critical HR issues for their businesses. In accordance with the framework used in this report, they found that the three categories of business shared the same top five concerns in common (see table 6), small businesses are concerned about the same HR issues regardless of their size.

Rank	Employees		
	1-50	51-100	101-150
1	Wages	Availability of quality workers	Benefits
2	Availability of quality workers	Wages	Wages
3	Benefits	Government regulations	Availability of quality workers
4	Government regulations	Benefits	Job security
5	Training	Job security	Training

Table 6: SME managers’ perceptions of important future HR issues (source (Hornsby and Kuratko, 1990))

With respect to small-scale enterprises, the literature on personnel issues is in general more conceptual than empirical/ data based (Hornsby and Kuratko, 1990). Rauch and Frese (2000) indicate an absence of studies about the relationship between HRM and success of small-scale enterprises. However Golhar and Deshpande (1997) found that many HRM practices of small and large manufacturing firm were similar; this suggests that what is important for bigger companies (Arthur, 1994; Huselid et al. 1997) is important for small-scale businesses as well. For mid-sized firms Welbourne and Andrews (1996) found that HRM could predict long-term survival of initial public offerings.

Thus the literature provides a variety of recommendations on people management practices derived largely from large firms. This stream of work suggests that

developing the people management skills to encourage delegation (participation and empowerment), communication and teamwork are primary needs for firms that need to make the transition from owner micromanagement to larger scale professional structures and for firms that are expanding their existing management structure. However apart from isolated studies such as the above, the literature is strangely quiet on the specific people management skills that are needed by growing small businesses, or on the transition from owner-manager to more professional people management systems and skills. This is another area where further research could prove valuable in policy design.

A need for more professional management in growing firms has been identified by Arnold et al. (2004), and Tabuenca and Listerri (1998) add empirical strength to this argument by reporting that most successful Latin American enterprise development projects have included management training. Motivation for growth was among the top ten entrepreneurial learning needs reported in a survey conducted by Sexton et al (1997). Jones, Morris, and Rockmore (1995) examined entrepreneurial companies and found that an entrepreneurial orientation encouraged higher levels of employee involvement in the appraisal process. They found that the greatest differences between entrepreneurial and non-entrepreneurial firms can be described in terms of performance appraisals, compensation practices and training practices. Specifically, they found that the HR policies of entrepreneurial organisations reflected an orientation toward: innovation and risk-taking, long-term planning, results over process, individualism, flexibility, active employee participation, external focus. Hence it appears that management training specifically for SMEs could provide a valuable intervention. Whether the market for such training is adequately developed in the UK regarding coverage and quality is a question that further research could address.

7.2. Strategy

“Has my firm selected the right strategy?” and “Can we execute our strategy effectively and efficiently?” are two critical questions entrepreneurs must ask continuously (Bhide, 1996). The long-term plan a firm uses to achieve its goals (Zahra, 1993b) and the mechanism it uses to align with its environmental conditions (Hitt & Ireland, 1985), helps the firm form competitive advantages Careful study of the entrepreneurial firm’s competitive strategy is important, because it significantly influences the venture’s performance (Zahra and George, 2002). Koberg et al. (1996) note that it is well accepted that firms having a clear growth strategy do grow more quickly. Tabuenca and Listerri (1998) in their report on Latin American enterprise development projects, indicate that most successful programs have included strategy consultancy. Tellis and Golder (1996) found that pioneering firms that fail in the early stage, fail as a result of poor strategic planning. Careful planning to examine the direction of the business, the issues and foreseeable problems as well as the financial needs are critical factors to firm success (Chittipeddi and Wallett, 1991). Ensley et al. (2003) asked ‘does strategy really matter for fast growing entrepreneurial firms?’ Can some firms, on the basis of their strategy, sustain high returns over time? They found that strategy does play an important role. Specifically, some firms, by virtue of their strategy, attain and sustain superior performance that is beyond that which could be explained by industry or population-level effects. Gundry and Welsch (2001) focus on firms driven by female owners; their study showed that high-growth-oriented entrepreneurs were different from low-growth-oriented entrepreneurs on several

dimensions of strategy. The former were more likely to select strategies for their firms that permitted greater focus on market expansion and new technologies, to exhibit greater intensity towards business ownership, and be willing to incur greater opportunity costs for the success of their firms. High-growth-oriented firms were characterised inter alia by strategic intentions that emphasize market growth and technological change, earlier planning for the growth of the business, and a concern for reputation and quality.

In practice, however, strategy making processes are often ad-hoc or sporadic, leaving firms without a well articulated strategy. Stockley & Birley (2000) investigates the short-term evolution of strategy-making processes within entrepreneurial teams. This study demonstrates that the answer to the question of ‘how strategy is made in an organisation’ depends greatly upon whom you ask. Some dramatic differences are observed between the responses of individual top team members and their Managing Directors. There is clear evidence in the Data Co case that formal, rational strategy making processes were suppressed as the firm negotiated a high growth transition from one organisational configuration to another. Four of the team referred to the regime as being ‘autocratic’. This case of strategy making is reflective of Stevenson’s (1983) view of entrepreneurial management as a set of opportunity-based management practices.

Barringer and Neubaum (1999) suggest 5 types of strategies drawing on work by Hacker, (1986), Hayes-Roth and Hayes-Roth (1979), and Zempel (1994). Reactive Strategy implies that one is driven by the situation, makes little proactive use of information and that actions are not planned. Complete Planning Strategy plans ahead and actively structures the situation. Opportunistic Strategy starts out with some form of rudimentary planning but deviates from these plans easily when opportunities arise. Critical Point Strategy (Zempel, 1994) starts out with the most difficult, most unclear, and most important point and plans and acts on this one first without any planning of other points. Only after solving the first critical point, further steps may be attacked. Habit is when people just use their routines without any explicit decision for a strategy. Their empirical results suggest that at least some restricted form of planning is necessary for success. Opportunistic, Reactive and Habit strategies were not considered to perform well. This finding is backed up by a study comparing strategies for high-growth and low-growth entrepreneurs (1997) which found that high growth firms were far more likely to have articulated strategy goals across a range of strategy possibilities from adding new products to seeking new finance (table 7). They also found that strategic planning was more highly rated as a growth driver by high growth firms. This suggests that it is less a question of good vs bad strategies, and more a case that having any thought out strategy dominates a strategy free approach.

Strategy	High-growth entrepreneurs (n=295)		Low-growth entrepreneurs (n=211)	
	mean	s.d.	mean	s.d.
Adding a new product or service	4.57	0.96	2.91	1.7
Selling to a new market	4.44	1.14	2.80	1.64
Adding operating space	4.19	1.24	1.55	0.94
Expanding distribution channels	4.05	1.29	2.00	1.36
Expanding advertising and promotion	4.32	1.04	2.41	1.39
Acquiring new equipment	4.64	0.70	2.79	1.48

Computerising current operations	3.95	1.59	2.03	1.42
Upgrading computer systems	4.13	1.39	1.99	1.46
Replacing present equipment	3.93	1.33	2.09	1.37
Expanding current facilities	4.11	1.26	1.48	0.92
Adding specialised employees	3.89	1.22	1.71	1.17
Redesigning layout	3.50	1.38	1.35	0.79
Off-site training of employees	3.06	1.51	1.34	0.88
Redesigning operating methods	3.92	1.07	1.55	0.94
Seeking additional finance	3.93	1.37	1.60	1.04

Note: all ratings are significantly different ($p < .001$), based on one-way ANOVAs

Table 7: Strategic options for high growth firms (Source: Gundry and Welsch (1997))

Ireland and Hitt (1997) identify three generic strategies for the high-growth entrepreneurial firm. Low-Cost Strategy (LCS): this strategy calls for firms to focus consistently on efficiency and on finding ways to drive its costs lower than competitors. High-Quality Strategy (HQS): HQS is a strategy to produce products with the highest levels of quality, relative to competitors' offerings, that can be sold to customers at what they perceive is an acceptable price. Time-Based Strategy (TBS): an increasing number of large and small firms now consider speed to the marketplace an important competitive weapon and Chen and Hambrick (1995) found that small firms had a higher propensity for action and were able to execute actions more rapidly than larger companies. Ireland and Hitt (1997) report that both LCS and HQS can lead to good performance but that not many of their firms were using a LCS. They found no relationship between the use of TBS and firm performance. These results suggest that strategy needs to be tailored to the environment of the firm, and this is also suggested by Ensley et al. (2003), whose findings demonstrate that performance was related to the interaction between environmental dynamism and four dimensions of strategy (riskiness; innovativeness; analysis; and defensiveness). They suggest that for example young firms can accommodate changes in the environment by pursuing strategies with greater levels of financial risk. Similarly, and notwithstanding the limitations of their research (non-random sector specific sample and geographically concentrated) Brush & Chaganti's (1998) study implies that firms seeking growth are best served by a clear strategy to identify and enter growth markets and industries, whereas high cash flow requires a different strategy based on cost efficiency.

Van Gelderen and Frese (1998) analysed the relationship between different types of strategy and success, using Miles & Snow's (1984) categories. Their results suggest that a reactor strategy is the least successful in the market (Glick, Huber, Miller, Doty, and Sutcliffe, 1993) and that at least some form of planning is necessary for success. They find a positive and significant relationship between Critical Point Strategy, which implies some degree of planning, and success. This study backs up the overall impression given by this literature that having a well planned strategy is important to firm growth and success. However there is a lack of literature on examining the effectiveness of external interventions that help SMEs to develop such a well planned strategy. While strategy consultants are known to be commonly used, there is little evidence on the value they add. The almost complete absence of evidence regarding how SMEs can plan successful strategies represents a void of [particular importance in the literature. Further research to fill this important gap in the literature that could have significant implications for policy.

7.3. Formalised systems

Formalization enables early-stage firms to focus limited resources and to concentrate efforts, thereby promoting effectiveness, improving morale, and increasing innovation (Van de Ven, 1986; Walsh and Dewar, 1987). Koberg (1996) notes that various structural devices including formalization can facilitate innovation. An empirical analysis of a sample of 118 high-tech manufacturers and software developers showed that small firms with formalized systems made better choices of new products (Pavia, 1991). Recent research suggests that the effects of formalization on organizational innovation vary with the age of the firm (Koberg et al, 1996). Aldrich & Langton (1997) note that founding and growth constitute two phases of the developmental process, and that a major feature of the move from founding to growth phases is increasing formalization and rationalization of business practices (Scott and Bruce, 1987). In this context a need for external advice for growing firms on processes and their improvement is noted by (Arnold et al, 2004).

Underdown and Liles (1998) reported that the most prevalent issue in preventing the growth and transformation of small businesses was the lack of formal systems (i.e. a sequence of activities performed according to an established set of rules). Based on a series of 9 case studies the authors identified a lack of formal systems to be associated with organisational 'growing pains'. In order to transform the organisation from its current state to some desired future state the authors argue that managers must necessarily formalise their processes, and in particular they point to the development of a formal plan for transformation, formal HR processes to develop a workforce with adequate and sufficient competencies to enable transformation, formal measurement and reward processes and the command and control processes that facilitate transformation, finally develop formal problem solving processes to promote teamwork and continuous improvement.

On the other hand, "the older, larger, and more successful organizations become, the more likely they are to have a large repertoire of structures and systems that discourage innovation" (Van de Ven, 1986; 596). As the organization evolves, it becomes more formalized, primarily because of a need for increased efficiency, "power games" by firm managers, and external institutional influences (DiMaggio and Powell, 1983; Walsh and Dewar, 1987). Moreover, it becomes increasingly difficult for a firm to innovate and adapt to a changing and expanding environment as it moves outside its core business (Sykes and Block, 1989). Hence there are two opposing effects of formalized systems to be found in the literature: the beneficial effect of replacing ad-hoc systems with formal ones; and the detrimental effect of ossifying formal systems, embodying the 'success to excess' concept of Mintzberg (1984).

In sum, it appears that there is a need for growing firms to introduce more formal systems, yet there is little in the literature to point to the degree of formalization needed or to offer practical assistance regarding implementation of such systems. Further, there is an implicit suggestion that firms to strike an optimum balance between not enough formalization and too much formalization. However there is little or nothing in the literature to show how such an optimum balance can be found. This represents another important research gap with potential policy implications.

7.4. New market entry

Within the services sector, high-tech firms feel significantly constrained in relation to marketing and sales skills, with over 35% of the high-tech service firms rating it as a significant or crucial constraint (Cosh and Hughes, 2003). Edelman et al. (1996) present findings that indicate that small less glamorous firms should follow strategies that bring them closer to their customers, and de Koning and Muzyka (1998) found that higher performing firms had a stronger awareness of customers and customer needs. In a similar vein the majority of interviewees alluding to negative influences in SMART projects indicated that they had suffered because of market behaviour or because of marketing problems (PACEC).

This deficiency in sales and marketing skills in growing firms is widely acknowledged, eg the need for market development specialists noted in Arnold (2004). Again, an evaluation of the Polish British enterprise project (Sealy, 1999) showed the need for marketing consultancy services in SMEs. The AMAP/DAI international review of impact assessments found a need for more help in forming market linkages (eg buyer-supplier relationships). In this context it found a valuable role for trade associations. Tabuenca and Listerri (1998) report that for Latin American enterprise development projects, most successful programs have specifically included sales support. De Koning, and Muzyka (1998) report that in higher performing organisations visits to customers on the part of sales and R&D staff were actively encouraged; and there was a strong bias to gathering and sharing information about the market.

The technological bias of many government small business development programmes has resulted in low levels of sales and marketing expertise being provided; it appears from the evaluations noted above that there is a major role for reinforcing market entry skills within growing firms. The assistance that can be given by trade associations points to the role of networks in both spreading marketing knowledge and increasing absorptive capacity in this key area. Further research on the effectiveness of sales and marketing advice in helping firm growth, either from direct training or from provision of contacts via networks, could again have important policy implications.

7.5. Obtaining Finance

Relatively few new firms break the entrepreneurial growth barrier and become medium-sized (Saemundsson and Dahlstrand, 1999). In Europe, lack of venture capital has been both a barrier and a reason why small firms sell off their business. As in many earlier studies (Cooper, 1986; Moore, 1994), Saemundsson & Dahlstrand (1999) found that self financing and loans are the two most usual ways of financing the emergence of the technology-intensive firm, while very few firms had received any financing from private investors or Business Angels. Less than a third of the firms did receive any venture capital. Government support in the form grants or loans were found in a third of the firms, and especially so in the firms who managed growth as independent non-acquired firms (Saemundsson and Dahlstrand, 1999).

In a US study (Gundry and Welsh, 1997) found that the Small Business Administration Loan Program was significantly more likely to be a source for high-growth entrepreneurs than for low-growth entrepreneurs at both start-up and expansion. In fact, high-growth entrepreneurs were 7 times more likely to use SBA

than low-growth entrepreneurs. This suggests that government sponsored finance programmes have an important role in enabling firms to obtain the capital needed to grow. However such government finance programmes have not been an undisputed success.

The Oakey Report indicates that there must always be a proportion of new business ventures that would never be eligible for external investment capital support (e.g. through the SMART scheme). A smaller percentage of new business ideas are immediately fundable by the private sector : most studies on this subject suggest that the proportion would not be greater than 20% (Murray and Lott, 1995). However, a further 30% of SMEs are termed “probably un-fundable” for a variety of reasons related to management competencies, project viability, and market potential and other factors. From a “hard headed” business viewpoint, deal makers would be unlikely to venture into these. Government interventions in this area have not had a particularly successful review. The Oakey Report provides a dim picture of initiatives to help high risk small businesses obtain the funding they need for growth. It states that it would not be an exaggeration that the actual policy impact at firm level of government concern for barriers to growth in early 1990s was not particularly large or effective. It concludes that the Enterprise Investment Scheme (EIS) and Venture Capital Trusts (VCTs), were largely ineffective in practice and the House of Lords Select Committee recently noted that, “these two schemes do not appear to have achieved in practice their potential for funding technology-based start ups, and there are signs that the VCTs are drifting towards a risk averse strategy” (HL Paper, 1997; 16).

Similar problems beset the Small Firms Loan Guarantee Scheme, one of the main government support schemes to business is designed to guarantee loans from banks and other financial institutions for small firms who have viable business propositions but are unable to secure a loan because of lack of a track record or security. The Robson Rhodes report (1984) found “limited technical expertise amongst branch managers in analysing business propositions” and the House of Lords Select Committee on Science and Technology (1997) noted a number of complaints that banks were often unwilling to issue SFLGS unless the proposal was “almost risk free”.

The evaluation of SMART in 2000-2001, a scheme aimed at new technology businesses, suggested that the scheme was relatively effective; and that it provided value for money (PACEC); indeed around one-fifth of the companies interviewed suggested that all of their sales, employment, profits were attributable to Smart. However this is to see the scheme through the eyes of firms that received quantities of free funding. Even this programme was perceived as falling down on the critical issue of sustainability: perhaps the most damaging weakness of SMART, as seen by recipients, was the lack of any continuing commitment attached to a SMART award, particularly with regard to the final commercialisation of a new product development (North and Smallbone, 2000).

The literature on small business growth accepts the proposition that firms often require a substantial period of development before products can be launched on the market which implies the need for medium to long term investment of capital (Oakey, 1995).

The schemes noted above have been primarily aimed at technology based firms. A more rounded picture is painted by Arnold et al. (2004) who point out that there is little help available for firms that want to be more innovative but do not want science-push schemes: want to use existing knowledge stock not create new knowledge. In a service driven economy such firms are likely to outweigh science based firms. They also suggest that firms need understanding as much as better finance to deal with their high perceived risk. Obtaining finance therefore shades into strategy: without a good commercial strategy and understanding of risk management, business plans are unlikely to attract commercial (and perhaps government) funding.

An alternative to government backed finance schemes is therefore the absorption of knowledge by firms on how to construct a financial case that can win commercial funding. There appears to be an absence of experience reported in the literature in this key area.

7.6. Operational improvement

Coles et al. (2003), in “the economic rationale for promoting dissemination of commercial best practice: review of evidence” suggest that ‘best practices’ linked to better business performance can be identified, and are the subject of a substantial body of business school and practitioner literature. For example, evidence shows that organisations that use benchmarking perform better. Since this literature is extensive and covers many different types of best practice that appear to vary over time with management fashions, we do not review it here. We note that little of it is specific to the needs of small and growing firms and that there is little robust economic research on the subject. Perhaps more important is the finding Harris (2003), of evidence of lagging UK take up of best practices, particularly among single unit enterprises, and clear evidence of take up being much less frequent among small firms. This implies barriers to operational improvements via best practice take up for SMEs.

Similarly, an AIM study (Pittaway et al, 2004) (adoption of best practice: a systematic review of the literature, aim research,) looking at the evidence regarding successful adoption of promising practices in UK organisations, concluded there was a poor level of adoption in the UK.

Hence it appears that best practice operational improvements have been difficult to foster. The recent deletion by the DTI of a best practice awareness product line fits into this picture.

Viewing this issue through the lens of our two dimensional model, we suspect that the root of the problem may lie in the absorptive capacity state of firms together with the wide variety of operational improvements that are possible. Unless a firm is targeted at the right time (absorptive state) with the right best practice, it is unlikely to respond; and the multiplicity of times and practices means that only a careful targeting based on both dimensions would be expected to produce high levels of take-up. It follows that resources might initially be spent on raising absorptive capacity states before offering best practice ideas around specific issues.

8. DISCUSSION: THE FRAMEWORK AND THE LITERATURE

The framework we have developed in this paper shows that to support the growth of SMEs there are two interwoven dimensions that need to be addressed: absorptive capacity and awareness and solution of tipping point issues. Neither on its own can constitute a complete assistance package. Without awareness or the ability to tap into sources of knowledge and help, issues are unlikely to be resolved quickly as the firm will be thrown back on solving problems through its own trial and error experiences; this is unlikely to provide a satisfactory outcome for a growing and still fragile firm. Without available assistance focussed on the key issues that growing firms can expect to face, it may be difficult for firms to locate reliable sources of help or they may waste resources on less fundamental issues without properly addressing these key issues that have been reported as most important for survival and growth.

Regarding absorptive capacity, this review shows a need for rigorous thinking and empirical evidence on how to improve awareness of key issues at the level of the firm. The framework developed in this paper identifies the key issues that need (at a minimum) to be addressed from an awareness perspective. The identification of this literature gap is one important area where further policy relevant work is needed.

While two mechanisms: networks and expert insertion into the firm, have been widely promulgated as responses to supporting understanding of issue solutions and implementations, there is a lack of rigorous empirical validation of their effectiveness. The identification of this literature gap is another important area where further policy relevant work is needed. A further option to consider would be individuals and institutions to act as 'knowledge brokers' (Hargadon, 1998; Hargadon and Sutton, 1997). In Hargadon's conceptualisation, these are firms that span multiple industries whose aim is to provide innovative solutions to organisations' problems by transferring knowledge from where it is known to where it is not. Their effectiveness is predicated on their ability to access existing knowledge and combine it in contextually novel forms to provide local solutions.

The interaction between issue awareness and network effectiveness is another area where the literature is lacking and further research could lead to a better understanding of how best to stimulate knowledge absorption. Finally the question of why firms should need economic assistance in using expertise if it truly creates value for them remains unresolved. Further research in this area would have considerable value in helping to determine the value of expert insertion interventions. The almost complete absence of research on this point provides an interesting area for further exploration.

A comparison of DTI intervention products with the three areas of absorptive capacity improvement discussed earlier show that while products cover aspects of absorption capability once issue awareness is in place, there is a gap in helping firms to identify these issues in the first place (table 8). The apparent gap against awareness can perhaps be explained by the devolving of responsibility for access to best business practices to RDAs .

Turning to the tipping points the review shows a number of areas where interesting policy relevant considerations arise, and yet where the literature is thin (or sometimes effectively non-existent). Empirical evidence of interventions that move organisations through specific tipping points is rare. There is plenty of literature on techniques, such as scenario planning, to help envisage a future, but little that explicitly aims to develop a competence or capability to deal with a particular tipping point. If the question we set ourselves when considering the papers is “what interventions can assist the organisation to meet the challenge of any or all of our six tipping points?” then there is little direct response from the academic literature.

Absorptive capacity improvement	DTI products
Awareness of key issues	
Knowledge and understanding of key issues and solutions	Grant for research and development Grant for investigating an innovative idea Collaborative research and development Knowledge transfer networks
Implementation of actions to address key issues	Knowledge transfer partnerships Support to implement best business practice Small firms loan guarantee Selective finance for investment in England

Table 8: Absorptive capacity and DTI products

There is a reasonable amount of grey literature reflecting on the impact of multilateral interventions in small business development. Mostly these focus on the sustainability of the institutions that are funded by the intervention rather than the skill or knowledge accumulations of those businesses that are supported. The output of the Developing Markets for Business Development Services Conference BDS 1999 is testament to this.

On people management the literature is thin on the specific people management skills that are needed by growing small businesses, or on the transition from owner-manager to more professional people management systems and skills. Given the importance of people to any firm (and perhaps particularly in the dominant services sector), this is an area where further research could prove valuable in policy design.

Whether or not the market for training in the specific people management skills needed by small businesses is adequately developed in the UK regarding coverage and quality is an open question that further research could profitably address. On strategy there is a lack of literature examining the effectiveness of the tools or interventions that can help SMEs to develop well planned strategies. While strategy consultants are known to be commonly used in this role, there is little empirical evidence on the value they add. This represents another important gap in the literature. Further research to fill this gap could have significant implications for policy.

On formalized systems there is little in the literature to point to the degree of formalization needed or to offer practical assistance regarding implementation of such systems. Further, there is little or nothing in the literature to show how an optimum balance can be struck between a carefree lack of formalization and a red tape culture

of excessive formalization. These gaps represent important research issues with potential policy implications.

On new market entry we have identified a gap both in the provision of advice from government schemes and in research on the effectiveness of sales and marketing advice in helping firm growth, Research to identify the value of marketing and sales knowledge, either from direct training or from provision of contacts via networks, could again have important policy implications.

On obtaining finance there is need for a more in-depth understanding of why government backed schemes have not been successful in providing finance to higher risk firms nor in providing longer term support; whether these problems have been due to details of the schemes or whether a general effect of retreat to funding lower risk firms is an inevitable feature of all such schemes would provide highly significant policy knowledge. The absence of experience reported in the literature on how firms can be helped to increase their ability to construct financial cases that can win commercial funding is a related research gap and of similar policy significance.

On operational improvement we have identified a research gap concerning the lack of knowledge on the types of operational improvements that have specific value for small and growing firms, this, once again, has potential policy implications.

Support to help firms grow through innovation by new and existing knowledge acquisition, is something that many governments strive to achieve. In this context, the problem governments must grapple with is how, where and when to intervene. Mostly, this problem has been addressed from a supply side perspective. In this study, we have reviewed some key issues from the demand side. Following the identification of gaps in research relating to a lack of studies directly addressing organisations' use of external knowledge we would highlight the following as gaps in the literature and important areas for future research:

- Paucity of empirical studies of organisations' transitions through phases of knowledge tipping points, from 'ignorance of issues' through to 'implementation of actions to address key issues (see table 5). It is unclear what are the modes and mechanisms for effective transition, and how is knowledge absorption best stimulated? Relatedly, is the question of how firms might be made better aware of the issues they will confront as they grow. The six thematic tipping points that we propose in section 8 would provide a useful framework for such a study. The starting position for such a study might be to map existing programmes and support initiatives onto this framework.
- Address the issue of apparent market failure. If the knowledge issues that we have identified are truly important for growing businesses, then why is there an apparent failure within at least part of the business community to respond to the acquisition challenge?
- There is a need for longitudinal studies to generate and societally-embed new knowledge around the themes we have identified and their absorption by firms. Gibbons et al. (1994) describe this as 'Mode 2' knowledge production, and it is characterised by a constant flow back and forth between the

fundamental and the applied, between the theoretical and the practical. Such a proposition is congruent with recommendations made in the recent Lambert (2003) review of industry-university collaboration. One key objective of such research would be for applied academic research to provide a platform to allow academics and practitioners to mutually construct knowledge that has useful applications within practitioners' specific contexts.

A comparison of DTI intervention products with the six tipping points, we find that DTI products are focussed largely on two of the tipping points: raising finance and operational improvement (table 9).

Tipping Points	DTI products
People management	SIBBP, Employee relations
Strategy	
Formalized systems	
New market entry	
Obtaining finance	Grant for research and development Grant for investigating an innovative idea Small firms loan guarantee
Operational improvement	Support to implement best business practice

Table 9: Tipping points and DTI products

This framework we have developed therefore identifies not only research gaps in the literature, but also gaps in the range of intervention products presently offered. As such it provides guidance for areas of concern to small, growing businesses which may be of interest for future investigations.

9. CONCLUSIONS

Organisational life cycle models assume that organisations go through predictable stages. There is a plethora of life cycle, stages and evolutionary models, many of which we have reviewed here. We find that there is little consistency either in the numbers of elements that define these models or in the constitutive components of these elements and that they suffer from being linear, unidirectional, sequenced and deterministic. However, it is interesting to note from this review, not that studies show moderate evidence of patterning of relations between problem types and life cycle stage, but that there is not a greater degree of convergence than is actually reported. We propose that this challenges both the ontological status of stages models and, their explanatory validity.

Indeed, we point to the heterogeneous nature of the small and growing business community and the consequent difficulty of applying a generalizable model of stages. We have therefore developed an alternative approach. From reviews of surveys of practising managers we have been able to arrange the problems that they face at transition points in their organisation's life into six major categories that we have labelled tipping points. This approach builds on the concept of punctuated equilibrium that features in some life stages models (i.e. periods of stability followed by crisis, for example Churchill and Lewis (1983) and Greiner (1972)). It is similarly consistent with the view that organisations change discontinuously after having confronted and dealt with organisational crises (Miller and Friesen, 1984).

Together with a dimension representing learning capability (absorptive capacity), this categorisation provides a useful organising framework for discussion of the types of issues that managers may face as their organisations develop and face critical decisions. This issue based typology provides an advance on conceptualisations that appended specific problems to specific stages, since it allows for the observed heterogeneity of firm growth and development paths: there is no standard linear sequence of stages or problems, but there is a basic set of key issues that all growing firms can expect to encounter at some point.

These are the tipping points and the key to growth is seen as the absorption of knowledge and solutions to successfully traverse the tipping points. In dealing with these tipping points the firm needs to grow its absorptive capacity. It needs to become aware of key issues it is facing and it needs new knowledge inputs to provide solutions to the crises and challenges generated at tipping points.

From this review several important policy-relevant points emerge. First the importance of issue awareness as the first step in developing absorptive capacity. We have suggested that raising issue awareness is a fundamental step at the root of all interventions, and that it is necessary to support more solution oriented interventions such as networks and specific tipping point interventions. Yet there appears to be a gap in intervention programmes aimed at this fundamental need.

Second, intervention and support occurs within a context of limited resources. Consequently, in policy development, consideration should be given to which of the

two dimensions that are proposed in the framework (tipping points and absorptive capacity) it would be more efficacious to support. It is a question of whether or not direct support be given to firms addressing identified tipping points or, be directed toward encouraging firms to develop their own absorptive capacity, which in the longer term may better equip the firm to be able to take fuller control of future knowledge requirement needs. By way of illustration, consideration should be given to whether or not the construction of networks (from which firms can obtain advice and support) is more or less effective than the insertion of experts into firms (giving direct advice). Similarly, whether or not firms need specific finance support schemes or the provision and transfer of knowledge on how to construct good financial cases is a more appropriate alternative.

This apparent dichotomy, though realistically a third way exists that could offer support in both dimensions of the framework, spotlights the importance of evaluations for the appropriate targeting of interventions. Without an adequate measurement framework (Phelps, 2004) it is difficult to improve the focus and benefits of intervention policies. DTI has a track record of rigorous evaluations of interventions, and this practice should be maintained. However, in the light of the dimensions emerging from this review consideration should be given to incorporating criteria in future evaluations that specifically interrogate tipping points and absorptive capacity. Consideration should also be given to meta-analysis of previous evaluations also specifically interrogating these dimensions.

Finally, most of the tipping point issues identified are not technological but commercial in nature, mirroring the relatively small proportion of technology led firms in the economy. Yet intervention programmes are strongly biased in a technology direction. This appears to represent a misalignment of intervention policy and resources with the business growth potential of the economy. Further, we note that, on the basis of a very limited literature, it is not possible to generalise as regards the service sector.

Our understanding of firms' absorptive capacity, our understanding of tipping points, and our understanding of the effectiveness of various interventions to get growing firms successfully through the tipping points remains far from complete. We have identified a number of important research gaps where further work is needed with significant potential implications for the formulation of policy in this field.

Nonetheless, the framework we have developed provides initial guidance, not only in analysing the extant literature but in pointing toward potential means of support for growing firms that are presently not offered, and to some extent in questioning the primacy of measures of support that are currently offered. In particular we have identified a lack of support in raising the awareness of firms to the tipping points they face, and in providing any appreciable support for firms transitioning through four of the six categories of tipping points.

10. APPENDICES

10.1. Methodology

10.1.1. Systematic review

The methodology proposed for this investigation was systematic review. Systematic review specifies a clear methodology to guide the process of identifying, selecting and reviewing relevant literature. Below, we briefly describe the origins, process and benefits of the systematic review, but also illustrate how, in the course of this investigation, we necessarily deviated from its strictures.

Systematic review is a scientific investigation, with pre-planned methods and strategies that aim, amongst other things, to limit the bias and random error to which traditional narrative reviews of the literature have been accused of being prone. It differs from traditional reviews by specifying a replicable and transparent process that provides a guide, rationale and audit trail for review decision-making, procedures, analysis and conclusions. Specifically, its strategies include a comprehensive search for all potentially relevant articles and the use of explicit, reproducible criteria in the selection of articles for review (Cook, Mulrow, and Haynes, 1997). As such, it is a methodology that is firmly grounded in the philosophy of the evidence-based movement with the underpinning principle that policy and action be based on empirical evidence of what works. In the case of management, this has been described as an approach to practicing management in which the manager is aware of the evidence in support of managerial practice, and the strength of that evidence (Tranfield, Denyer, and Smart, 2003).

The undertaking the review we sought to follow closely the steps specified by Tranfield et al. (2003) and outlined in table 10. As can be seen in table 10, these steps map neatly against the DTI's project specification and reporting requirements.

Systematic review process	DTI requirements
Stage 1: Planning the review	
Phase 0 – Identification of the need for a review	Inception meeting
Phase 1 – Preparation of a proposal for a review	
Phase 2 – Development of a review protocol	
Stage 2: Conducting the review	
Phase 3 – Identification of the research	
Phase 4 – Selection of the studies	
Phase 5 – Study quality assessment	
Phase 6 – Data extraction and monitoring progress	Interim report
Phase 7 – Data synthesis	
Stage 3: Reporting and dissemination	
Phase 8 – The report and recommendations	Draft final report
Phase 9 – Getting evidence into practice	Final report

Table 10: Systematic review stages and phases. Source Tranfield et al. (2003)

A set of general parameters, or themes, for the review were set at the inception meeting, and are illustrated in table 11.

Historical antecedents	<ul style="list-style-type: none"> The study will not be specifically constrained by any particular dates. It was noted, though, that the more recent literature will likely reflect findings of earlier studies and so should be predominant in the review. Seminal papers should also be included in the review.
Phenomena and concepts	<ul style="list-style-type: none"> Stages, states and key decision points in an organisation's growth. Move beyond the conventional size and age perspectives Knowledge – types, sources (supply side), role (user requirements, provision), demand side Impact of knowledge at different organisation states (before and after input), impact determined at the level of the firm (i.e. not wider societal benefits)
Country specific	<ul style="list-style-type: none"> N/A, but international experiences to inform the review
Firm level	<ul style="list-style-type: none"> This is a micro (firm-level) review as opposed to country or sector-level analysis. Particularly of interest are those organisations that can be found at the top end of the SME category (in terms of size), but are not yet MNEs
Populations	<ul style="list-style-type: none"> Focus on service sector, but not to the inclusion of other sectors. Particularly, what is known about the service sector and how does it differ from the manufacturing sector?
Specified key words	<ul style="list-style-type: none"> Knowledge, advice, expertise, supplier, receiver, knowledge sources, agency provision, Fraunhofer, Knowledge, Policy experiences – UK, FRG, Finland, etc Advice, Spillover effects, Expertise, Regional effects, Supplier, Proximity (sector, etc) effects, Receiver, Cluster effects. Market information, Barriers to absorption of knowledge, Tacit and codified knowledge, Decision making, Turning points, switch points, Growth (company level, not wider economic growth) – employment, t/o, 'wisdom', And growth in terms of capability (not growth by replication), 'firm before/after', Organizational change/ development, Technology transfer Knowledge diffusion, Professionalisation of management Stages of growth (and matching policy to them), Decision points/ influence points, <i>Persistent Non-users</i> of external knowledge – and why, Intermediation, Knowledge sources, Use of sources by different types of firm – small, medium, large etc?, (or by absorptive capacity, innovation capability, etc.), Agency provision.

Table 11: Study parameters

For the following reasons, this review did not adhere strictly to the methodology laid down by Tranfield et al. (2003). First, given the range and diversity of the literature and the scope of the issues, more specific defining parameters (e.g. paper selection criteria in terms of conceptual, empirical or methodological criteria) were not established. Rather, a series of important themes were identified and these were pragmatically interrogated. Systematic review is best undertaken where the research gap is clearly articulated in a tightly constructed question and where the literature is not fragmented (Tranfield et al, 2003). In this instance the terms and scope of the guiding research question have been kept deliberately loose in order to permit a wide range of sources and perspectives to be investigated. Second, and reflecting the first position, a broad diversity of keywords was identified which necessitated a wide-ranging search. Third, although a preference for service companies operating at a level between SME and large company, it was generally felt that this should not be at the expense of important data in other fields. Finally, a large volume of literature has been generated in the academic and practitioner literature addressing the general themes that guide this investigation. It should be noted that this review does not

reflect exhaustive coverage of the literature. The systematic review here was undertaken with pragmatic considerations to the fore, and decisions had to be made with regard to what should and should not be included. As the review and literature search progressed, from stages and life cycle models through to an investigation of particular knowledge types and interventions feeding into each of the elements of our conceptual model, meaningful literature became increasingly sparse – reflecting, perhaps, that interest has remained at the conceptual or theoretical level. Further reflecting the pragmatic nature of the review, the requirement for explicit, reproducible criteria in selection of articles for review (Mulrow, Cook, and Davidoff, 1997) have been relaxed. Amongst the search strategies employed was the snowballing technique, in which the reviewer is pointed in the direction of potentially informative work from the references section of work being reviewed. This technique can lead to articles being uncovered that might not have been found from having been restricted to a key word search. Further, we chose not to employ strict quality criteria in the selection process. Typically, these might include assessments of theory robustness, methodology, generalisability, contribution etc. These are principally concerns of the academic community, but we were keen not to exclude contributory work from practitioner and policy communities whose ‘quality’ might be determined by different criteria.

The focus of this review was bounded in several directions. First, although interest is in growing firms, studies that address growth by acquisition or by franchise are excluded because the dynamics and needs are considered by the DTI to be different from those of organisations growing organically. This view is also supported in the literature (e.g. Delmar and Shane, 2003; Penrose, 1959). Indeed, it is an observation of the literature that organic growth is more likely to be a characteristic of smaller and younger businesses whereas acquisition is more likely in older and larger firms, and in mature industries. Penrose (1959) further noted the difference between the two types of growth, suggesting that organic growth was likely to be smoother or less ‘punctuated’ than growth by acquisition.

Finally, it should be noted that the literature appears to use the terms ‘life cycle’, ‘phase’, ‘stage(s) of growth/development’ interchangeably. Some authors have been critical of this because the labels imply (and sometimes directly invoke) an evolutionary biology analogue (for a discussion of why this is problematic, see below). For the sake of brevity and clarity, however, in the review we refer to ‘life cycle models’ and ‘stages’.

10.1.2. The review strategy

Systematic review is quite explicit about its objectives and methodology. It requires a clearly articulated research question that indicates key research themes and bounds the scope of the enquiry. Broadly or loosely specified questions limit the researchers’ ability to provide clear trails of evidence. Table 12 illustrates the path we steered between the strictures of the formal methodology and the flexibility necessitated by a broadly scoped question and fragmented literature.

1	The review panel identified a series of key words to guide the initial search
2	Key words constructed into search strings
3	Search strings relating to stages of development input to data bases selected on the basis of their relevance and capacity
4	Citations identified and selected for review on basis of: 1) seminal paper; 2) synthetic paper; 3)

	critical paper; 4) empirical application.
5	Literature on stage and life cycle models reviewed and report section outline drafted. Gap identified related to learning and knowledge requirements at different stages. Stimulates a snowballing literature search relating to key papers on the topic and points toward grey literature.
6	Search strings relating absorptive capacity and tipping points input to data bases selected on the basis of their relevance and capacity. Stimulates a snowballing literature search relating to key papers on the topic and points toward grey literature.
7	Interim report confirms and clarifies direction
8	Revisit emergent themes and search for confirming and disconfirming evidence, and empirical instances

Table 12: Review strategy

10.1.3. The systematic review panel

Title	A systematic review of the academic and grey literature relating to the role of external knowledge and expertise at key stages of business growth and development	
Review panel	Name	Affiliation
	Ulrike Hotppp	DTI
	Ray Lambert	DTI
	Matthew Bowhill	DTI
	John Bessant	Cranfield SoM
	Robert Phelps	Cranfield SoM
	Richard Adams	Cranfield SoM
Review consultations	Others may be included in the review process as appropriate	

10.1.4. Databases and search string results

The following databases were selected for use in this study

Database: ABI/Inform (Proquest)			
Collections: ABI/Inform (Global)			
Dates: All dates			
Search number	Fields: Full text documents Date of search: 8 March 2005	Total	Relevant
1	search string: "business growth" AND lifecycle* OR stage*	106	25
2	search string : "stages of growth" AND NOT development	108	6
3	search string : knowledge type AND organi?ation	18	8
4	search string: tipping point	23	1
5	search string: knowledge pre/3 source AND knowledge type	5	0
6	search string: absorptive capacity and adaptation	5	3
7	search string: absorptive capacity and capability	44	16
8	search string: capability AND maturity AND organisation - exclusions made on basis of focus of papers such as country level focus or product focus or alternative applications/meanings of word maturity	25	10

9	search string: capability and models and knowledge: rejections made on grounds of paper focus (excluding knowledge management within companies) and level of focus	14	2
10	search string: models AND firm AND capability Initial volume of returns (1613) necessitated refining search to firm and capability appearing in title. Items rejected on grounds of wrong type of knowledge – not skill or capability related (e.g. info on accounting packages)	40	0
11	search string: absorptive capacity and crisis	1	1
Totals		389	72
<ul style="list-style-type: none"> • right hand truncation character • ? replaces a single character • AND find all the words • AND NOT find the first but not the second word • OR find any of the words • WITHIN first word appears within some number of words before or after the second word • PRE find these words within <i>n</i> words in a field (eg knowledge PRE/5 growth) • Rejected items include: book reviews, franchising, micro organisations, business cycle 			

Database: EBSCO			
Collections: Academic journals			
Dates: All			
Search number	Field: Text, title and keywords Date of search: March 2005	Total	Relevant
1	search string: life cycle AND organi?ation (13/3/05, all years – relevant papers were replications of others found earlier)	224	4
2	search string :stage of growth AND information (13/3/05, all years – relevant papers were replications of others found earlier)	26	2
3	search string: knowledge type AND organi?ation CHUA (some duplication)	10	1
4	search string: knowledge source AND organi?ation	2	2
Totals		262	9
Boolean operators AND, OR, NOT Not product or project lifecycle			

Database: Science Direct			
Collections: Business, management and accounting			
Dates: 1995 - present			
Search number	Field: Abstract, title, keywords Date of search: March 2005	Total	Relevant
1	search string: organi! Lifecycle (14 March 2005. some replication from previous searches)	73	5
2	search string : life cycle AND knowledge (14 March 2005. mostly relating to product, network or sectoral lifecycles, some replication)	29	1
3	search string : life cycle AND service* (some replication)	35	0
4	search string: tipping point	6	0

Totals	143	6
Operators ! finds possible combinations (behave! Finds behaviour, behaviour, behavioural etc) * searches alternative letters (wom*n, returns woman, women...)		

Database: Social Science Citation Index (ISI Web of Science)			
Collections: Social science citation index			
Dates: 1981 - present			
Search number	Fields: Title and abstract Dates: March 2005	Total	Relevant
1	search string: "life cycle*" and organi?ation* (in title, 9 march 05) (12 removed: duplicates and book reviews)	23	11
2	search string : life cycle AND knowledge (14 March 2005. Title and abstracts, returns principally product, knowledge, career, software, technology lifecycles. Some replication)	141	1
3	search string : stage of growth AND knowledge (14 March 2005)	0	0
4	search string: stage of growth AND decision (14 March 2005)	0	0
5	search string: tipping point (14 March 2005)	24	0
6	search string: growth AND knowledge AND stage (14 March 2005. Principally, regional, industry and individuals' knowledge growth. Some replication)	48	0
7	search string: tipping point	24	0
8	search string: crisis AND organi?ation AND knowledge	38	3
9	search string: knowledge type	81	8
10	search string: homophily:	55	2
Totals		434	25

10.2. Literature summary on firm states

The table below summarizes how the extant literature fits into the 4 dimensional state model:

	internal firm characteristics	external environmental characteristics	perceived key issues	Knowledge, learning and innovation
(Churchill and Lewis, 1983)	Company resources, owners skills, complexity			
(Dun & Bradstreet, 1987)				Market knowledge, marketing and sales knowledge, competitor knowledge

(Hanks and Chandler, 1994)	Structural dims: Organizational structure Mgmt style Diversity Complexity Formalization Skills rewards Contextual dims: Age Size Growth rate Major tasks			
(Terpstra and Olson, 1993)			obtaining external financing, internal financial management, sales/marketing, product development, production, general management, HRM, economic environment, regulatory environment	
(Greening, Barringer and Macy, 1996)			Recruitment Training Owner involvement Compensation workloads	
(Kazanjian and Drazin, 1989)			Organizational structure and processes Sales HRM Production Strategy Financial and personal support	
(Smith et al, 1985)	Organizational structure Rewards Communications Formalization Decision making Top team Age Size growth			
(Atherton, 2003)				Learning processes Manager heuristics
(Lee and Tan, 2001)	Structure Systems Staff Skills		Opportunism vs selectivity Low price vs profits	

	Mgmt style Org. culture		Diversification and expansion	
(Sexton et al, 1997)				Cash flow decisions, Financing growth, Increasing value, Compensation' Hiring and training, Change mgmt, Sales, Mgmt succession
(Miller and Friesen, 1983)			Information and decision making, innovation	
(Vohora et al, 2004)			Critical junctures: Reluctance to innovate, Reluctance to take risks, Attracting skills, Use of networks, Finance, Business planning, Growth mgmt, General mgmt, Sales	Lack of understanding of markets, Value of product to customer, Understanding personal limits, Recognizing opps/threats, Decisions under uncertainty, learning
(Lorange, 1996)				Learning to broaden technology base to new products and markets
(Gupta and Chin, 1993)		Dynamism Hostility heterogeneity		More analysis and innov. For higher env. Leves (and for younger firms)
(Scott and Bruce, 1987)			Profitability Admin Workloads Overtrading Distribution Mew competition Information Market expansion Top manager distanciation Customer needs	
(Nambisan, 2002)	Founding conditions Strategy Resources/capabilities Manager characteristics	Availability of VC funds Geographic location Skilled labour availability Technical expertise Regulations Regional culture		

(Hanks and Chandler, 1994)			Cash flow mgmt Ops. Mgmt Org. structure Hiring managers Sales Suppliers Controls Delegation Distribution Scaling up Systems Profitability	
(Smith and Gannon, 1987)			Control Leadership Planning Know the business	
(Kazanjian and Drazin, 1990)	Formalized Decisions Centralized decisions Functional specialization Rate of growth			
(Shim et al, 2000)			Business resources Entrepreneurial talent Marketing and sales	
(Nicholls-Nixon, 2005)		External environment	Personnel Business model Organisational and management structure Financial management Role of CEO	
(Brown et al, 2001)			Strategic orientation Resource orientation Management structure Reward philosophy Growth orientation Management culture	
(Barringer and Neubaum, 1999)			Managerial capacity	

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