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Key variables impeding organisational learning in a high growth start-up business unit environment: A case study

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ABSTRACT

The objective of this research project was to determine the key variables that impede organisational learning in a high growth start-up business unit environment. The value of high growth business units or firms lies in their immediate contribution to wealth creation and employment, although the success rate of firms and business units are low due to the inherent managerial complexities in the high growth environment. This research project contributes to the body of knowledge on high growth start-up firms by identifying, testing and rating variables that impede organisational learning, as well as providing a new construct. A survey was done to identify variables that may impede organisational learning and a sub-set of variables were identified in the categories of orientation factors, human resources practises, systems and structures, knowledge management practises and communication. Twenty propositions were formulated. A qualitative research methodology, using case research and in-depth interviews, was used to rate the relative impeding effect of the twenty variables on organisational learning in an actual high start-up business unit environment. The results indicated that 6 key variables had the highest impact on organisational learning. These variables were: a lack of common and shared logic, selection of inappropriate managers, a lack of teamwork, inappropriate systems (processes and software), a lack of networks and a lack of communication. Although the results may not be generalised due to a lack of a statistical base, management may already be alerted to consider these variables when starting up a new high growth venture.

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DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University.

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Günther Willy Hasse

14 November 2007

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1. INTRODUCTION TO THE RESEARCH PROBLEM

1.1 *Background*

Successful high growth start-up firms have the ability to unlock value beyond the narrowly defined financial return-on-investment metric. Their effect may even be to positively influence the social dilemmas of nations. These types of companies contribute substantially to wealth creation and decreasing unemployment (Nichols-Nixon, 2005), providing stimuli to the national economy and often new industries are born that further lead to the creation of innovative products and services (Barringer, Jones and Neubaum, 2005). The higher the growth rate of a firm, the earlier the achievement of economies of scale, increased profitability and the attraction of investment capital (Nichols-Nixon, 2005). High growth firms attract interest from various stakeholders including investors, consultants and governments each for a different reason. Investors are searching for a potential higher-than-average return on investment, consultants are searching for lucrative contracts and governments are looking to this type of firm as a job creator (Fisher et al., 1999).

High growth firms that become sustainable for extended periods of time are rare to find (Nichols-Nixon, 2005). The periods of high growth are normally short-lived and performance problems arise during this high growth phase. In many cases, a period of high growth for an organisation is followed by decline in sales, unemployment and even bankruptcy and closure (Fischer et al., 1999). Nichols-

Nixon (2005) refers to the “entrepreneur’s impossible dream”, implicating how difficult it is to simultaneously have high growth and high performance in a start-up company. Phelps, Adams and Bessant (2007) offer an alternative explanation for the path-dependent evolution of firms, stating that once a “tipping point” or crisis has been reached during the life-cycle of the organisation, new knowledge must be found by the organisation in order to resolve the challenges to allow further growth. Phelps et al. thus links growth and organisational learning.

The objective of this research project is to determine the key variables that impede organisational learning in a high growth start-up business unit environment. Propositions are constructed and tested to determine the magnitude of variables obstructing organisational learning. An understanding of these variables may help to better manage high organisational, firm and new business unit growth with increased learning and performance.

1.2 *Problem definition*

Researchers refer to unique circumstances that prevail specifically during high growth such as the rapid changes in the scale and the scope of a firms activities, a sense of infallibility, internal turmoil, paradoxal decisions on centralising and decentralising, risk-taking versus a risk-averse culture and unique patterns of high growth that evolves (Nichols–Nixon, 2005; Delmar et al., 2003 and Fischer et al., 1999). It appears from the literature that a need arises during the high growth phase of a start-up firm for extraordinary management capabilities that are able to substantially reorganise the start-up firm and manage day-to-day operations in a

counter-intuitive fashion (Nichols-Nixon, 2005 and Beaver, 2002). What is not clear in the literary texts is a body of knowledge on the impeding effect of variables on organisational learning. This research aims to contribute to a better understanding of the impedimentation of key variables on organisational learning.

1.3 *High growth of the PBMR technology development start-up company and the Helium Test Facility business unit*

In 2000, a technology development start-up company, PBMR (Proprietary) Limited, was established in South Africa as a State Owned Enterprise (SOE) with the aim to become the first company globally to develop and demonstrate the viability of a generation IV nuclear power plant by 2011 (PBMR, 2006). The advantages of the future generation IV reactors compared to the current generation III nuclear reactors are related to its inherently safe operations, economical viability, reduced nuclear waste and proliferation resistance (U.S. DOE Nuclear Energy Research Advisory Committee and the Generation IV International Forum, 2002). Nuclear power plants produce almost no environmentally harmful greenhouse gasses such as Carbon Dioxide (CO_2) (Grimston & House, 2005) and, as such, provides an immediate and long-term solution for the drastic reduction of CO_2 emission levels worldwide. A reduction in CO_2 atmospheric levels could limit and avoid the devastating effects of global warming (United Nations Foundations, 2007). The successful development of the South African Pebble Bed Modular Reactor (PBMR) technology would contribute to the drastic reduction of CO_2 levels and secure a competitive position in the global clean energy market if the technology could be

developed, demonstrated and commercialised within the market window of opportunity.

Project funding was granted by the South African government to PBMR in 2004 to achieve this objective and since then the total staff complement has grown by 142% within a period of two years (from 325 to 788 employees) up to 1 April 2006 (PBMR, 2006). The PBMR Company has experienced high growth in employee numbers. The first objective of PBMR is to successfully develop, build and operate a Demonstration Power Plant (DPP) at Koeberg. Many of the engineering systems are First-Of-A-Kind (FOAKE) and are developed locally and internationally. It was decided to build and test some of the full-scale prototype systems for some of the FOAKE engineering systems. These tests are conducted at the PBMR Helium Test Facility (HTF) at Pelindaba, near Pretoria, to confirm functionality before placing the orders for these systems for the DPP. Early system testing at the HTF would mitigate the risk of malfunction in these systems in the DPP.

On 23 March 2005, the manager of the Helium Test Facility (HTF) start-up business unit was recruited by PBMR with the objective of establishing an operational business unit to operate the HTF and to produce integrated prototype system tests on a 24/7 basis. The HTF business unit was formed and 5 personnel were recruited before 1 September 2005. From the following year to 1 September 2006, the total personnel count was increased to 38 (660% increase) and in the subsequent year (1 September 2007) the total personnel count again increased to

44 (15% increase). The HTF business unit, similar to the PBMR Company, experienced an amazingly high growth in personnel numbers (780%) over the two year period from 1 September 2005 to 1 September 2007.

The success of the PBMR Company and, similarly, its HTF business unit, is dependent on the ability of the managers to effectively handle the turbulent operational conditions resulting from high growth, ensure that maximum learning takes place and that set milestones are achieved on time. Late delivery of the first nuclear Demonstration Power Plant (DPP) at Koeberg, in 2011, would probably mean the loss of first mover advantage by South Africa in the global nuclear development race against China and other countries to demonstrate and commercialise the first workable generation IV nuclear power plant. China plans to demonstrate its first Pebble Bed Reactor producing 195MWe by 2011 in the eastern province of Shandong (Shafer, 2006).

In contrast, successful and timely delivery of the PBMR demonstration plant will positively affect the reputation of the democratic government of South Africa as a pioneer in Africa and the world on the development of generation IV nuclear power plants. South Africa would be internationally recognised as an integral part of the African renaissance. Related and new industries would be established as a result of this first move, as well as the creation of jobs, foreign-direct investment, export potential and a contribution to the economic growth of the country. A strong

imperative exists for PBMR and all its start-up business units, such as the HTF, to succeed.

1.4 *Objective of the research*

The objective of this research project is to determine the key variables that impede organisational learning in a high growth start-up business-unit environment. This research will qualitatively verify, by means of in-depth interviews regarding which key variables impede organisational learning and as such which variables are important to consider for strategy and planning of a new firm or business unit. The unit of analysis for this research will be employees of the HTF start-up business unit of PBMR. Based on the results obtained from this single case study, a construct will be developed that will identify the most important variables that have an impeding effect on learning during high growth of a start-up business unit. This construct may then be used in subsequent longitudinal studies to verify its validity and ultimately to build a model on organisational learning for high growth start-up ventures.

1.5 *Practical value of the research*

It is expected that this research will contribute to the academic body of knowledge on organisational learning of high growth start-up firms. By knowing which variables have the most significant effect on learning during high growth, a start-up manager is empowered to plan up-front and attend to these variables as the business unit grows rapidly. It is also expected that this research will lead to a better understanding of the current organisational environment within the HTF as

well as within the PBMR Company. Practical managerial suggestions will be made that could be considered for implementation by management. The proposed theoretical construct will help management, consultants and government to conceptualise and allow for better understanding of high growth and organisational learning.

1.6 *Limitations of the research*

This research is limited to a single case of variables impeding organisational learning in a high growth start-up business unit. The nature of the research is explorative with the aim to build a theory of organisational learning in the defined environment. A qualitative research method was employed using the case research methodology applied to a single start-up business unit. No statistical base exists to generalise the research results but the explorative nature of the research will allow a better understanding of the complexities relating to learning in a high growth environment. High growth may occur in both start-up firms as well as business units as a result of organic growth or in mature companies as a result of mergers and acquisitions. This research is limited to organic growth of high growth start-up business units or firms only.

1.7 *Research questions*

This research project has the objective to identify the key variables that impede organisational learning in a high growth start-up business unit environment. No construct could be found in the literature and, as a new theory will be built, the research questions formulated were of a general nature. Five questions were

formulated based on high level orientation, human resource practises, systems and structures, knowledge management practises and communication. The five research questions are as follows:

1) Do high level orientation factors such as vision, mission, values and strategy impede organisational learning in a high growth start-up business unit environment?

2) Do human resource management practises impede organisational learning in a high growth start-up business unit environment?

3) Do organisational systems and structures impede organisational learning in a high growth start-up business unit environment?

4) Do knowledge management practises impede organisational learning in a high growth start-up business unit environment?

5) Does communication impedes organisational learning in a high growth start-up business unit environment?

Chapter Two will cover the literature review with the objective to identify variables that may impede organisational learning in the high growth business unit environment.

2. LITERATURE REVIEW

The literature review is divided into three parts. Part One deals with high growth, Part Two, with organisational learning and Part Three covers research that links both growth and learning. Conclusions are made at the end of each part to identify possible gaps in the current research and to identify the variables that impede high growth, organisational learning and growth and learning, to allow for the identification of possible variables that may impede organisational learning for high growth start-up firms.

2.1 *Literature review on high growth organisations*

The literature review on high growth firms has as objective to reveal the latest thinking, models and empirical evidence on the variables that drive high growth. The section opens with definitions and life-cycles of growing organisations. A discussion follows, concerning the optimal rate of organisational growth, after which the difficulties in achieving and maintaining high growth are discussed from the available literature. Three constructs on high growth are then explained and the variables identified. Conclusions are made on the variables that affect high growth firms.

2.1.1 Definition of high growth organisations

This section of the literature survey will not focus on average growth but on “high growth”, “rapid growth” or “hyper growth” of firms and, specifically, of start-up technology development firms.

Definitions on high growth firms differ and can be based on sales, profit or employees. David Birch described high growth companies as “gazelles” when they achieve a 20% compounded sales growth each year over a five year period, starting at a base of $100,000, with between 100 – 499 employees (Feindt, Jeffcoate & Chappel, 2000). Beaver (2002, p. 55) defined hyper growth as a company in which the “sales revenue doubles and then doubles again with customer demand far outstripping supply and challenging the infrastructure of the business”. Barriner, Jones and Neubaum (2005, p. 664) defined high growth firms as those with a “three year compound annual sales growth rate of 80% or above”. The National Commission on Entrepreneurship (2001) defines a rapid growth firm as a firm that is able to grow its employment by 15% per year. The research of Fischer, Reuber and Carter (1999) revealed that firm growth is negatively related to firm size and age. This means that “hyper growth is largely confined to young, small firms that can grow significantly in terms of percentages because their magnitude at the outset is small”.

For the purpose of this research the HTF business unit will be considered a high growth business unit based on employee growth of more than 15% per year that was achieved during the period 2005 to 2007.

2.1.2 The life cycle of growing organisations

How do organisations develop from inception and what typical phases and stages are to be expected during their life? Bhide (2000) proposed four different categories of theories and models that aim to describe organisational evolution, in

terms of a) mainstream economic theories, b) life-cycle models, c) evolutionary theories and d) business strategy models. It appears from available literature that most researchers on organisational behaviour focused on the study of life-cycle models with lesser emphasis on evolutionary models.

Bhide (2000) is of the opinion that organisational life-cycle models aim to compare human evolution to organisational evolution and therefore give these models "intuitive appeal" (p. 244). He states that: "just as humans pass through similar stages of physiological and psychological development from infancy to adulthood, so businesses evolve in predictable ways and encounter similar problems in their growth" (p. 244). The manager ("parent") has different roles and responsibilities throughout the life-cycle of evolution of this organisation ("child"). Phelps, Adams and Bessant (2007) provided a summary of all the published literature on life-cycle models ranging from 1967, by Lippert and Schmidt, up to 2003, by Rutherford et al. He indicated that these researchers categorised the life cycle stages of organisations from two to ten different life cycle stages with no convergence on the number of stage during this period in the literature. Many of these models indicate a pattern of slow growth during start-up followed by a period of high growth and expansion. This is normally followed by a reduction in growth and maturity. Organisational maturity is then followed by either decline or another cycle of growth. This research is focused on the high growth cycle that normally follows the start-up cycle.

Evolutionary theories differ from life-cycle theories, in that "the inherent traits of a species change through chance variation and natural selection…(and) nothing predestined about firm development in evolutionary models" (Bhide, 2000, p.249). Bhide states that organisational development is "path dependent" and its history play an important role in the evolutionary process. This view is supported by Phelps, Adams and Bessant (2007) who proposed a framework for the development of firms based on the multidimensional concept of path dependent firm states that appear at different points during the life cycle and may even reappear. During these states, a crises or issue may appear and are characterised as "tipping points". These "tipping points" may then be resolved by the absorptive learning capacity of the firm (p. 8).

The different literary sources do not seem to agree on the manner in which organisations grow but there appears to be recognition that growth or in some cases, high growth, is part of the evolution stages of an organisation.

2.1.3 Optimal rate of growth and patterns of high growth in organisations

Senge (1990, revised 2006, p.62) notes that "virtually all natural systems, from ecosystems to animals to organisations, have intrinsically optimal rates of growth" and that this optimal rate of growth is far less that the "fastest possible rate of growth". He states that when the rate of growth is too excessive, the organisation itself will slow down the growth rate as the organisation acts as an integrated system.

Delmar, Davidsson and Gartner (2003) conducted a study of all 11,748 firms in Sweden with more than 20 employees over a 10 year period (1987 – 1996) and found that there are seven different types of high growth patterns. They categorised these high growth firms as: a) super absolute growers, b) steady sales growers, c) acquisition growers, d) super relative growers, e) erratic one-shot growers, f) employment growers and h) steady overall growers. Small and medium sized firms that relate to start-up firms in this research, are typically experiencing only the following types of growth: a) super absolute growers, d) super relative growers, e) erratic one-shot growers and f) employment growers. Super absolute growers are firms that grow substantially in both employee numbers and sales while super relative growers are the firms that grow strongly but with somewhat erratic development in both sales and employment. Erratic one-shot growers have a decline in employee numbers but have a single year in which it has excessive sales. Employment growers are firms that grow more in employee numbers compared to financial growth.

It seems, from the limited literature, that organisations may grow too fast and that there are many different manners in which high growth may take place. The limited research literature on the rate of growth of organisations does not allow any conclusions on this aspect of high growth.

2.1.4 Why is high growth difficult to achieve and maintain?

Barriner, Jones and Neubaum (2005) state that high growth is difficult to achieve and maintain and there is no consensus in the literature on the reasons for these difficulties. They further state that rapid growth firms are not a chance event but associated with “specific firm attributes, behaviours, strategies and decisions”. (p. 665). Beaver (2002, p. 55) states that one of the principle findings in a McKinsey study was that: “hyper growth requires substantial reorganisation of the business”. Fischer, Reuber and Carter (1999) studied multiple perspectives on rapid growth firms. Their research indicated “modest evidence” exists in which “rapid growth firms are unique phenomena”. Nichols-Nixon (2005, p. 85) states that in a high growth firm “something is always out of alignment”. She referred to the gap that exists between the delivery of products and services of the high growth organisation and the structures and systems that are normally not in place to support the urgent delivery of those products or services. Researchers do, thus, not agree on the reasons for the difficulties to achieve and maintain high growth.

2.1.5 Models, theories and constructs on high growth organisations

Three constructs on high growth organisations were selected for consideration for the purpose of this literature review. These are the Penrose Model on the managerial capacity problem as portrayed by Barringer and Jones (2004), the construct on the key attributes for rapid growth firms (Barringer, Jones and Neubaum, 2005) and the construct on rapid growth and firm performance by Nichols-Nixon (2005). These constructs allow for the identification and comparison of the variables that influences high growth in start-up firms.

2.1.5.1 A construct on the managerial capacity problem affecting high growth organisations

The managerial capacity problem states that a growing firm needs both new ideas as well as managers that are capable and willing to execute these ideas in order to generate growth (Barringer and Jones, 2004). The addition of new management capacity does not necessarily translate immediately into the effective managerial capacity to execute and implement projects that create new products and services. A number of factors constrain the overall managerial capacity of any organisation according to this construct. These factors are: a) socialisation of managers, b) managerial motivation regarding growth, c) adverse selection of managers and d) the moral hazard (Barringer and Jones, 2004). A detailed description of each variable is found in APPENDIX A. The managerial capacity problem is also known as the “Penrose effect” so named for Penrose, who named this effect in 1959 (Barringer and Jones, 2004, p. 78).

Barringer and Jones used the Penrose model and conducted a study on 50 high growth and 50 normal and slow growth organisations to identify which sub-variables would have the biggest impact in reducing the managerial capacity problem. The result of their study is graphically shown in Figure 1 showing the main variables: a) socialisation, b) motivation, c) adverse selection and d) moral hazard. The sub variables in these categories were substantially more prominent in rapid growth firms compared to slow growth organisations.

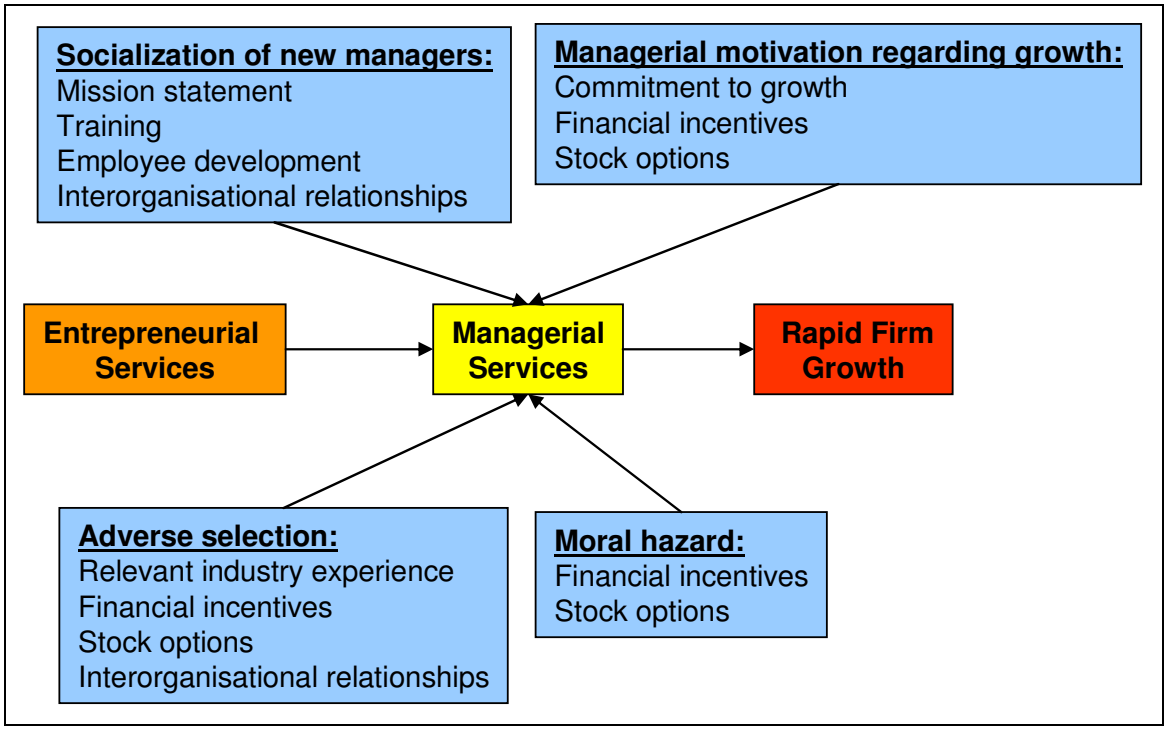

Figure 1: The managerial capacity problem construct updated with research data for high growth organizations (Barringer and Jones, 2004).

The researchers concluded from their study that it is not a single variable that affect the managerial capacity problem but rather a collection of variables that should be simultaneously addressed in order to achieve high growth in an organisation. The managerial capacity problem will not diminish by simply hiring new employees and managers and a well planned strategy is required to integrate them into a growth orientated organisation in order to obtain sustainable high growth.

2.1.5.2 A construct on the characteristics of high growth organisations

Barringer, Jones and Neubaum (2005) summarised the literature on high firm growth and performance by applying the technique of content analysis to 106

published articles, book chapters and books in the management, economics and entrepreneurship literatures on high growth. This was done up to 2003. They are of the opinion, contrary to other researchers, that the literature on rapid growth firms is focused on four major areas: a) founder characteristics, b) firm attributes, c) business practises and d) human resources management practises. A detailed description of each variable is found in APPENDIX A. A construct showing these four major areas, as well as sub-variables, is shown in Figure 2, for key attributes that differentiate rapid growth from slow growth firms.

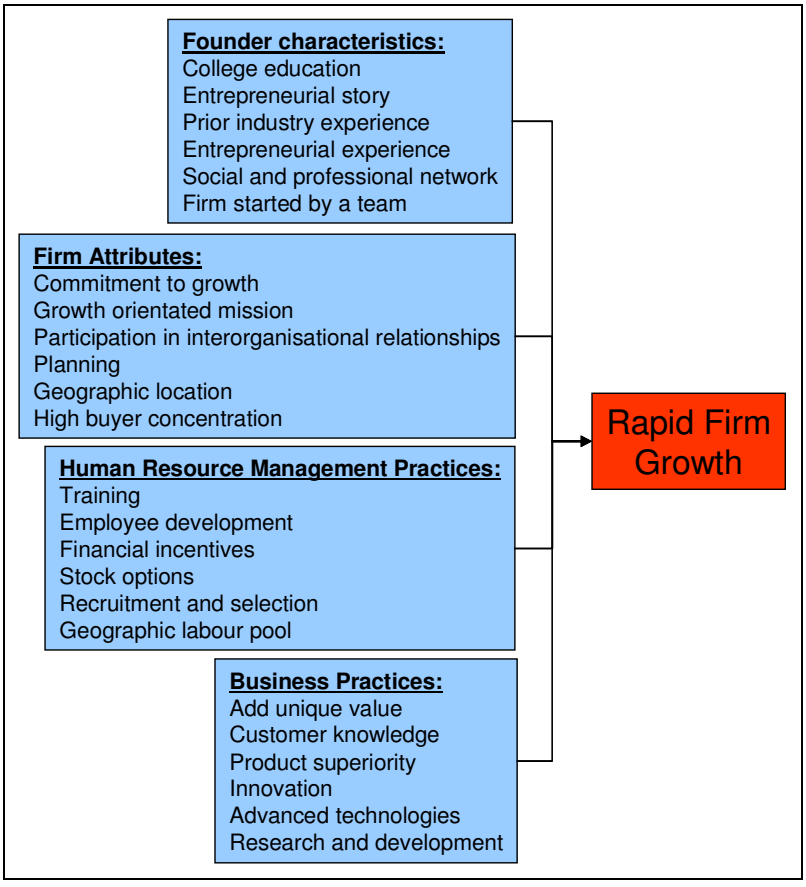

Figure 2: A construct of high growth organisation characteristics (Barringer, Jones and Neubaum, 2005).

The researchers concluded that organisations that have made a deliberate commitment to growth are more likely to achieve rapid growth compared to organisations whose goals are not as explicitly expressed. Their second observation from the research results is that the personal characteristics of entrepreneurs who have started the firm have a significant impact on the firm achieving high growth.

They also indicate three shortcomings in the current literature in terms of a) the high growth firm variables are not examined holistically, b) there is a need for more integration of variables across the categories of variables and c) the current literature suffers from a "halo effect" in only portraying the positive consequences of high growth but neglecting the negative consequences. Their results also do not indicate which variables have the most significant impact on rapid growth compared to the other variables.

2.1.5.3 A construct on rapid growth and firm performance based on the complexity sciences

Nichols-Nixon (2005) conducted 15 in-depth interviews with CEO's of high growth firms in Canada. The organisations ages ranged from 4 to 13 years, with between 30 and 2,500 employees and included both high and low technology businesses. She drew on the field of complexity sciences in her research to gain an understanding on how firms cope with continuous and unpredictable change that also characterises high growth firms. Complexity sciences explain that living

organisms, such as organisations, are able to survive and flourish by displaying self-organising behaviour. This self organising behaviour enables the system (organisation) to adapt by generating ever-changing patterns of behaviour that produce order in the short-term but also create the potential for unpredictable behaviour in the long term (p. 80). By following the rationale of this science, organisations are able to adapt in real time to impulses of change in their environment.

Nichols-Nixon (2005) concluded from her research that the following variables are applicable to high growth organisations based on the principles of self-organising: a) a shared business logic, b) capturing and sharing of information, c) building relationships, d) management of organisational politics and e) leadership style that promotes facilitation. A detail description of each variable is found in APPENDIX A. A construct, as shown in Figure 3, graphically displays the research findings as reported by Nichols-Nixon.

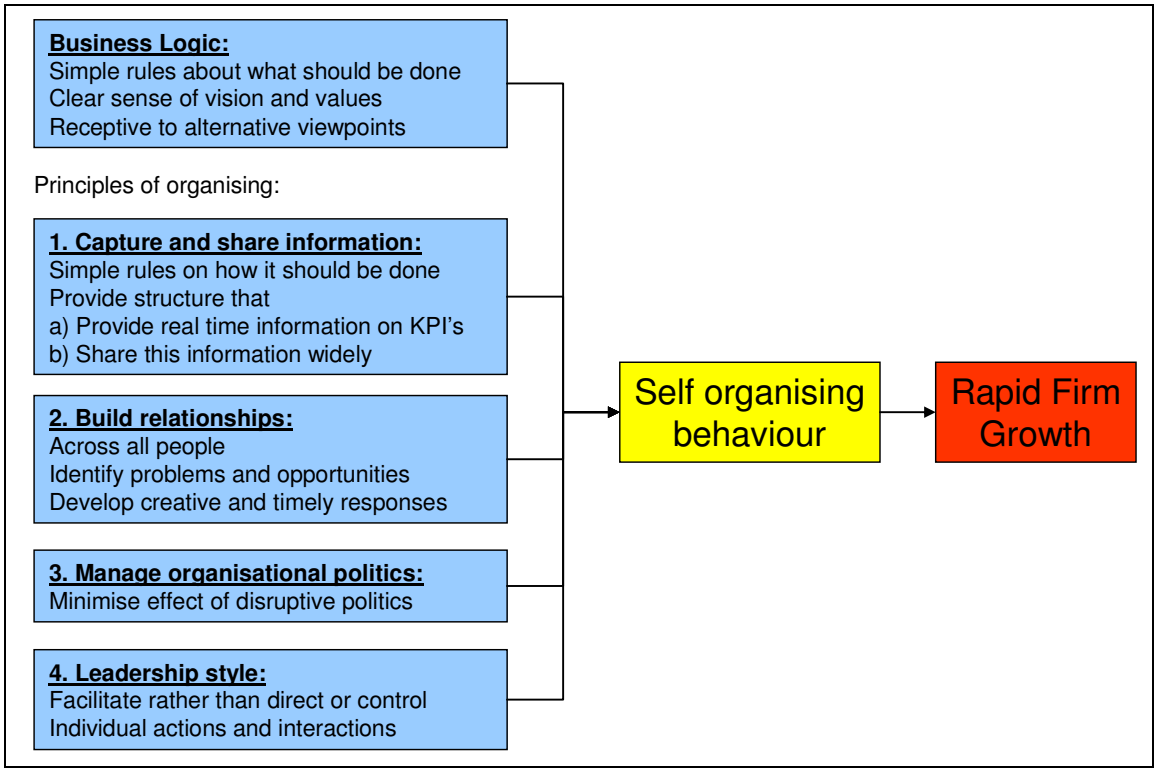

Figure 3: A construct created based on the research results on high growth organisations by Nichols-Nixon (2005).

She states that, as the speed of change will always be greater than the establishment of new systems and structures in high growth firms, the ability of an organisation to adapt quickly and apply self-organisation during periods of change must be a core capability to ensure high sustainable growth. This research goes beyond the point of describing **what** management practises to employ during high growth but provides an understanding **why** these practises are important to sustain high growth in organisations.

2.1.6 Conclusion on literature review for high growth organisations

Based on the literature reviewed for this study, it is concluded that there is no universal agreement on the phenomena of high growth in firms. A limited amount of research was done on high growth firms. There is disagreement among researchers on the manner in which organisations grow i.e. a) in sequential life-cycle stages, in which high growth is a typical stage or b) growth by evolution, where high growth may occur at different times during the life of an organisation. The optimal rate of growth and the patterns of high growth do not seem to be understood by researchers. This assumption is based on the limited research found in this area. It also seems that there is no definite agreement among researchers on why it is difficult to achieve and maintain high growth.

The three models on high growth that were discussed have all indicated specific variables that must be dealt with before high growth can materialise. These variables are summarised in Table 1. None of the variables of the different models are in exact agreement.

Table 1: Comparison of variables on high growth organisations.

No	Variables for the managerial capacity problem model	Variables for the construct on high growth firms	Variables for the self organising model
	Barringer & Jones (2004)	Barringer, Jones & Neubaum (2005)	Nichols-Nixon (2005)
1	Socialisation of new managers	Founder characteristics	Business logic
2	Adverse selection	Firm attributes	Capturing and sharing of

			information
3	Managerial motivation regarding growth	Human resource management practices	Building relationships
4	Moral hazard	Business practises	Managing organisational politics
5			Leadership style

2.2 *Literature review on organisational learning*

The literature review on organisational learning has the objective to summarise the latest thinking and understanding on what variables influence organisational learning and the affect of these variables in the achievement of a learning organisation state. The definitions on organisational learning as well as the importance for business are highlighted. Three constructs are then discussed in more detail with the objective to gain a better understanding of the variables that influence organisational learning. The variables of these constructs are then summarised.

2.2.1 Definition of organizational learning

Yeo (2005, p. 369) defines a learning organisation as a type of organisation ("what") while organisational learning refers to a process of learning ("how"). Jensen and Rasmussen (2004, p. 478) provides a definition by referring to organisational learning which takes place at a "macro-scale" as the learning organisation in comparison to "persons changing from one knowledge state to another" which takes place at a "micro-level" as organisational learning. Yeo (2005) summarised research on organisational learning for the period 1990 to 2004 and

identified 9 definitions for organisational learning that were used by prominent researchers. He noted that these definitions all have a common theme in the sense that organisational learning is seen as “a driver of organisational performance and competitive advantage” (p. 372). In a broader perspective, Yeo (2005, p. 372) stated that organisational learning, in essence, “deals with the process of change and transformation”. This change and transformation has to do with the “expansion of people’s values and beliefs about what is possible and how things work”. Researchers, thus, differ on the definition of organisational learning.

2.2.2 Why is organisational learning important?

Organisational learning and a learning organisation should be able to ensure a competitive advantage for organisations participating in the global knowledge economy. Dulworth and Bordonaro (2005, p. 4) argue that learning is imperative in the current business environment and that “rapid learning enables employees to reach peak performance faster, drives organisational productivity and agility, and enables faster response to competitive threats, new product opportunities and new customer requirements”. Senge (1990) in his revised work on “The Fifth Discipline” (2006) states that “the organisations that will truly excel in the future will be the organisations that discover how to tap people’s commitment and capacity to learn at all levels in the organisation” (p. 4). He then adds that a learning organisation is able to continually “expand its capacity to create its future” (p. 14). Organisational learning, therefore, seems important, as a mechanism, to innovate and survive in a global competitive world.

2.2.3 How do people, teams and organisations learn?

Does learning take place on various levels in a systematic manner or is the process of learning erratic? Jensen and Rasmussen (2004) are of the opinion that learning takes place in a complex and nonlinear manner between the macro level (learning organisation) and at a micro level (organisational learning by employees).

Senge (1990, revised 2006) states that his five disciplines which lead to a learning organisation, have to develop within an organisation in a simultaneous manner in order to enhance organisation-wide learning. The most powerful learning is achieved from direct experience (Senge, 1990, revised 2006, p. 23). He refers to the "learning dilemma" (p. 23) that occurs in organisations when the effect and consequences of decisions are not immediately visible. This means that there is a time delay in the feedback between a decision and the consequences of this decision. Senge argues that decisions, thus, have consequences beyond a "learning horizon" of immediate operations. Based on this notion, it is therefore very difficult to only use "trail-and-error" to learn and therefore "systems thinking" is required to gain an understanding of the complexities of the organisation, the learning environment and the time delay feedback mechanisms that exist in any organisation.

Gavetti and Rivkin (2005), in their paper on strategic thinking, indicated that there are two extremes of learning and decision making, namely "trail-and-error" and deductive reasoning. Trail and error is learning "after the fact" and has been used to make strategic decisions in ambiguous, novel and complex environments, where

any cognitive sense-making effort is doomed to fail. On the other hand, during deductive reasoning, general administrative and economic principles are applied to a specific business situation, to identify alternatives, weigh them up against each other and to arrive at a logical and rational choice. Deductive reasoning works well for modular problems that can be broken down into smaller parts. Gavetti and Rivkin (2005) then proposed a method of analogy to compare a foreign company problem with the current problem in an organisation. Once the similarities are verified in terms of the problem definition, the next step is to "map" or investigate the actions and solutions to the problem the foreign company encountered to the current organisation and arrive at a current solution to the problem of the current organisation.

The dilemma then, based on a comparison of the ideas of Senge's with the ideas of Gavetti and Rivkin, is that organisations are complex entities and that methods of learning beyond "trail-and-error" are required to enhance learning due to the time delay between decisions taken and the consequences of those decisions.

2.2.4 Models, theories and constructs on organisational learning

Three constructs on organisational learning were selected for consideration for the purpose of this literature review but graphic drafts of these constructs were unavailable. These are Senge's construct (1990, revised 2006), Yeo's construct (2005) and a single construct pertaining to learning in the New Product Development (NPD) firms from Kim and Wilemon (2007). These models allow for

the identification and comparison of the variables that influence organisational learning in general.

2.2.4.1 A construct on organisational learning based on Senge's seminal work

Senge (1990, revised 2006) states that the five disciplines (systems thinking, personal mastery, mental models, shared vision and team learning) represent theories and models for developing three core learning capabilities (fostering aspiration, understanding complexity and developing reflective conversation) that will lead to experimentation and advancement of the organisation (a learning organisation). A detailed description of each variable is found in APPENDIX A. A construct was generated based on Senge's ideas, as shown in Figure 4.

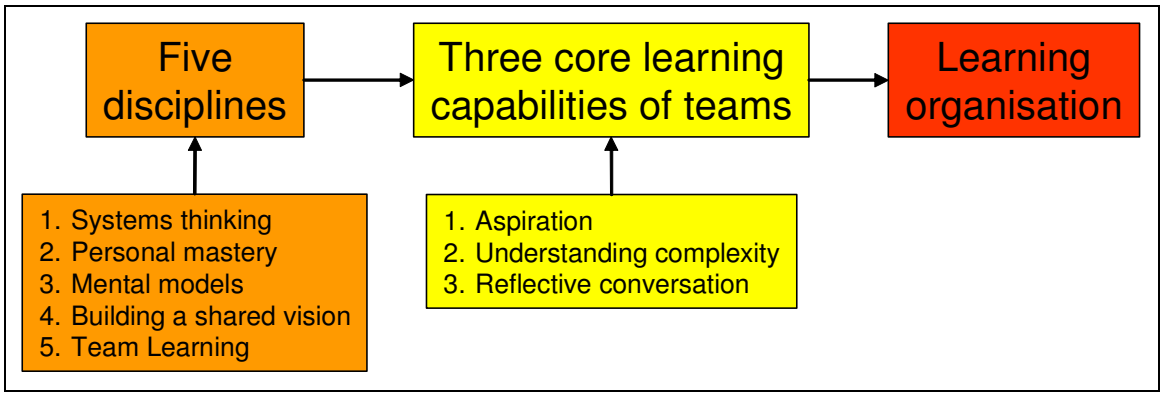

Figure 4: A construct representing Senge's organisational learning model.

Senge (1990, revised 2006) refers to two types of learning that take place i.e. adaptive learning and generative learning. Adaptive learning is applied in "survival mode" as a reaction to a specific threat while generative learning enhances the

organisation's capacity to create (p. 14). Both types of learning are required as adaptive learning alone will not allow the organisation to live up to its full potential.

2.2.4.2 A construct on organisational learning based on a previous researcher's work by Yeo

Yeo (2005), in his summary of research on organisational learning for the period 1990 to 2004, used Peter Senge's "The Fifth Discipline" (1990, revised 2006) seminal work as a basis for discussion and illustration of the development of theories in organisational learning. Yeo classified all the organisational learning constructs of prominent researchers into three stages of learning: Single-loop learning, Double-loop learning and Triple-loop learning. A detailed description of each variable is found in APPENDIX A. When mapping these stages of learning to Senge's process of learning, the Single-loop learning takes place on the individual level, Double-loop learning takes place of the team level and Triple-loop learning takes place at the organisational level (Yeo, 2005, p. 378).

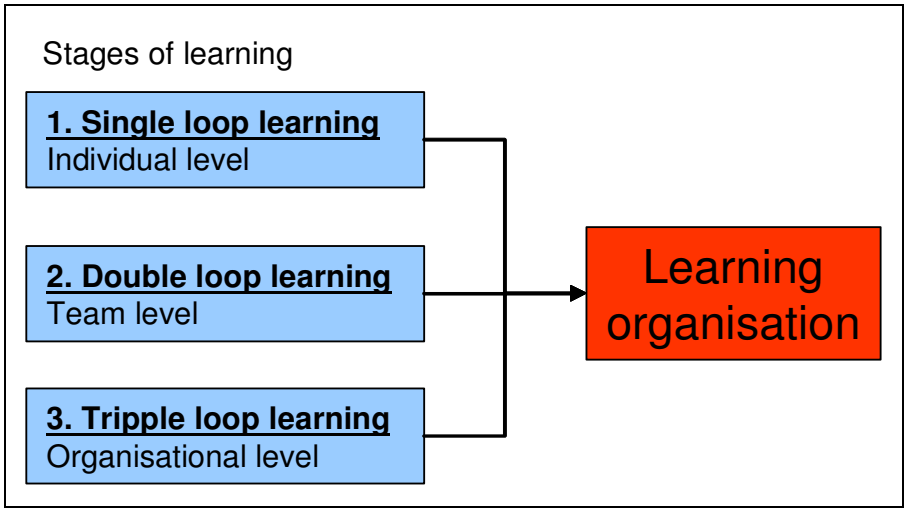

Figure 5: A construct of the learning organisation based on a summary of literature reviews by Yeo (2005).

Yeo concluded that learning involves a number of paradigms and contexts where individuals, teams, processes, structures and strategies are interacting in a complex manner. It is the manner in which the complex interaction dynamics take place that will create or destroy learning. The only construct that sufficiently explained this complex interaction is Senge's "systems thinking" and is therefore the common construct in all the organisational literature that was reviewed by Yeo (2005).

2.2.4.3 A construct on the barriers to organisational learning within the New Product Development firms

Kim and Wilemon (2007) argued in their research paper that New Product Development (NPD) firms have significant levels of complexity and that a learning organisation needs to be created that is attuned to the management of this complexity. They conducted an explorative study using in-depth field interviews of

32 NPD firms to understand the barriers to transferring learning in complex new product development environments. Kim and Wilemon (2007) have identified 5 groups of variables that may act as barriers in transferring learning as shown graphically in Figure 6. These barriers are: a) Lack of communication, b) discontinuities, c) inadequate documentation, d) time constraints and e) other factors. A detailed description of each variable is found in APPENDIX A.

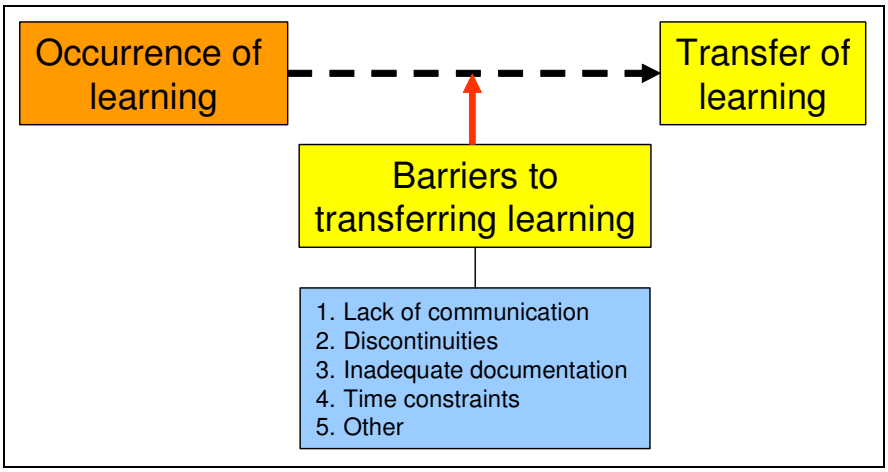

Figure 6: Construct for the barriers to learning in a NPD organisation (Kim & Wilemon, 2007).

Kim and Wilemon (2007, p. 189) concluded from their research that in most NPD environments under study, methods for "cross pollinating" project learning are mostly non-existent or not effective. They also found that team members and documents were the most important methods of transferring learning.

2.2.5 Conclusion on the literature review for organisational learning

Based on the literature review conducted on organisational learning for this study, it is concluded that Senge's construct on organisational learning is widely accepted as a "leitmotif" (Yeo, 2005, p. 370) on organisational learning. It was difficult to find

research articles that conducted quantitative or qualitative research on the subject of organisational learning. Some research articles proposed constructs on organisational learning. A summary on the variables that influence organisational learning is given in Table 2. Yeo (2005) indicated in his paper that Senge's variables could be grouped under single loop learning (mental models and personal mastery), double loop learning (team learning) and triple loop learning (systems thinking and shared vision).

Table 2: Comparison of variables on organisational learning.

No	Variables for organisational learning	Variables for the construct on high growth firms	Barriers to organisation learning in NPD
	Senge (1990, revised 2006)	Yeo (2005)	Kim & Wilemon (2007)
1	Systems thinking	Single loop learning (individual level)	Lack of communication
2	Personal mastery	Double loop learning (team level)	Discontinuities
3	Mental models	Triple loop learning (organisational level)	Inadequate documentation on learning
4	Building a shared vision		Time constraints
5	Team learning		

2.3 *Literature review on the link between growth and organisational learning*

No literature could be found on the link between an organisation that experienced high growth and the status of organisational learning but two research papers were located that linked organisational growth and organisational learning.

2.3.1 Models, theories and constructs on growth and organisational learning

The two research papers found did not contain empirical research data on growth and organisational learning.

2.3.1.1 A construct on growth and organisational learning in small firms

Macpherson and Holt (2007) conducted a search on three prominent databases for research papers containing the text: “learn”, “know”, “grow” and “small firms”. They found 931 papers in various Journals. Further filtering provided 459 papers that formed the basis of their literature review. Most of the research papers were done in three regions i.e. United Kingdom, Ireland and the rest of Europe. Their review indicated that the following themes appeared consistently in research papers relating to growth, knowledge, learning and small firms: a) entrepreneurial and managerial human capital, b) organisational systems and processes, c) knowledge systems, absorptive capacity and networks and d) business policies and social capital. A detailed description of each variable is found in APPENDIX A. A construct was generated as shown in Figure 7 to represent these variables.

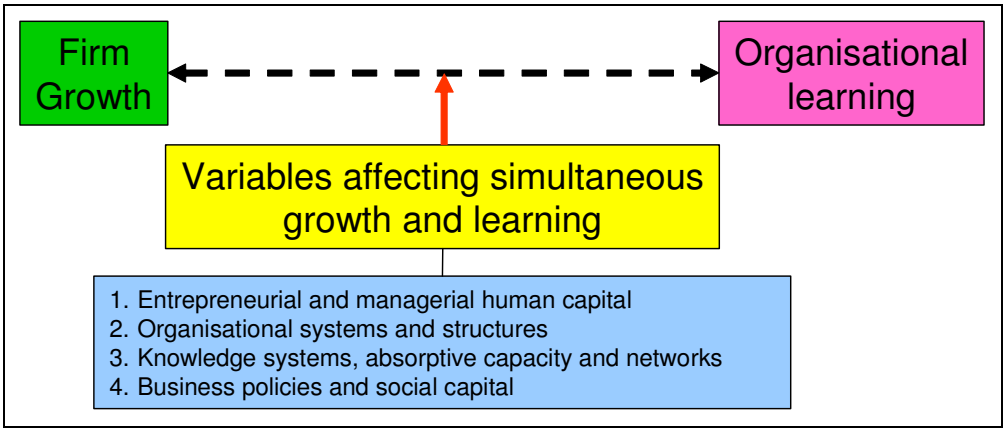

Figure 7: Variables influencing growth and organisational learning (Macpherson & Holt, 2007).

They have also found, in the literature evidence, that firm size and sector are important as these factors influence the "availability and application of knowledge in the learning and growth process" (p. 186). This review of existing literature by Macpherson and Holt (2007) only indicated the themes relating to firm growth and learning without providing any empirical research data to confirm that these variables actually affect growth and learning.

2.3.1.2 A construct on growth and organisational learning based on a life-cycle perspective

A review on available literature on the life-cycles of growing organisations was done by Phelps, Adams and Bessant (2007) and they have indicated that the research results for the period 1965 to 2005 did not converge on a common understanding about the number of typical life-cycle phases. They have provided an alternative conceptual framework to explain how firms grow and learn. Their reasoning is that organisational growth is path dependent and that the "tipping point" (crisis) is reached as a result of internal or external influences. For the firm to

continue to grow the firm must successfully resolve the "tipping point" challenge. The resolution of this challenge is dependent on the firm finding new knowledge and on the implementation of this new knowledge. The firm must therefore have the ability to learn i.e. have an absorptive capacity. Phelps, Adams and Bessant (2007) indicated in their conceptual framework that six tipping points are normally encountered during firm growth: a) people management, b) strategy orientation, c) formalisation of structures and systems, d) new market entry, e) obtaining finance and f) operational improvements. A detailed description of each variable is found in APPENDIX A. This conceptual framework is shown graphically in Figure 8.

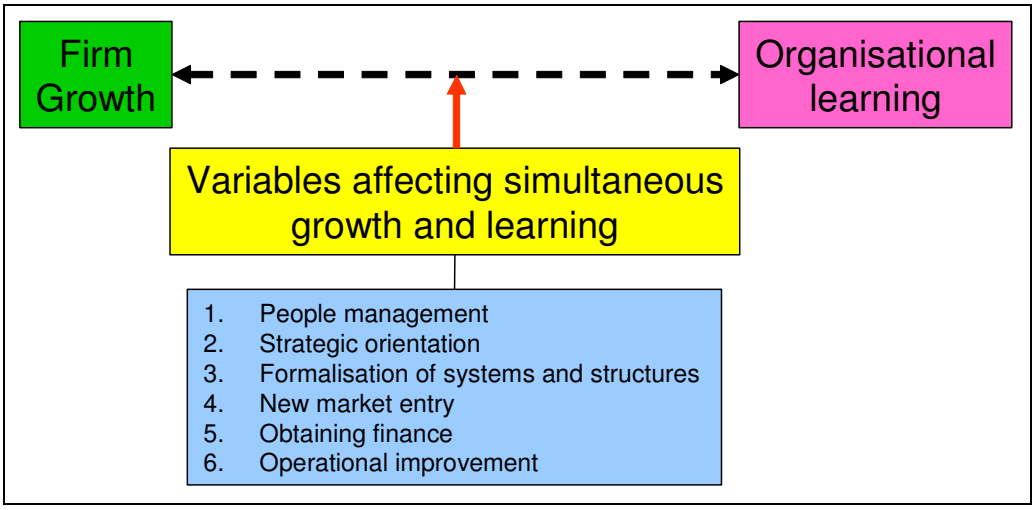

Figure 8: Conceptual framework on firm growth (Phelps, Adams & Bessant, 2007).

They further noted that firm growth is neither linear nor predictable and is in no determined sequence and the "tipping points" may be encountered one by one or all simultaneously. The organisation must develop the capability to absorb knowledge in order to allow the resolution of these "tipping points". Phelps, Adams

and Bessant (2007) however do not provide any empirical evidence to validate their construct.

2.3.2 Conclusion on the literature review on growth and organisational learning

Only two research papers could be found that simultaneously address growth and learning. The variables that affect the growing and learning organisation are summarised in Table 3. Some of the variables are similar (systems & structures, people management) but the others differ. No literature could be found on high growth and organisational learning. These research papers also lack empirical evidence to support the validity of the constructs.

Table 3: Comparison of variables on simultaneous growth and organisational learning

No	Variables for growth and organisational learning	Variables for growth and organisational learning
	Macpherson & Holt (2007)	Phelps, Adams & Bessant (2007)
1	Entrepreneurial and managerial human capital	People management
2	Organisational systems and structures	Strategic orientation
3	Knowledge systems, absorptive capacity and networks	Formalisation of systems and structures
4	Networks	New market entry
5		Obtaining finance
6		Operational improvement

Based on the literature survey on high growth, organisational learning and both growth and learning, a gap in the research literature seems to exist, that is, to identify the variables that are important when high growth is taking place and the

effect on organisational learning. This research aims to provide a qualitative answer on the variables that might be important during high growth and organisational learning.

Chapter Three will employ a method to consider all the variables that were identified in the literature review and select a sub-set of variables that is believed to starkly influence organisational learning in a high-growth business-unit environment. Propositions will then be developed based on this sub-set of chosen variables.

3. RESEARCH PROPOSITIONS

The important variables that are suspected of influencing organisational learning in a high growth start-up business unit environment were identified from constructs as portrayed in the literature survey in Chapter 2. These variables were then grouped into themes and testable propositions were formulated. Variables that are important in growing organisations were assumed to be also relevant and important in high growth organisations. The formulated and testable propositions will possibly provide answers to the stated research questions as indicated in paragraph 1.7.

3.1 *Deriving the research propositions*

The constructs and variables that were identified for high growth, organisational learning and for both growth and learning are summarised in APPENDIX B, Table 8. An attempt was made to find common themes across the variables that might be applicable to the impediment effect on organisational learning. The following common themes with related variables were identified, consistent with the research questions as formulated in paragraph 1.7:

1) Research question on vision, mission, values

   Selected variables: Business logic, shared vision, mental models, strategic orientation;

2) Research question on human resource practises

Selected variables: Adverse selection, socialising of new managers and managerial motivation to growth.

3) Research question on systems and structures

   Selected variables: Systems, structures and operational improvements.

4) Research question on knowledge management and networking

   Selected variables: Knowledge systems, absorptive capacity and networks, communication and documentation.

5) Research question on communication

   Selected variables: Communication, discontinuities, inadequate documentation and time constraints.

3.2 *Formulating the research propositions*

The common themes were used to formulate 20 propositions for the purpose of this research project. The 20 testable propositions will produce a research result that will provide an outcome to each research question as indicated in paragraph 1.7.

Proposition 1 (high level orientation factors)

A lack of a common business logic & shared logic impedes organisational learning in a high growth start-up business unit.

Proposition 2 (high level orientation factors)

A lack of a common vision & mission impedes organisational learning in a high growth start-up business unit.

Proposition 3 (high level orientation factors)

A lack of common mental models impedes organisational learning in a high growth start-up business unit.

Proposition 4 (high level orientation factors)

A lack of a common strategic orientation impedes organisational learning in a high growth start-up business unit.

Proposition 5 (high level orientation factors)

A lack of common business practises impedes organisational learning in a high growth start-up business unit.

Proposition 6 (human resource factors)

Selection of inappropriate managers impedes organisational learning in a high growth start-up business unit.

Proposition 7 (human resource factors)

A lack of socialising of new managers impedes organisational learning in a high growth start-up business unit.

Proposition 8 (human resource factors)

Commitment to growth by non-founder managers impedes organisational learning in a high growth start-up business unit.

Proposition 9 (human resource factors)

Inappropriate incentive schemes impede organisational learning in a high growth start-up business unit.

Proposition 10 (human resource factors)

A lack of teamwork impedes organisational learning in a high growth start-up business unit.

Proposition 11 (systems and structures factors)

Inappropriate systems (processes and software) impede organisational learning in a high growth start-up business unit.

Proposition 12 (systems and structures factors)

Inappropriate structures (organisational chart) impede organisational learning in a high growth start-up business unit.

Proposition 13 (systems and structures factors)

Inappropriate operational improvements impede organisational learning in a high growth start-up business unit.

Proposition 14 (knowledge management factors)

Inappropriate knowledge systems impede organisational learning in a high growth start-up business unit.

Proposition 15 (knowledge management factors)

A lack of absorptive capacity impedes organisational learning in a high growth start-up business unit.

Proposition 16 (knowledge management factors)

A lack of networks impedes organisational learning in a high growth start-up business unit.

Proposition 17 (communication factors)

A lack of communication impedes organisational learning in a high growth start-up business unit.

Proposition 18 (communication factors)

Discontinuities when people resign impede organisational learning in a high growth start-up business unit.

Proposition 19 (communication factors)

Inadequate documentation impedes organisational learning in a high growth start-up business unit.

Proposition 20 (communication factors)

Time constraints impede organisational learning in a high growth start-up business unit.

The research methodology for this study is explained in Chapter 4.

4. RESEARCH METHODOLOGY

The research methodology covers the case research design, the sampling design process, questionnaire design and protocol and concluded with data recording and the process of data analysis.

4.1 *Case research design*

Case research design comprises of an explanation and application of case research for this research context, unit of analysis identification, definition of dependent and independent research variables and by taking into account the case research quality considerations.

4.1.1 Case research

The purpose of this research is to identify the key variables that impede on organisational learning in a high growth start-up business unit. This research is done on a start-up business unit of the PBMR Company (the HTF business unit) and therefore constitutes an embedded case according to Yin (2003). This research could also have been done on other business units of PBMR as well as for PBMR as a whole. The rationale for a single case is justified as the start-up business unit typifies a “representative” or “typical” case (Yin, 2003, p. 41). No systems, structures, personnel etc. for the HTF operational business unit existed at the time when the HTF operations manager was recruited by PBMR. This is similar to the conditions that prevail during most start-up companies. The business unit was fully operational within a period of 24 months.

A qualitative research methodology was employed using the case research method as described by Yin (2003) and Perry (2001). In-depth interviews were done that covered two parts. Part One was used to allow the respondents to speak freely about their understanding of the impeding effect of high growth on learning and to identify variables that might enhance the impeding effect. During Part Two, Likert-scale type questions were asked about the variables that were identified during the literature survey as indicated in paragraph 3.1. In both cases, probing questions were asked to gain a deeper understanding of the respondent's views. The methodology employed is equivalent to Perry's (2001) case research and is a blend of theory building and theory testing and having the ability to mix both qualitative and quantitative methods (Yin, 2003, p. 15).

4.1.2 Unit of analysis

The unit of analysis for this research is comprised of individuals of the HTF start-up business unit at both group leader and individual team member levels. All group leaders were interviewed to ensure that all seven groups were represented in the research. These groups cover testing, engineering, technical support, continuous operations, operational support, admin and safety. The objective of the research is to study the impeding effect of learning at the HTF business unit as a result of the high growth of the HTF business unit. By choosing these individuals on the HTF, an adequate response was obtained during the in-depth interviews to be able to provide "tendency" indications for the research questions on learning at both an individual and team level.

4.1.3 Research variables

The moderating variable for this research was chosen to be “high growth” and it was made clear to all respondents that the HTF experienced and is still experiencing high growth based on the definitions in the literature survey (see paragraph 2.1.1 i.e. personnel growth of 15% per year). The dependent variable for this research is “organisational learning” and the independent variables: strategic orientation, human resource practises, systems & structures, knowledge systems, communication and holding company policies are being investigated for their impeding effect on organisational learning.

4.1.4 Case research quality considerations

Perry (2001) refers to the work of Yin (1994) and indicates that four tests of quality may be applied to case research i.e. construct validity, internal and external validity and reliability. Construct validity is ensured due to the triangulation that will be applied during this research i.e. “multiple perceptions of reality” (Perry, 2001, p. 319). External validity is ensured by the confirmation or disconfirmation of preliminary theory. Internal validity is ensured by searching for “causal tendencies or generative mechanisms that suggest a causal relationship “that exists in “limited contexts” (p. 320). Reliability is ensured by the “extent to which the research can be audited” (p. 320). All documentation will be managed in a manner that will allow for an audit trail.

4.2 *The sampling design process*

The sampling population and sampling frame were determined after which the sampling technique and sample size were finalised. Triangulation was done to enhance the reliability of the research.

4.2.1 Target population and sampling frame

The target population is defined as personnel involved in the PBMR HTF business unit operations. The HTF business unit is divided into seven teams (Testing, Engineering, Technical Support, Continuous Operations, Operational Support, Finance-Admin and Safety). The educational level of employees comprises of managers, engineers, technicians, artisans, operating personnel, specialised support personnel and general support personnel. There are a total of 58 approved man-plan positions for this start-up business unit with the current 44 filled positions and 14 vacant positions. Each team is managed by a Group Leader.

The sampling frame is derived from the target population which includes the Group Leaders (mangers) and individual engineers, technicians, process controllers and support staff, who are part of the HTF start-up business unit, are involved in the day-to-day operations of the business unit and who have the educational background and conceptual ability to grasp the organisational learning concepts of this research context. Artisans and general support personnel were excluded from the sampling frame and, thus, make up the sampling frame error.

4.2.2 Sampling technique and sampling size

Non-probability sampling techniques (Zikmund, 2003, p. 380) were employed using quotas and convenience sampling. The quota was set to at least 10 in-depth interviews as De Ruyter and Scholl (1998) indicated that between 10 and 60 respondents are required for a qualitative research project with about 40 respondents required in a large project. A total of 13 in-depth interviews were conducted that included two interviews for triangulation purposes. An additional initial in-depth interview was done to conduct pilot testing of the interview questionnaire and protocol. Respondents were selected from different strata inside the HTF business unit (7 groups) to include all Group Leaders as well as other engineers, technicians, Process Controllers and support staff. These personnel were chosen on availability and constitute a convenience sample within the defined group strata.

4.2.3 Triangulation

Triangulation was done by conducting in-depth interviews with two respondents from PBMR that are regularly engaging with the HTF business unit. These respondents had sufficient engagement with the HTF business unit to have a valid experience of the learning of the HTF individuals and team members but are not engaged on a full time basis with the business unit to enable a more objective opinion on learning. Further triangulation of the research results was done by studying the HTF business unit month-end reports, operational indicators and progress with set deliverables.

4.3 *Questionnaire and protocol development*

Questionnaire and protocol development was done by designing the questionnaire, compiling the protocol, conducting the first pilot interview and adjusting the final interview questionnaire and, finally, by considering the expected response biases.

4.3.1 In-depth interview questionnaire design

An interview questionnaire was designed with two open-ended questions followed by Likert-scaled questions. The two open-ended questions probed the respondents on their understanding of organisational learning as well as identifying variables that might impede organisational learning within the high growth start-up business unit context. The open-ended questions were aimed at achieving "story telling" i.e. "invites the interviewee to simply tell the story of their experience of whatever the research is about" (Perry, 2001, p. 311). The 20 propositions for this research (see paragraph 3.2) were formatted into Likert-scaled questions and presented to respondents for rating. This methodology (open ended questions and then Likert-scaled questions) is in agreement with the case research method as suggested by Perry (2001) for conducting qualitative research.

4.3.1.1 Design of open-ended interview questions

The two open-ended questions that were posed to candidates were:

a) "Tell us what organisational learning means to you?"

   (Possible probing questions: How do we learn and why? Are there different rates of learning and why?")

b) "Look at the sketch as indicated in Figure 9. In your opinion, what are these variables that impede organisational learning in the high growth start-up business unit environment and explain why?"

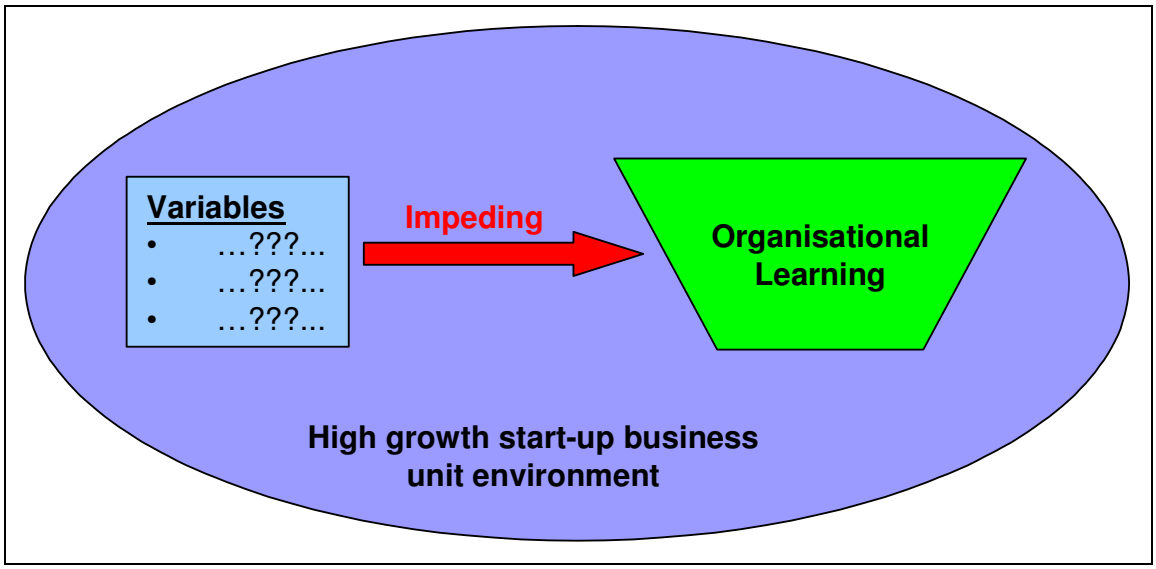

Figure 9: Sketch that was shown to respondents to provide a graphical image of the objective of the research.

4.3.1.2 Design of Likert-scaled questions

Twenty propositions were formulated, previously, for this research as indicated in paragraph 3.2. These propositions were based on the variables identified in the literature survey. A Likert-scale rating was allocated to each proposition in the questionnaire. Respondents had to rate each proposition ranging from 1 = disagree strongly to 5 = agree strongly. An explanation was given to the respondent for each variable in the propositions according to the definitions as summarised in APPENDIX A. The 20 Likert-scaled questions were as follows:

1) A lack of a common business logic & shared logic impedes organisational learning in a high growth start-up business unit;
2) A lack of a common vision & mission impedes organisational learning in a high growth start-up business unit;
3) A lack of common mental models impedes organisational learning in a high growth start-up business unit;
4) A lack of a common strategic orientation impedes organisational learning in a high growth start-up business unit;
5) A lack of common business practises impedes organisational learning in a high growth start-up business unit;
6) Selection of inappropriate managers impedes organisational learning in a high growth start-up business unit;
7) A lack of socialising of new managers impedes organisational learning in a high growth start-up business unit;
8) Commitment to growth by non-founder managers impedes organisational learning in a high growth start-up business unit;
9) Inappropriate incentive schemes impede organisational learning in a high growth start-up business unit;
10) A lack of teamwork impedes organisational learning in a high growth start-up business unit;

11) Inappropriate systems (processes and software) impede organisational learning in a high growth start-up business unit;
12) Inappropriate structures (organisational chart) impede organisational learning in a high growth start-up business unit;
13) Inappropriate operational improvements impede organisational learning in a high growth start-up business unit;
14) Inappropriate knowledge systems impede organisational learning in a high growth start-up business unit;
15) A lack of absorptive capacity impedes organisational learning in a high growth start-up business unit;
16) A lack of networks impedes organisational learning in a high growth start-up business unit;
17) A lack of communication impedes organisational learning in a high growth start-up business unit;
18) Discontinuities when people resign impede organisational learning in a high growth start-up business unit;
19) Inadequate documentation impedes organisational learning in a high growth start-up business unit;
20) Time constraints impede organisational learning in a high growth start-up business unit.

The pilot survey has been drafted to include these twenty questions (statements) and is shown APPENDIX C.

4.3.2 Protocol development

A protocol was compiled for this research to ensure that the in-depth interviews were conducted consistently and thereby increasing the reliability of the results gathered (Yin, 2003, p. 67).

4.3.2.1 Invitation to respondents

- Select respondents based on the sampling technique;
- Contact respondents telephonically and inform them about the purpose of the research, confidentiality, duration and possible practical application of the results;
- Enquire if the respondent is willing to conduct the interview;
- Schedule an appointment with willing respondents.

4.3.2.2 Preparation for the in-depth interview

- Print interview questionnaire;
- Ensure availability of a copy of the variable definitions as obtained from the literature survey (APPENDIX A);
- Ensure availability of the sketch (Figure 9), that graphically explains the research context.

4.3.2.3 In-depth interview: Introduction

- Welcome the respondent;
- Explain briefly (again) the objective and end-goal of the research;
- State the protocol on confidentiality;
- Explain the process that will be followed (first open ended questions, then Likert-scaled questions);

- State that the interview will be recorded on tape and results will be recorded on paper simultaneously;
- Enquire if the respondent has any questions and respond accordingly.
- Assign a number to the respondent and record the personal details of the respondent (sex, race, occupation, age and experience).

4.3.2.4 In-depth interview: Open-ended questions

- Pose the first open-ended question to the respondent's understanding of the concept of organisational learning;
- Pose follow-up questions to ensure clarity on the explanation given by the respondent on the first open-ended question;
- Record key concepts on a note pad;
- Show the research context to the respondent (Figure 9) and pose the second open-ended question regarding the identification of the variables impeding organisational learning;
- Pose follow-up questions to ensure clarity on the identification and explanation of variables given by the respondent on the second open-ended question;
- Record key concepts on a note pad.

4.3.2.5 In-depth interview: Likert-scaled questions (statements)

- Pose the twenty Likert-scaled questions (statement), one by one, to the respondent and explain the variables in these questions by referring to the variables definitions as obtained from the literature survey (APPENDIX A);

- Request the respondent to rate the questions (statements) from 1 to 5;
- Note the rating on the printed questionnaire.

4.3.2.6 In-depth interview: Close out

- Check to ensure that responses to all Likert-scaled questions (statements) were filled in;
- Ask the respondent if he/she wishes to make any other comments;
- Thank the respondent for his/her time and contribution;

4.3.3 Pilot testing and questionnaire adjustment

A single pilot test was done on a candidate that was conveniently available when the interviews commenced. The protocol (see paragraph 4.3.2) was used as a guide during the interview.

Three areas of improvement to the protocol and interview questionnaire were identified as follows;

1) Replace the candidate name with a candidate number to ensure conformance to confidentiality agreement;
2) Add the wording: “processes and software” to question 11 of the interview guide in order to provide clarity to respondents on the meaning of “inappropriate systems”;
3) Add the wording: “organisation chart” to question 12 of the interview guide in order to provide clarity to respondents on the meaning of “inappropriate structures”.

These improvements were incorporated into the final interview questions as indicated in paragraph 11.2 in APPENDIX C.

4.3.4 Expected response bias errors

Response bias errors in the form of social desirability, auspices and acquiescence are expected (Zikmund, 2003, p. 177). Social desirability is expected as a PBMR HTF Operations Manager conducted the in-depth interviews and employees are likely to provide answers that would not jeopardize their position in the company and start-up business unit. Similarly, auspice bias may be present as this research was not conducted by an independent 3rd party but by a PBMR HTF employee. Respondents are, therefore, less likely to reveal their full impression of the current situation within the organisation. As many employees in the company realise that organisational learning has to take place, acquiescence bias may be prevalent.

4.4 *Data recording and analysis processes*

4.4.1 Data recording process

Data was recorded during interviews using a tape recording machine, note pad and filled out questionnaire forms. During the open-ended questions on organisational learning and the variables as identified by the respondents, key concepts were recorded on the note pad. Recordings of some of the important concepts were read back to the respondent to ensure accurate recording of data.

4.4.2 Data analysis process

4.4.2.1 Data analysis process on in-depth interview open-ended questions

Similar responses from respondents were categorised for all the interviews conducted. This included key concepts on the respondents understanding of organisational learning as well as the variables that impede organisational learning in a high growth start-up business unit. The data obtained from the pilot in-depth interview was not included in the data analysis and was used only to pre-test the in-depth interview questionnaire and the protocol. The results are presented in Chapter 5.

4.4.2.2 Data analysis process on Likert-scaled questions

All questionnaires were coded into a single coding sheet and the number of occurrences per Likert-scale category (1 – 5) was recorded. These frequencies were summarised to ensure that a total number of occurrences equal the number of in-depth interview responses (13) for both nominal and ordinal data as shown in Table 11, APPENDIX D.

The decision was made to analyse the ordinal data (Likert-scaled responses) using the frequencies (Table 11) and the mean values (Table 12) as measures of centre. The range (minimum and maximum values as indicated in Table 12) and standard deviation were calculated as measures of spread. This method is in accordance with “common descriptive measures” that could be used to analyse ordinal data as indicated by Page and Meyer (2003, p. 149).

The ordinal data was then ranked from the highest mean value to the lowest mean value. For occurrences where two or more mean values were similar, the proposition with the lowest standard deviation was ranked higher than a proposition with a lower standard deviation. The standard deviation provided insight into the spread of responses from the target population with respect to the same proposition. Thus, *the proposition with the highest mean and lowest standard deviation was considered to be the most important variable impeding on organisational learning*. Similarly, *the proposition with the lowest mean and highest standard deviation was considered to be the least important variable impeding on organisational learning in a high growth start-up business unit.* This ranking of ordinal data, according to mean values for a qualitative research project, is in accordance with Page and Meyer (2003, p. 153).

The results of this research project are portrayed in Chapter 5.

5. RESULTS

The research results are presented as summaries on the target population demographics, the two open-ended questions and the results on the Likert-scaled questions. The open-ended questions were aimed at understanding the concept of organisational learning from the respondent's point of view and to allow the respondent to identify variables that would impede organisational learning. The Likert-scaled questions tested the validity of variables, obtained from the literature review, that impede the organisational learning of a high growth start-up business unit environment.

5.1 *Results on the sampling frame demographics*

The target population was defined as the 58 approved positions as portrayed by the HTF workforce plan. Of those 58 approved positions, 46 positions were filled at the time of the in-depth interviews. The sampling frame of 13 was derived from the target population as the Group Leaders (mangers) and individual engineers, technicians, process controllers and support staff who are part of the HTF start-up business unit, are involved in the day-to-day operations of the business unit and have the educational background and conceptual ability to grasp the concepts of this research context. The sampling frame demographics are shown in Figure 10 from a frequency perspective for the demographics, namely: sex, race, occupation, age and experience.

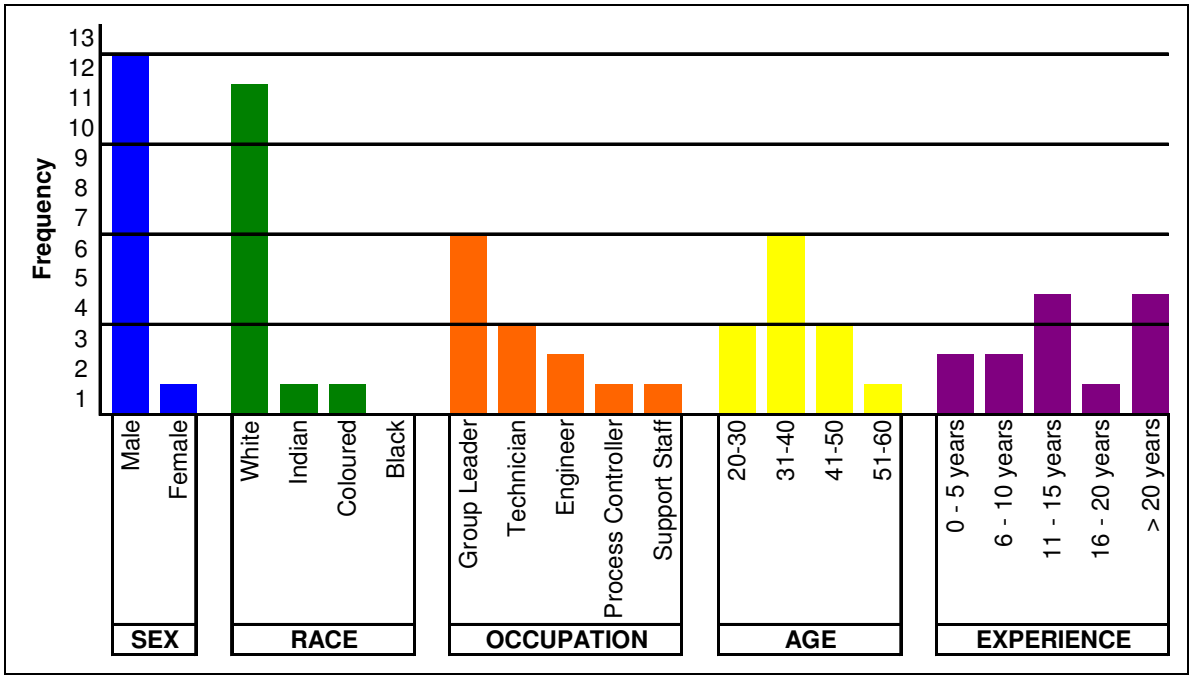

Figure 10: Result for the sampling frame demographics used this research.

The demographics shown in Figure 10 indicate that the 13 respondents were predominantly white (11), male (12) of which nearly half (6) were Group Leaders (managers). Most of the respondent's ages were between 20 years and 50 years, with the majority in the age bracket between 31 years to 40 years. The respondents working experience had a bi-modal characteristic of 11 – 15 years and greater than 20 years.

5.2 *Results on the first open-ended question: What is organisational learning?*

5.2.1 Summary of results on the first open ended question

The first open-ended question posed to respondents was: "Tell us what organisational learning means to you?" (Refer to paragraph 4.3.1.1) The objective

of this question was to obtain an understanding of the concept of organisational learning from the respondent's point of view. The results indicated three categories of understanding, as indicated in Table 4.

Table 4: A summary of results on the understanding of the concept of organisational learning.

No.	The concept of organisational learning	Number of respondents with similar responses
1	Organisational learning as trail-and-error	3
2	Organisational learning as a range between trail-and-error and the scientific process	1
3	Organisational learning as a range between trail-and-error, followed by model building to thought processes	1

Only 3 respondents out of the total 13 respondents clearly stated that learning takes place as a trail-and-error process. Many more respondents implicitly stated that learning takes place by doing. One respondent explained organisational learning as a range between trail-and-error and the scientific process and one respondent depicted organisational learning as a continuum between trail-and-error, model building and thought processes. In total, only 5 out of 13 respondents demonstrated a clear comprehension of their own understanding of the concept of organisational learning.

5.2.2 Detailed results on the first open ended question

5.2.2.1 Organisational learning as trail-and-error (respondents 3, 9 & 12)

Learning takes place as trail-and-error. “We learn by doing”. “A company learns as fast as the slowest learner”.

5.2.2.2 Organisational learning as a range between trail-and-error and the scientific process (respondent 7)

Learning occurs within a range from trail-and-error to a combination of trail-and-error and the scientific process and then to the scientific process only. Trail-and-error in the HTF happens in a high stress environment and is not very effective. More time is required for the scientific process and this type of learning is more effective. Learning on the HTF is about a) how to manage, b) how to deal with science and technology and c) how to effectively manage the core business. “An organisation can only learn as fast as the sum of its individuals”. We learn both consciously and unconsciously. “If the rate of change is too fast, learning slows down”.

5.2.2.3 Organisational learning as a range between trail-and-error, model building and thought processes (respondent 10)

A metaphor for learning can be created similar to that of the evolution of a human being. The baby type of learning (trail-and-error) is replaced by teenager learning (model building) and ultimately by adult learning (thought process learning). Learning in an organisation takes place as a result of procedures and as a result of cultural adaptation. “Learning is not only changing processes and procedures but

how you adapt your culture", therefore, if you change your processes and procedures you do not necessarily learn.

5.3 *Results on the second open-ended question: Which variables impede organisational learning in a high growth start-up business unit?*

5.3.1 Summary of results on the second open-ended question

The second open-ended question posed to respondents was: "In your opinion what are these variables that impede organisational learning in the high growth start-up business unit environment and explain why?" (Refer to paragraph 4.3.1.1) The objective of this question was to allow the respondent to identify variables that impede organisational learning without any exposure to the variables that were identified for testing during the literature review. The results are listed in the order of the number of respondents with similar responses, as shown in Table 5.

Table 5: A summary of results on opinions of respondents on the variables that impede organisational learning in a high growth start-up business unit environment.

No.	The variables impeding organisational learning	Number of respondents with similar responses
1	Personal learning attributes	6
2	Inappropriate training	5
3	Roles and responsibilities not properly defined	3
4	Too much cultural diversity	2
5	Lack of clarity on a personal development plan	2
6	Too many parallel activities	2
7	Organisational culture	2

8	Lack of resources	1
9	Inappropriate experience of personnel	1
10	Lack of focus on core business	1
11	Interesting work	1
12	High rate of change in an organisation	1
13	High stress levels of individuals	1
14	Over stimulation	1
15	Unwillingness to transfer knowledge	1
16	Inappropriate leadership	1
17	Poor job fit and resulting conflict	1

Seventeen impeding variables were identified by the respondents as shown in Table 5 with “personal learning attributes” identified by 6 of the respondents during the in-depth interviews. It should be noted that when respondents identified impeding variables such as “time constraints” that was already one of the propositions for this study, it was not captured again in this section as the respondents view on the influence of “time constraints” on organisational learning would be tested during the Likert-scaled question during the last part of the in-depth interview. Further note that respondents did not have prior access to the open-ended questions nor to the impeding variables as identified during the literature survey. They had to provide immediate responses to these questions during the in-depth interview. Five respondents identified “inappropriate training” and 3 respondents identified “roles and responsibilities not properly defined” as variables impeding organisational learning in a high growth start-up business unit.

5.3.2 Detailed results on the second open-ended question

5.3.2.1 Personal learning attributes (respondents 2, 5, 7, 10, 11 & 13)

It was suggested by respondents to measure the learning capability as well as the need for learning or training of the individual potential employees, during recruitment and selection, to identify “fast” learners. The innovative attributes of individuals could then be determined as this will have an impact on the speed of learning. “A humble personality enhances learning and a willingness to change. This requires personal maturity”. Strong headedness, as a result of previous experience, does not foster learning.

5.3.2.2 Inappropriate training (respondents 2, 3, 4, 6 & 11)

Training can facilitate effective learning. Training can be used to capture learning from “fast” learners and transfer this learning to “slow” learners. Use training to provide a theoretical understanding then execute a project and learning should take place when both theory and practise meet. “A high need for achievement facilitates learning”. Too much training can result in less time to do the work and learn. “The higher the quality of the trainers, the higher the rate of learning”.

5.3.2.3 Roles and responsibilities not properly defined (respondents 3, 11 & 12)

“When there are too many people on the job, you do not get a chance to learn”. When roles and responsibilities are better defined, you are able to focus on the task at hand, and learn.

5.3.2.4 Too much cultural diversity (respondents 1 & 8)

Increased employment equity may impede learning. HTF personnel were recruited from all walks of life. “Many strong opinions may lead to reduced learning”. The mother tongue of some lower skilled personnel is either Afrikaans or Tswana and not all team members are fluent in English. The language barrier slows down learning.

5.3.2.5 Lack of clarity on the personal development plan (respondents 2 & 8)

A clearly defined personal development plan motivates an employee to learn with a career end-goal in mind. Some team members do not have a need to further their careers and are, therefore, not motivated to learn.

5.3.2.6 Too many parallel activities (respondents 5 & 9)

“More learning takes place when tasks are executed in serial. When parallel activities are executed there is a tipping point beyond which less is accomplished and learning slows down.

5.3.2.7 Organisational culture (respondent 11 & 13)

As the company grows bigger and bigger the organisational culture changes from “agile” to “dynosaural”. This leads to negative feelings by employees, a drop in productivity and key personnel resigning from the company. All these circumstances reduce organisational learning.

5.3.2.8 Lack of resources (respondent 3)

“When there is a lack of resources, some projects need to be cancelled. These projects were an opportunity to learn”.

5.3.2.9 Inappropriate experience of personnel (respondent 5)

"Insufficient experience in the New Product Development (NPD) environment retards learning. A NPD mindset enhances learning".

5.3.2.10 Lack of focus on core business (respondent 5)

A lack of focus on core business retards learning as less work gets done. Minimum time and effort should be spent on head-office support services.

5.3.2.11 Interesting work (respondent 5)

"When work is interesting – learning will take place".

5.3.2.12 High rate of change in an organisation (respondent 7)

The rate of change influences the rate of learning. "If the rate of change in the organisation is higher than the learning capability of the individual, the individual cannot learn fast enough and learning slows down". "If the rate of change of the organisation is slower than the learning capability of the individual, the individual can learn fast".

5.3.2.13 High stress levels of individuals (respondent 7)

"Too little or too much stress produces low levels of learning at the individual and group level". Sufficient stress levels produce optimal learning.

5.3.2.14 Over stimulation (respondent 7)

"Too little or too much stimulation produces low levels of learning at the individual and group level." Sufficient stimulation produces optimal learning.

5.3.2.15 Unwillingness to transfer knowledge (respondent 8)

Where willingness exists between team members to transfer knowledge, learning will increase. “Experienced supervision increases the rate of learning”.

5.3.2.16 Poor job fit and resulting conflict (respondent 8)

Where a poor job fit exists between an individual and the HTF, a substantial amount of energy is lost in resolving conflict and learning slows down.

5.3.2.17 Inappropriate leadership (respondent 11)

“High IQ (Intelligence Quotient) and low EQ (Emotional Quotient) does lead to poor facilitation skills and reduces learning”. Recognition of employees enhances learning.

5.4 *Results on the Likert-scaled questions on stated propositions*

The 20 propositions defined for this research that was based on the literature survey (refer to paragraph 3.2), were rated by respondents after explaining the definition of each variable (refer to APPENDIX A). The 13 respondents rated all 20 Likert-scaled propositions. Descriptive statistical calculations were performed on the data set and the variables were ranked in order of the highest mean and lowest standard deviation. The results are shown in Table 6.

Table 6: Results of the Likert-scaled questions rated by respondents and ranked in order of the highest mean and lowest standard deviation.

Prop. No.	Variable impeding organisational learning	Min	Max	Mean	Stdev
Highest impact: Variables sorted containing highest Mean with Min=4 and Max=5 and lowest standard deviation (Stdev)					
6	Selection of inappropriate managers	4	5	4.9	0.3

1	A lack of a common business logic & shared logic	4	5	4.8	0.4
17	A lack of communication	4	5	4.8	0.4
10	A lack of teamwork	4	5	4.7	0.5
11	Inappropriate systems (processes and software)	4	5	4.7	0.5
16	A lack of networks	4	5	4.6	0.5
Moderate impact: Variables sorted with Mean=4 and lowest standard deviation (Stdev)					
4	A lack of a common strategic orientation	1	5	4.4	1.1
19	Inadequate documentation	2	5	4.2	0.9
5	A lack of common business practises	1	5	4.2	1.1
20	Time constraints	1	5	4.2	1.5
18	Discontinuities when people resign	2	5	4.0	1.2
15	A lack of absorptive capacity	2	5	4.0	1.1
Lowest impact: Variables sorted with Mean<4 and lowest standard deviation (Stdev)					
13	Inappropriate operational improvements	2	5	3.9	0.8
14	Inappropriate knowledge systems	2	5	3.9	1.3
8	Commitment to growth by non-founder managers	2	5	3.9	1.2
9	Inappropriate incentive schemes	1	5	3.8	1.5
12	Inappropriate structures (organisational chart)	2	5	3.6	1.0
3	A lack of common mental models	1	5	3.6	1.4
7	A lack of socialising of new managers	2	5	3.5	1.4
2	A lack of a common vision & mission	1	5	3.3	1.3

The results are presented in three categories, namely: “highest impact”, “moderate impact” and “lowest impact” on organisational learning. The first 6 variables

(selection of inappropriate managers, lack of common business & shared logic, lack of communication, lack of teamwork, inappropriate systems and a lack of networks) were rated consistently by the respondents as either a minimum of a 4 (agree) or a maximum of 5 (agree strongly). This category of variables, therefore, has the highest impact on organisational learning in this high growth environment.

The next 6 variables (lack of common strategic orientation, inadequate documentation, lack of common business practises, time constraints, discontinuities when people resign and a lack of absorptive capacity) obtained a mean score between 4.0 and 4.4 and is considered to have a “moderate” impact on organisational learning.

The remaining 8 variables (inappropriate operational improvements, inappropriate knowledge systems, commitment to growth by non-founder managers, inappropriate incentive schemes, inappropriate structures, lack of common mental models, lack of socialising of new managers and a lack of a common vision & mission) scored the lowest mean values (3.3 – 3.9) with wide-ranging standard deviations (0.8 – 1.5). These 8 variables are considered to have a “lower” impact compared to the other two groups of variables on organisational learning in a high growth start-up business unit.

6. DISCUSSION OF RESULTS

The results are discussed by first considering the research methodology with respect to the sampling frame and the expected errors. Then a discussion follows on the general understanding respondents had of the concept of organisational learning, as it was found that only a few respondents provided meaningful responses to this question during the in-depth interview. The results are then discussed by considering each research question and the recorded responses to the related propositions. Lastly, a new model is presented on the key variables that impede organisational learning in a high growth start-up business unit environment.

6.1 *Research methodology: Sampling frame and expected errors*

The demographics show that the respondents were predominantly white males of which nearly half were Group Leaders aged between 20 years and 50 years with most of them within the age bracket of 31 years to 40 years. The respondents' working experience had a bi-modal characteristic of 11 – 15 years and greater than 20 years. The result of this research is, thus, biased towards the opinion of white males with a leadership position on the HTF team. It should further be noted that errors in the data may be expected from social desirability, auspices and acquiescence as discussed during the research methodology in Chapter 4.

6.2 *Respondents understanding of the concept of organisational learning*

Only three concepts of organisational learning were identified by all the respondents. Three respondents explicitly identified trail-and-error as the dominant mode of learning while 2 other respondents referred to continuums of learning as indicated in paragraph 5.2. Senge (1990, revised 2006, p. 4) states that “no one teaches an infant to learn” and further that: “learning organisations are possible because not only is it in our nature to learn but we love to learn”.

6.3 *High level orientation factors impeding organisational learning*

The variables impeding organisational learning, categorised as high level orientation factors, were arranged from the highest to lowest impact. The highest impact was made by a common business and shared logic followed by the other variables as rated by the 13 respondents during each in-depth interview.

6.3.1 Key variables relating to orientation factors with a high impact on organisational learning

A lack of a common business and shared logic (proposition 1) had a high impact on organisational learning in a high growth start-up business environment. Nichols-Nixon (2005, p. 81) quoted one of her CEO respondents on the importance of a common business and shared logic in a rapid growth environment: “because you are always behind in systems development, you have to rely on more than systems to grow. You need to provide guidelines for what the company represents, where it

is and where the boundaries are. Then, you need the goodwill of the people who work for you to find ways to get things done when systems aren't there to enable you to do it". It is, therefore, speculated that a common business and shared logic enhances learning because the boundaries of learning exploration are set to allow employees to explore by trail-and-error or whatever learning method they choose to use. The employees may, thus, have the freedom to learn within boundary constraints but with the objective to deliver a well defined result.

6.3.2 Variables relating to orientation factors with a moderate impact on organisational learning

A lack of a common strategic orientation (proposition 4) and a lack of common business practises (proposition 5) had a moderate effect on organisational learning in a high growth start-up business unit environment. Dodgson (1993, p. 387) states that "firms purposefully adopt structures and strategies to encourage learning". They do this as they are not only reactively but proactively seeking to influence the business environment in which they learn.

6.3.3 Variables relating to orientation factors with a low impact on organisational learning

A lack of a common vision and mission (proposition 2) and a lack of common mental models (proposition 3) had a low impact on organisational learning in a high growth start-up business unit environment.

6.3.4 Conclusion on the impediment of high level orientation factors on organisational learning

The key variable relating to orientation factors with the highest impact on organisational learning was proven by this research to be a lack of a common business and shared logic (proposition 1). Surprisingly, a lack of a common vision and mission (proposition 2) had a low impact on organisational learning. A moderate impact on organisational learning was recorded to be a lack of common strategic orientation (proposition 4) and common business models (proposition 5). These research results provide an answer to the first research question (refer to paragraph 1.7) on the effect of orientation factors on organisational learning in the defined environment.

6.4 *Human resource management practises impeding organisational learning*

6.4.1 Key variables relating to human resource management practises with a high impact on organisational learning

Selection of inappropriate managers (proposition 6) and a lack of teamwork (proposition 10) had a high impact on organisational learning in a high growth start-up business environment.

6.4.2 Variables relating to human resource management practises with a low impact on organisational learning

A lack of a socialising of new managers (proposition 7), a lack of commitment to growth by non-founder members (proposition 8) and a lack of inappropriate

incentive schemes (proposition 9) had a low effect on organisational learning in a high growth start-up business unit environment.

6.4.3 Conclusion on the impediment of human resource management practises on organisational learning

The key variables relating to human resource practises with the highest impact on organisational learning was proven, by this research, to be the selection of inappropriate managers (proposition 6) as well as a lack of teamwork (proposition 10). The 3 other variables relating to human resource management practises had a low impact on organisational learning in the defined environment. These were: A lack of a socialising of new managers (proposition 7), commitment to growth by non-founder members (proposition 8) and a lack of inappropriate incentive schemes (proposition 9). These research results provide an answer to the second research question (refer to paragraph 1.7) on the effect of human resource management practises on organisational learning in the high growth start-up business unit environment.

6.5 *Organisational systems and structures impeding organisational learning*

6.5.1 Key variables relating to organisational systems and structures with a high impact on organisational learning

Inappropriate systems (processes and software) (proposition 11) had a high impact on organisational learning in a high growth start-up business environment.

6.5.2 Variables relating to human organisational systems and structures with a low impact on organisational learning

Inappropriate structures (organisational chart) (proposition 12) and inappropriate operational improvements (proposition 13) had a low effect on organisational learning in a high growth start-up business unit environment.

6.5.3 Conclusion on the impediment of organisational systems and structures on organisational learning

The key variables relating to systems and structures with the highest impact on organisational learning was proven, by this research, to be the selection of inappropriate systems (processes and software) (proposition 12). Inappropriate structures (organisational chart) (proposition 12) and inappropriate operational improvements (proposition 13) proved to have a low impact on organisational learning. These research results provide an answer to the third research question (refer to paragraph 1.7) on the effect of organisational systems and structures on organisational learning in the high growth start-up business unit environment.

6.6 *Knowledge management practises impeding organisational learning*

6.6.1 Key variables relating to knowledge management practises with a high impact on organisational learning

A lack of networks (proposition 16) had a high impact on organisational learning in a high growth start-up business environment.

6.6.2 Variables relating to knowledge management practises with a moderate impact on organisational learning

A lack of an absorptive capacity (proposition 15) had a moderate effect on organisational learning in a high growth start-up business unit environment.

6.6.3 Variables relating to knowledge management practises with a low impact on organisational learning

Inappropriate knowledge systems (proposition 14) had a low effect on organisational learning in a high growth start-up business unit environment.

6.6.4 Conclusion on the impediment of knowledge management practises on organisational learning

The key variables relating to knowledge management practises with the highest impact on organisational learning was proven, by this research, to be a lack of networks (proposition 16). A lack of absorptive capacity (proposition 15) had a moderate effect on organisation learning while the effect of inappropriate knowledge systems (proposition 14) was proven to be low on organisational learning. These research results provide an answer to the fourth research question (refer to paragraph 1.7) on the effect of knowledge management practises on organisational learning in the high growth start-up business-unit environment.

6.7 *Communication factors impeding organisational learning*

6.7.1 Key variables relating to communication factors with a high impact on organisational learning

A lack of a communication (proposition 17) had a high impact on organisational learning in a high growth start-up business environment.

6.7.2 Variables relating to communication factors with a moderate impact on organisational learning

Three variables had a moderate effect on organisational learning according to the research results. These were: Discontinuities when people resign (proposition 18), inadequate documentation (proposition 19) and time constraints (proposition 20).

6.7.3 Conclusion on the impediment communication factors on organisational learning

The key variables relating to communication factors with the highest impact on organisational learning was proven, by this research, to be a lack of communication (proposition 17). Discontinuities when people resign (proposition 18), inadequate documentation (proposition 19) and time constraints (proposition 20) proved to have only a moderate effect on organisational learning in the set environment. These research results provide an answer to the fifth research question (refer to paragraph 1.7) on the effect of communication factors on organisational learning in the high growth start-up business unit environment.

6.8 *A new construct on the key variables impeding organisational learning in a high growth start-up business unit environment*

Five research questions were stated for this research project (refer to paragraph 1.7) and 20 propositions were tested using the methodology as described in Chapter 4. The results were analysed and presented in Chapter 5 and discussed in Chapter 6. Based on the results of this research project, a new construct on the key variables impeding organisational learning in a high growth start-up business unit environment and the magnitude (high, moderate or low) of their effect on

learning is compiled as shown in Figure 11. During the commencement of the in-depth interviews, respondents were requested to identify key variables that impede organisational learning. The variables that were identified by the respondents that were not already captured in any of the 20 propositions were identified and included in this model. No qualitative testing was performed on these variables but they should be included as variables for testing in future research efforts.

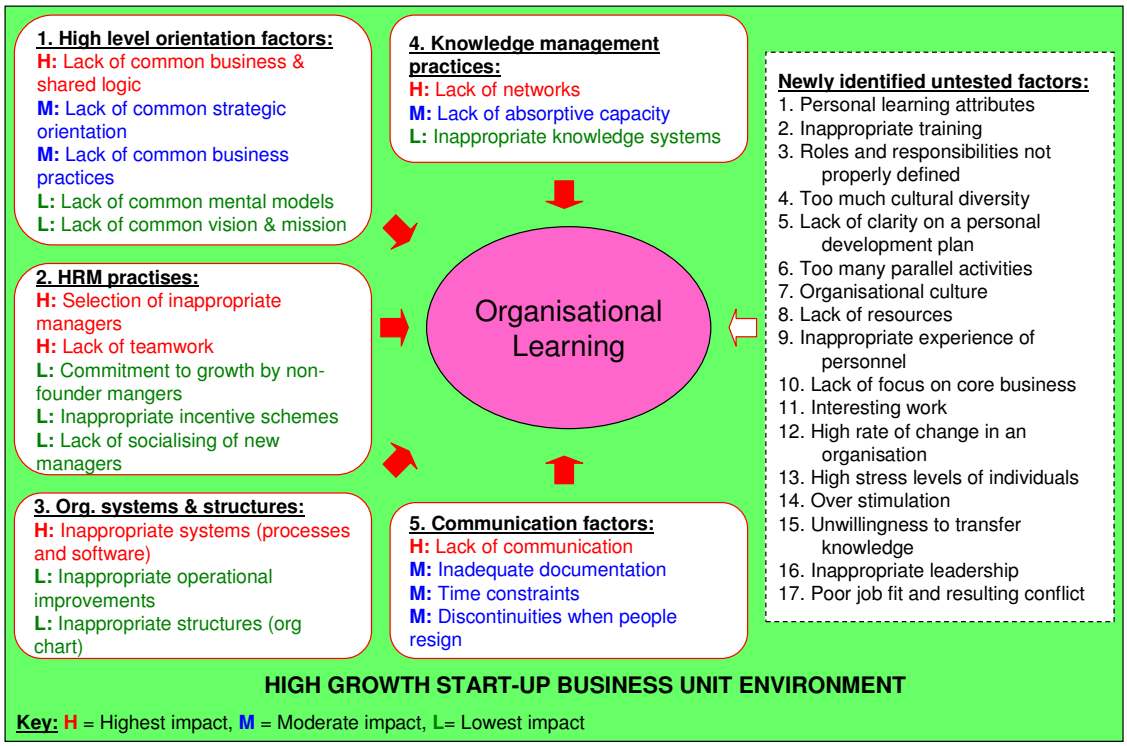

Figure 11: A new construct on key variables impeding organisational learning in a high growth start-up business unit environment.

6.9 *New propositions based on the results of this study*

The results of this study indicate the high growth start-up business unit environment affects the magnitude of influence of the identified key variables on organisational learning. High growth, as a moderating variable, thus have an influence on both organisational learning and the identified key variables. The following new propositions could be stated based on the results of the study:

New propositions A

A high growth start-up business unit environment reduces the influence of a lack of a common vision and mission on organisational learning.

New propositions B

A high growth start-up business unit environment reduces the influence of a lack of common mental models on organisational learning.

New propositions C

A high growth start-up business unit environment reduces the influence of a lack of commitment to growth by non-founder members on organisational learning.

New propositions D

A high growth start-up business unit environment reduces the influence of inappropriate incentive schemes on organisational learning.

New propositions E

A high growth start-up business unit environment reduces the influence of a lack of socialising of new managers on organisational learning.

New propositions F

A high growth start-up business unit environment reduces the influence of inappropriate operational improvements on organisational learning.

New propositions G

A high growth start-up business unit environment reduces the influence of inappropriate structures (organisational chart) on organisational learning.

New propositions H

A high growth start-up business unit environment reduces the influence of inappropriate knowledge systems on organisational learning.

7. CONCLUSION

The objective of this research project was to determine the key variables that impede organisational learning in a high growth start-up business-unit environment. Gaining a better understanding of these variables may allow management to strategise and plan high growth start-up business units or firms more effectively and increase the survival rate of such start-up ventures. High growth start-up business units or firms, when successful, have a positive effect on wealth creation and unemployment. However, the start-up business unit environment requires a unique managerial effort to ensure that optimal learning takes place in a complex and fast changing environment to ensure delivery on defined business outputs.

Five research questions were formulated on the categories of variables that may impede organisational learning in a high growth start-up business unit environment. These categories were: Orientation factors, human resource management practises, systems & structures, knowledge management practises and communication.

A literature study was done on variables that impede high growth firms, variables that impede organisational learning and variables that impede learning when firms grow. No literature could be found on variables that impede organisational learning in high growth firms. All the variables that were identified from the literature study

were mapped and a sub-selection of variables that may impede organisational learning in a high growth start-up business-unit environment was made.

These sub-selected variables were chosen to represent the 5 categories of variables that impede organisational learning, as stated in the research questions. A total of 20 propositions were formulated for testing. To avoid misinterpretations during the research project, a list of definitions were compiled for each variable as obtained from the literature study.

Due to the limited literature that was published on organisational learning in a high growth start-up environment, it was decided to conduct an explorative study using qualitative research methods to build a theory (construct) on the key variables that impede organisational learning in this environment. The case research methodology was chosen for this research project as it allowed for obtaining both results on open-ended questions during the first part of the interview and Likert-scaled questions during the second part of the interview. The open-ended questions during the first part of the in-depth interview allowed respondents to identify variables that might impede organisational learning and during the second part of the interview they rated the impeding effect of the 20 identified variables on organisational learning. The unit of analysis was chosen, specifically the employees in managerial and other positions of the Helium Test Facility (HTF) start-up business unit of PBMR (Proprietary Limited) who had sufficient educational background to be able to understand the concept of organisational learning. The

target population included all 44 employees of the HTF start-up business unit and the sampling frame was reduced to 13 employees in managerial and other positions. Provision was made for triangulation. A research questionnaire was developed as well as an in-depth interview protocol. A pilot test was conducted on the original research questionnaire and some adjustments were made to produce the final research questionnaire. The expected errors were identified that may affect the research results. Both the data recording and data analysis processes were defined based on methodologies employed for the analysis of qualitative research results.

The research results were presented on the sampling frame demographics, the open-ended questions and the respondent ratings on the Likert-scaled questions. The sampling frame demographics showed that the 13 respondents were predominantly white males with almost half of them occupying managerial positions on the HTF start-up business unit. The ages of the respondents ranged from 20 years to 50 years with most of them in the 31 years – 40 years age bracket. The respondents working experience had a bi-modal characteristic of 11 – 15 years and greater than 20 years.

Three methods of learning were identified by respondents as a response to the first open-ended question. The methods of learning were:

- The first method of learning was identified as trail-and-error.

- The second method of learning was identified as a continuum ranging from trail-and-error to the scientific method.
- The third method of learning was identified by respondents as a continuum ranging from trail-and-error, model building to thought processes.

Limited responses were obtained from respondents on this open-ended question that may indicate that either the respondents had an unconscious understanding of the concept of learning or no understanding at all.

Seventeen variables that impede organisational learning in the HTF high growth start-up business unit environment were identified by respondents during the second interview. These variables were not rated or tested for validity by other respondents. These 17 variables were:

- Personal learning attributes, inappropriate training, roles & responsibilities not properly defined, too much cultural diversity, lack of clarity on personal development plans, too many parallel activities, organisational culture of the organisation, lack of resources, inappropriate experience of personnel, lack of focus on core business, interesting work, high rate of change in an organisation, high stress levels of individuals, over stimulation, unwillingness to transfer knowledge, inappropriate leadership and poor job fit and the resulting conflict.

The 20 propositions were rated by respondents, using Likert-scaled questions, for their impeding effect on organisational learning in the high growth start-up business unit environment. These 20 propositions and related variables provided clarity on the 5 stated research questions for this project as follows:

- The impeding effect of high level orientation factors on organisational learning:
    - High effect by a lack of common and shared logic;
    - Moderate effect by a lack of strategic orientation and common business practises;
    - Low effect by a lack of common mental models and vision & mission.
- The impeding effect of human resource management practises on organisational learning
    - High effect by the selection of inappropriate managers and a lack of teamwork;
    - Low effect by a lack of commitment to growth by non-founder members, inappropriate incentive schemes and a lack of socialising of new managers.
- The impeding effect of organisational systems and structures on organisational learning:
    - High effect by inappropriate systems (processes and software);
    - Low effect by inappropriate operational improvements and structures (organisational chart).

- The impeding effect of knowledge management practises on organisational learning:
    - High effect by a lack of networks;
    - Moderate effect by a lack of absorptive capacity;
    - Low effect by a lack of inappropriate knowledge systems.
- The impeding effect of communication factors on organisational learning:
    - High effect by a lack of communication;
    - Moderate effect by inadequate documentation, time constraints and discontinuities when people leave the organisation.

A new construct was presented on the variables that impede organisational learning in a high growth start-up business unit environment as well as their magnitude of impediment. As the nature of this research was theory building using explorative research methodologies applied to a single start-up business unit environment, no generalisation could be done based on the results obtained.

The results of this research project has identified 6 key variables that have a high impeding effect on organisational learning in the HTF high growth start-up business unit environment. These variables were: A lack of common and shared logic, selection of inappropriate managers, a lack of teamwork, inappropriate systems (processes and software), a lack of networks and a lack of communication. Although the results may not be generalised due to a lack of a statistical base,

management may already be alerted to consider these variables when starting up a new high growth venture.

It is recommended to include the 17 untested variables, that were identified by respondents, with the 20 variables that were identified from the literature and conduct a similar lateral research effort on multiple start-up business-unit environments. This will allow for inclusion of more variables and for a better validation of the construct for future generalisation purposes. New propositions were formulated to incorporate the moderating effect of the high growth environment on both organisational learning and the impeding factors.

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9. APPENDIX A: DEFINITIONS OF VARIABLES AS OBTAINED FROM THE LITERATURE SURVEY

Descriptive explanations are given for each variable that were identified as part of this research literature survey, as indicated in Table 7. These explanations were obtained from the literature source as indicated (blue) per variable category.

Table 7: Explanatory notes on each variable as identified the in the literature survey.

No	Variables on high organisational growth	Detail description
Barringer & Jones (2004)		
1	Socialisation of new managers	To be effective, new managers must be socialized into the culture of the firm, acquire firm specific knowledge, firm specific rules-of-thumb and work long enough to establish trusting relationships.
2	Adverse selection	With rapid firm growth more managers are required to manage the growth. It becomes increasingly difficult to recruit and select managers with the right skills and abilities in the appropriate positions and provide adequate supervision.
3	Managerial motivation regarding growth	Managers have a portfolio of issues that they deal with and are accountable for and growth is just one more issue. Some managers may prioritise issues other than the growth of the firm.
4	Moral hazard	As the firm grow and personnel are added, the new managers do not have the same ownership incentive compared to the original entrepreneurs. New managers have the propensity to avoid work
Barringer, Jones & Neubaum (2005)		
1	Founder characteristics	Relevant industry experience, higher education,

		entrepreneurial experience, broad social and professional network, firm started by a team rather by an individual.
2	Firm attributes	Growth orientated vision and mission, commitment to growth (motivation to grow), participation in inter-organisational relationships, planning, geographic location that facilitates the absorption of knowledge from external resources and high buyer concentration.
3	Human resource management practices	Exemplary recruitment and selection, pay-for-performance plans, stock options plans and employee stock ownership plans, geographic location that provides access to a qualified labour pool.
4	Business practises	Creating unique value for customers, product superiority (quality), innovation, utilisation of new and advanced technologies.
Nichols-Nixon (2005)		
1	Business logic	A few simple rules about what should be done by whom, establishment of a clear sense of vision and values that guide action in the absence of formal rules and procedures. To stay receptive to alternative viewpoints and to encourage exploration of new directions.
2	Capturing and sharing of information	Create infrastructure that facilitates more innovative and faster responses by providing access to real time information on key performance metrics and ensuring that the information is widely shared.
3	Building relationships	Facilitate connections between people within and across organisations to enhance identification of problems and opportunities and to develop creative and timely responses to their resolution.
4	Managing organisational	Minimize the effects of disruptive politics in order to

	politics	foster employee's willingness to engage in informal, voluntary and cooperative interactions.
5	Leadership style	Focus on facilitating rather than directing or controlling individual actions and interactions.
No	**Variables on organisational learning**	**Detail description**
Senge (1990, revised 2006)		
1	Systems thinking	Business endeavours may be seen as systems. They are bound by invisible fabrics of interrelated actions, which often take years to fully play out their effect on each other. System thinking is a conceptual framework, body of knowledge and tools developed to make the full patterns clearer and then change the patterns effectively.
2	Personal mastery	The discipline and proficiency to continually clarify and deepen the personal vision, focusing energy, developing patience and seeing objectively – the learning organisations spiritual foundation. There is a connection between personal learning and organisational learning.
3	Mental models	Deeply ingrained assumptions, generalisations, pictures or images that influence an understanding of the world and the how action should be taken. Institutional learning is the process by which management teams change their shared mental models of the company, markets and competitors.
4	Building a shared vision	Translation of individual vision into a shared vision – the skill of unearthing shared "pictures of the future" that foster genuine commitment and enrolment rather than compliance.
5	Team learning	The intelligence of the team exceeds the intelligence of the individuals and extraordinary capabilities for coordinated actions is developed. When teams are

		learning, individuals grow more rapidly than otherwise. Teams, not individuals are the fundamental learning unit in modern organisations.
Yeo (2005)		
1	Single loop learning (individual level)	Takes place at the individual level. Activities are routines based and repetitive. Individuals solve problems on their own in order to maintain existing structures, systems and rules. Limited learning only takes place in the difference between the deviation from the rule and application of corrective action to follow the rule.
2	Double loop learning (team level)	Takes place within a team. Individuals draw on strengths of other members to solve problems with the aim to change existing structures, systems and rules. Learning activities are non-routine and complex. Learning takes place first to understand the individual's limitations and then through the creation of opportunities for action.
3	Triple loop learning (organisational level)	Takes place at the organisational level and its environment. Learning takes place when individuals try to solve problems by focusing on external resources. The main objective is to develop new principles, positions, aims, roles in preparing the organisation for the dynamic changes of the external environment.
Kim & Wilemon (2007)		
1	Lack of communication	Learning is both explicit (easy to transfer) and tacit (difficult to transfer). Tacit knowledge is personal and deeply rooted in action and an individual's commitment to a specific context and not easily expressed. Not willing to give up 'secrets', silo effect, jealousy, interpersonal conflicts or wanting to be the 'star' of a highly visible problem.

2	Discontinuities	Lack of coordination, high workload and changing personnel and responsibilities constantly that depletes the pool of experienced team members.
3	Inadequate documentation on learning	Lack of written procedures and user friendly systems capable to record past challenges, problems and learning.
4	Time constraints	People are too busy to keep records and communicate their learning and insufficient time is spent on reviews/post mortems.
No	**Variables on growth and organisational learning**	**Detail description**
Macpherson & Holt (2007)		
1	Entrepreneurial and managerial human capital	The ability to perceive and adapt to environmental changes has a paramount influence on growth. The ability to learn and apply that learning to change strategies. Managerial capabilities are required to provide specialist functions and processes designed to support and exploit entrepreneurial actions.
2	Organisational systems and structures	Systems or 'tried and tested routines' (processes) benefit the firm by disseminating learning beyond the entrepreneur. Investment in cultural control economise formal administrative systems. Suitable organisational systems and activities that support knowledge transfer and encourage learning is an important antecedent for growth.
3	Knowledge systems, absorptive capacity and networks	Knowledge systems may be in conflict between exploration (R&D) and exploitation (production efficiency). Knowledge systems can both improve knowledge transfer and stifle flexibility and responsiveness. Knowledge systems provide absorptive capacity by providing access to and distribute knowledge.
4	Networks	The depth and diversity of network relationships

		influences knowledge transfer. Knowledge transfer can be supported by a variety of institutional or business contexts. Social networks are important at start-up but social, industry, professional and institutional links become more important over time.
Phelps, Adams & Bessant (2007)		
1	People management	Developing the people management skills to encourage delegation, communication and teamwork is a primary need for firms that need to make the transition from owner micro-management to larger scale professional structures.
2	Strategic orientation	The implication of growth is to move away from opportunistic, reactive working to a more deliberate and considered strategy. High growth firms tend to have a more structured approach to organising their business and more likely to have articulated strategy goals across a range of strategy possibilities.
3	Formalisation of systems and structures	Formalised systems have two effects: the beneficial effect of replacing ad hoc systems with formal ones and the detrimental effect of ossifying formal systems with no agility.
4	New market entry	High growth firms need to provide new products/services to existing or replicating the existing business model to the new market. Higher performing firms have a stronger awareness of customer needs. High tech firms feed constrained with respect to marketing and sales skills.
5	Obtaining finance	Growing organisations move from reliance of self-funding and loans to outside finance providers and from less to significant intervention by financiers.
6	Operational improvement	Mangers may recognise the need for operational improvements on the basis of observed productivity or efficiency gaps but be reluctant to adopt them for

		reasons of cost, lack of information, absence of motivation or simply through indecision. Among certain populations, significant barriers exist to operational improvements via best practise take-up.

10. APPENDIX B: SUMMARY OF VARIABLES FROM LITERATURE SURVEY

All the variables that were identified during the literature survey of this research project are indicated in Table 8.

Table 8: Summary of the variables that were identified during the literature survey.

No	Variables on high organisational growth			Variables on growth and learning		Variables on organisational learning		
	Barringer & Jones (2004)	Barringer, Jones & Neubaum (2005)	Nichols-Nixon (2005)	Macpherson & Holt (2007)	Phelps, Adams & Bessant (2007)	Senge (1990, revised 2006)	Yeo (2005)	Kim & Wilemon (2007)
1	Socialisation of new managers	Founder characteristics	Business logic	Entrepreneurial and managerial human capital	People management	Systems thinking	Single loop learning (individual level)	Lack of communication
2	Adverse selection	Firm attributes	Capturing and sharing of information	Organisational systems and structures	Strategic orientation	Personal mastery	Double loop learning (team level)	Discontinuities
3	Managerial motivation	Human resource management practices	Building relationships	Knowledge systems, absorptive capacity and networks	Formalisation of systems and structures	Mental models	Triple loop learning (organisational level)	Inadequate documentation
4	Moral hazard	Business practises	Managing organisational politics	Business policies and social capital	New market entry	Building a shared vision		Time constraints
5			Leadership style		Obtaining finance	Team learning		
6					Operational improvement			

11. APPENDIX C: INTERVIEW QUESTIONNAIRES

Details on the pilot and final interview questionnaires, are shown below, for which Likert-type scaled questions were posed to respondents.

11.1 *Pilot in-depth interview questionnaire*

A copy of the pilot interview questionnaire that was used during the interviews is shown in Table 9.

Table 9: The pilot interview questionnaire that was used during the research.

Name:		Date:	

	Male	Female
Sex		

	White	Black	Indian	Coloured
Race				

	Group Leader	Engineer	Technician	Process Controller	Support staff
Occupation					

	20-30	31-40	41-50	51-60
Age				

	0 - 5 years	6 - 10 years	11 - 15 years	16 - 20 years	> 20 years
Experience					

		Disagree strongly	**Disagree**	**Neutral**	**Agree**	**Agree strongly**
Prop no	**A. The effect of high level orientation**	**1**	**2**	**3**	**4**	**5**
1	A lack of a common business logic & shared logic impede organisational learning in a high growth start-up business unit.					
2	A lack of a common vision & mission impede organisational learning in a high growth start-					

	up business unit.					
3	A lack of common mental models impede organisational learning in a high growth start-up business unit.					
4	A lack of a common strategic orientation impede organisational learning in a high growth start-up business unit.					
5	A lack of common business practises impede organisational learning in a high growth start-up business unit.					
	B. The effect of human resource practises					
6	Selection of inappropriate managers impede organisational learning in a high growth start-up business unit.					
7	A lack of socialising of new managers impede organisational learning in a high growth start-up business unit.					
8	Commitment to growth by non-founder managers impede organisational learning in a high growth start-up business unit.					
9	Inappropriate incentive schemes impede organisational learning in a high growth start-up business unit.					
10	A lack of teamwork impede organisational learning in a high growth start-up business unit.					
	C. The effect of systems and structures					
11	Inappropriate systems impede organisational learning in a high growth start-up business unit.					
12	Inappropriate structures impede organisational learning in a high growth start-up business unit.					
13	Inappropriate operational improvements impede organisational learning in a high growth start-up business unit.					
	D. The efect of knowledge management practises					
14	Inappropriate knowledge systems impede organisational learning in a high growth start-up business unit.					

15	A lack of absorptive capacity impedes organisational learning in a high growth start-up business unit.					
16	A lack of networks impedes organisational learning in a high growth start-up business unit.					
	E. The effect of communication					
17	A lack of communication impedes organisational learning in a high growth start-up business unit.					
18	Discontinuities when people resign impede organisational learning in a high growth start-up business unit.					
19	Inadequate documentation impedes organisational learning in a high growth start-up business unit.					
20	Time constraints impede organisational learning in a high growth start-up business unit.					

11.2 *Final in-depth interview questionnaire*

A copy of the final interview questionnaire that was used during the interviews is shown in Table 10. Three changes were made to the pilot interview guide (shown in bold red) to produce the final interview guide.

Table 10: The final interview questionnaire that was used during the research.

Candidate number:	Date:

	Male	Female
Sex		

	White	Black	Indian	Coloured
Race				

	Group Leader	Engineer	Technician	Process Controller	Support staff
Occupation					

	20-30	31-40	41-50	51-60

Age					

	0 - 5 years	6 - 10 years	11 - 15 years	16 - 20 years	> 20 years
Experience					

		Disagree strongly	Disagree	Neutral	Agree	Agree strongly
Prop no	**A. The effect of high level orientation**	**1**	**2**	**3**	**4**	**5**
1	A lack of a common business logic & shared logic impede organisational learning in a high growth start-up business unit.					
2	A lack of a common vision & mission impede organisational learning in a high growth start-up business unit.					
3	A lack of common mental models impede organisational learning in a high growth start-up business unit.					
4	A lack of a common strategic orientation impede organisational learning in a high growth start-up business unit.					
5	A lack of common business practises impede organisational learning in a high growth start-up business unit.					
	B. The effect of human resource practises					
6	Selection of inappropriate managers impede organisational learning in a high growth start-up business unit.					
7	A lack of socialising of new managers impede organisational learning in a high growth start-up business unit.					
8	Commitment to growth by non-founder managers impede organisational learning in a high growth start-up business unit.					
9	Inappropriate incentive schemes impede organisational learning in a high growth start-up business unit.					
10	A lack of teamwork impede organisational learning in a high growth start-up business unit.					
	C. The effect of systems and structures					

11	Inappropriate systems **(processes and software)** impede organisational learning in a high growth start-up business unit.					
12	Inappropriate structures **(organisational chart)** impede organisational learning in a high growth start-up business unit.					
13	Inappropriate operational improvements impede organisational learning in a high growth start-up business unit.					
	D. The efect of knowledge management practises					
14	Inappropriate knowledge systems impede organisational learning in a high growth start-up business unit.					
15	A lack of absorptive capacity impedes organisational learning in a high growth start-up business unit.					
16	A lack of networks impedes organisational learning in a high growth start-up business unit.					
	E. The effect of communication					
17	A lack of communication impedes organisational learning in a high growth start-up business unit.					
18	Discontinuities when people resign impede organisational learning in a high growth start-up business unit.					
19	Inadequate documentation impedes organisational learning in a high growth start-up business unit.					
20	Time constraints impede organisational learning in a high growth start-up business unit.					

12. APPENDIX D: ANALYSIS OF RECORDED DATA

12.1 *Data analysis on Likert-scaled questions: Coding*

The frequency of occurrence for each response was captured for each nominal variable (sex, race, occupation etc.) and for each ordinal variable (Likert-scaled questions). Thirteen in-depth interviews were conducted and, therefore, a total of 13 responses were expected for each nominal and for each ordinal variable as shown in Table 11.

Table 11: Coding of Likert-scaled questions.

Candidate Number:		Date:

	Male	Female	**Control**
Sex	12	1	**13**

	White	Black	Indian	Coloured	Control
Race	11	0	1	1	**13**

	Group Leader	Engineer	Technician	Process Controller	Support staff	Control
Occupation	6	2	3	1	1	**13**

	20-30	31-40	41-50	51-60	Control
Age	3	6	3	1	**13**

	0 - 5 years	6 - 10 years	11 - 15 years	16 - 20 years	> 20 years	Control
Experience	2	2	4	1	4	**13**

		Disagree strongly	**Disagree**	**Neutral**	**Agree**	**Agree strongly**	**Control**
Prop no.	**A. The effect of high level orientation**	**1**	**2**	**3**	**4**	**5**	
1	A lack of a common business logic & shared logic				3	10	**13**

	impede organisational learning in a high growth start-up business unit.						
2	A lack of a common vision & mission impede organisational learning in a high growth start-up business unit.	1	4		6	2	**13**
3	A lack of common mental models impede organisational learning in a high growth start-up business unit.	1	3		5	4	**13**
4	A lack of a common strategic orientation impede organisational learning in a high growth start-up business unit.	1			4	8	**13**
5	A lack of common business practises impede organisational learning in a high growth start-up business unit.	1			6	6	**13**
	B. The effect of human resource practises						
6	Selection of inappropriate managers impede organisational learning in a high growth start-up business unit.				1	12	**13**
7	A lack of socialising of new managers impede organisational learning in a high growth start-up business unit.		5	1	2	5	**13**
8	Commitment to growth by non-founder managers impede organisational		3		5	5	**13**

	learning in a high growth start-up business unit.						
9	Inappropriate incentive schemes impede organisational learning in a high growth start-up business unit.	1	3		3	6	**13**
10	A lack of teamwork impede organisational learning in a high growth start-up business unit.				4	9	**13**
	C. The effect of systems and structures						
11	Inappropriate systems (processes and software) impede organisational learning in a high growth start-up business unit.				4	9	**13**
12	Inappropriate structures (organisational chart) impede organisational learning in a high growth start-up business unit.		3	1	7	2	**13**
13	Inappropriate operational improvements impede organisational learning in a high growth start-up business unit.		1	1	9	2	**13**
D. The efect of knowledge management practises							
14	Inappropriate knowledge systems impede organisational learning in a high growth start-up business unit.		3	1	3	6	**13**

15	A lack of absorptive capacity impedes organisational learning in a high growth start-up business unit.		2	1	5	5	**13**
16	A lack of networks impedes organisational learning in a high growth start-up business unit.				5	8	**13**
	E. The effect of communication						
17	A lack of communication impedes organisational learning in a high growth start-up business unit.				3	10	**13**
18	Discontinuities when people resign impede organisational learning in a high growth start-up business unit.		3		4	6	**13**
19	Inadequate documentation impedes organisational learning in a high growth start-up business unit.		1	1	6	5	**13**
20	Time constraints impede organisational learning in a high growth start-up business unit.	1	2		1	9	**13**

12.2 *Data analysis on Likert-scaled questions: Descriptive statistics*

The data for the Likert-scaled questions were analysed to identify the minimum (Min) and the maximum (Max) values chosen by the respondents. The average

chosen value, between 1 – 5, was calculated (Mean) after which the standard deviation was calculated (Stdev) as shown in Table 12.

Table 12: Descriptive statistical analysis on the recorded Likert-scaled data.

Prop No.	Variable	Min	Max	Mean	Stdev
Variables sorted containing highest Mean with Min=4 and Max=5, lowest Stdev					
6	Selection of inappropriate managers impede organisational learning in a high growth start-up business unit.	4	5	4.9	0.3
1	A lack of a common business logic & shared logic impede organisational learning in a high growth start-up business unit.	4	5	4.8	0.4
17	A lack of communication impedes organisational learning in a high growth start-up business unit.	4	5	4.8	0.4
10	A lack of teamwork impede organisational learning in a high growth start-up business unit.	4	5	4.7	0.5
11	Inappropriate systems (processes and software) impede organisational learning in a high growth start-up business unit.	4	5	4.7	0.5
16	A lack of networks impedes organisational learning in a high growth start-up business unit.	4	5	4.6	0.5
Variables sorted with Mean=4, lowest Stdev		**Min**	**Max**	**Mean**	**Stdev**
4	A lack of a common strategic orientation impede organisational learning in a high growth start-up business unit.	1	5	4.4	1.1
19	Inadequate documentation impedes organisational learning in a high growth start-up business unit.	2	5	4.2	0.9
5	A lack of common business practises impede organisational learning in a high growth start-up business unit.	1	5	4.2	1.1
20	Time constraints impede organisational learning in a high growth start-up business unit.	1	5	4.2	1.5
18	Discontinuities when people resign impede organisational learning in a high growth start-up business unit.	2	5	4.0	1.2

15	A lack of absorptive capacity impedes organisational learning in a high growth start-up business unit.	2	5	4.0	1.1
Variables sorted with Mean<4, lowest Stdev		**Min**	**Max**	**Mean**	**Stdev**
13	Inappropriate operational improvements impede organisational learning in a high growth start-up business unit.	2	5	3.9	0.8
14	Inappropriate knowledge systems impede organisational learning in a high growth start-up business unit.	2	5	3.9	1.3
8	Commitment to growth by non-founder managers impede organisational learning in a high growth start-up business unit.	2	5	3.9	1.2
9	Inappropriate incentive schemes impede organisational learning in a high growth start-up business unit.	1	5	3.8	1.5
12	Inappropriate structures (organisational chart) impede organisational learning in a high growth start-up business unit.	2	5	3.6	1.0
3	A lack of common mental models impede organisational learning in a high growth start-up business unit.	1	5	3.6	1.4
7	A lack of socialising of new managers impede organisational learning in a high growth start-up business unit.	2	5	3.5	1.4
2	A lack of a common vision & mission impede organisational learning in a high growth start-up business unit.	1	5	3.3	1.3