0

## UNIVERSITY OF KWAZULU-NATAL

# Exploring the use of complexity approaches in strategic management by the KwaZulu-Natal Department of Education

## By

## Nkosinathi Petros Mpungose

### 971132839

**A dissertation in partial fulfillment of the requirements for the degree**

**of**

**Master of Commerce in Leadership Studies**

**Name of School**

**Graduate School of Business and Leadership**

**Supervisor: Dr. Shamim Bodhanya**

**2011**

# Declaration

I, **Nkosinathi Petros Mpungose** declare that

(i) The research reported in this dissertation/thesis, except where otherwise indicated, is my original research.

(ii) This dissertation/thesis has not been submitted for any degree or examination at any other university.

(iii) This dissertation/thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

(iv) This dissertation/thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers.  Where other written sources have been quoted, then:

   a) their words have been re-written but the general information attributed to them has been referenced:
   b) where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

(v) This dissertation/thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the dissertation/thesis and in the References sections.

Signature: _____

# Acknowledgements

I wish to thank:

# Abstract

Finding ways to deal with complex situations has been a long issue of interest by researchers and scholars alike. Researchers and scholars have provided the strategy community with an insightful understanding of the phenomenon of complexity. The traditional understanding of complexity in strategic management, mainly coming from the design school of strategy, has given way to modern complexity perspectives. These perspectives are from Chaos Theory, Dissipative Structures and Complex Adaptive Systems (CAS). Complexity sciences seek to look at the challenges associated with knowing and understanding the unknowable by focusing on the interactions in complex systems. The properties of complex systems in turn provide lessons that can be transferred to the field of strategic management in a form of approaches to deal with complexity. The CAS metaphor will be used as a model to contrast the approaches in current use by the organisation of study in strategic management.

Insights from studies on complex systems points to a need for constant exploratory studies in organisations to determine how well organisations are responding to complexity. The aim of this study is to explore approaches that inform thinking and management practices in strategic management by the KwaZulu-Natal Department of Education (department) in view of complexity - increasing difficulties to understand the world. Firstly, results of the study are intended to contribute to understanding how insights arising from the study of complex systems, in the world, are being used to rethink and design government departments –public sector organisations- systems and strategic approaches, so that they are more flexible, adaptable and able to respond efficiently and effectively to changes in larger environment. Secondly, where the study finds that the current complexity approaches of the department are not informed by the latest thinking on complexity, recommendations are made on ways the department can improve its approaches.

# Table of Contents

# Table of Figures

# Tables

# Chapter 1 : INTRODUCTION

---

## 1.1. Introduction

Public sector organisations are complex and also experience complexities. Complex organisations are characterised, among other things, by non-linearity, emergence of order from disorder, uncertainty and ambiguity. These characteristics are discussed by scholars in various publications of management studies (Cilliers, 2000b; Meek *et al*., 2007; Midgley, 2008; Stacey *et al*., 2000; Maxfield, 1998). Since insights from complexity have long been in the public domain, it can be expected that most organisations have developed management approaches to deal with complexities (Newell and Meek, 1997, Plsek and Greenhalgh, 2001, Marrewijk and Hardjono, 2003, Boisot and Child, 1999). Therefore, understanding how the Kwazulu-Natal Department of Education (department) deals with complexity is an interest of this study. The study intends to look at specific models, tools and approaches that the department uses to deal with its specific complexities within the realm of strategic management.

## 1.2. Purpose of the study

The study contributes to the strategic management research by exploring the use of complexity approaches in strategic management by the department.  The study acknowledges that there is plurality of views in the literature around the meaning of complexity and the application of complexity approaches. However, the study seeks to make sense of the views on the meaning of complexity and application of complexity approaches from two perspectives, *viz.*, Systems Thinking Approaches and Complex Adaptive Systems (CAS). These two perspectives are contrasted with scientific management from which much of today's complexity challenges in organisational management rest.  What is considered, are the perspectives in systems thinking and CAS as emerging alternatives to scientific management in organisations.

Strategic management is a broad field, and as such when applied it acts as a nexus, something that binds together organisational activities (Poister and Streib, 1999). The study seeks to explore complexity approaches within the context of strategic management because strategic management is integrative. The other reason for basing the study on strategic management is that there is a wide range of literature that can be sourced in the strategic management field.  Given a wide range of literature and practices, the study was able draw from literature and practices to make sense of the complexity approaches in the organisation of study.

An assumption is made that the complexities that characterise complex organisations influence the emergence and implementation of strategies. At the centre of the emergence and implementation of strategies are people who evolve strategies as well as those implementing strategies. These people utilise senses to make meaning of the environment and also to generate strategies (Senge, 2006; Stacey *et al.*, 2000; Weick *et al.*, 2005). The study seeks to understand how the divergent interest of people and stakeholders influence the strategic perspectives of the department.

The results of the study are intended to contribute to understanding how insights arising from the study of complex systems, in the world, are being used to rethink and design government organisations and systems so that they are more flexible, adaptable and able to respond efficiently and effectively to changes in larger environment.

## 1.3. Questions for the research

The study seeks to achieve the aims and objectives of exploring the use of complexity approaches by asking four specific questions, namely:

1) What practices inform strategic management in the KwaZulu-Natal Department of Education?
2) What are the obstacles to innovation, creativity and adaptation within the strategic perspective?
3) To what extent does the department strategy making practices align to insights on complexity?
4) What changes to the strategy- making practices may be appropriate in the context of complexity?

To answer these question, an effort is made to review the literature in strategic management on complexity approaches, to conduct research within the organisation of study, to analyse and make findings, and lastly to make conclusions and recommendations.

## 1.4. An outline of the study

### 1.4.1. Theoretical reflections

In chapter 2, the focus is on the review of literature which covers the areas of strategic management that is considered to be of importance in locating complexity approaches within the strategic perspective. Other areas to be considered are those that deal with complexity approaches, basing them on systems thinking and CAS perspective. The scientific management perspective on strategy is important as a benchmark from which to understand complexity approaches. A brief overview of these approaches follows.

### 1.4.1.1. Strategic Management

The use of strategic management as an exploratory exercise in this work does not assume any universality in the field. Strategic management is a broad concept and does not have a single definition. It is suggested in some literature that the processes of institutionalising strategic management within the academic field dates back to the early nineteen sixties (Bracker, 1980). Later on in the early nineteen eighties (1980's) strategic management, known as business policy, gained prominence as a field of study in universities. Judging from a mention of the concept of business in business policy, it may appear strategic management is a preserve of private organisations whereas strategic management today is applied across all sectors. A case in point is the department which operates as a public organisation. The department has a specialised unit that provides support on strategic management by integrating activities (Poister and Streib, 1999; Sekhar, 1981; Ring and Perry, 1985).

It has been widely claimed in literature that strategic management operates on the basis of negotiated boundaries. Such is the widening boundary of strategic management that in recent times strategic management straddles many fields including organisational science, sociology, philosophy and economics (Nag *et al*., 2007). In organisational science, strategic management acts as a nexus that integrates organisational work using various perspectives from the strategic management field. Similarly, there is a general consensus in the literature that the concern of strategy is on improving capabilities and effectiveness of organisations (Poister and Streib, 1999; Mintzberg, 1990). The various perspectives that are found in strategic management include those that are a concern of this study, namely, scientific management, systems thinking and CAS.

### 1.4.1.2. Scientific management

The scientific management perspectives in strategic management remain an important consideration in public sector organisations. Scientific management is likened to mechanical thinking where it is suggested that scientific management borrows much of its underlying principles from the experiences of mechanisation of industries. In essence scientific management organising principles work best in situations where there is predictability and where conditions are not subject to changes (Gharajedaghi and Ackoff, 1984). The organising principles of scientific management relate to assumptions on the notion of time, interactions and emphasis on internal differentials. In scientific management time is compressed into the immediate variable; the history and the future of a variable, is not of great significance. Interactions from the perspective of scientific management occur in series. Scientific management emphasises the delineations of specific roles and responsibilities for all in the organisations; troubleshooting requires an identification of the functional part that is creating a problem for the

organisation. The study reviews the organising principles of scientific management to establish whether these principles are relevant to complexity.

### 1.4.1.3. Systems Thinking Approaches

In essence system thinking is concerned with understanding organisations as wholes (Senge, 2006). The field of systems thinking is broad; it originates from many fields, *viz.*, sociology, biology, management, engineering, mathematics, economics and physiology (Jackson, 2000). In the literature review, the study reviews some of the systems approaches with a view to establishing approaches that are used in complexity.

### 1.4.1.4. Complex Adaptive Systems

There are three prominent strands in complexity sciences that I came across during my search of theories and perspectives related to this study. The first perspective deals with dissipative structures; the second with chaos theory and the last with CAS (Stacey *et al*., 2000). The study focuses on CAS to discuss insights from complexity. The insights from CAS offer the study lessons that can be drawn and related to organisational experiences.

### 1.4.1.5. Critical systems thinking

A critique of systems thinking is that systems thinking is not a body of knowledge that constitute a theory. Even if it can be claimed that it is possible to establish theoretical assumptions of each systems thinking approach, such claims can only be by implication. The nature of systems approaches is such that they do not represent an overall outlook about the world as they are not ideologies. It is through critical systems thinking that the links between social theory and systems approaches has been clearly established (Jackson, 2000). The study reflected on strengths and limitations of systems thinking approaches and hence the importance of epistemological assumptions.

### 1.5. Adopting an approach for intervention

Chapter 3 of this study reflects on the research methodology. In the preceding paragraphs, it has been mentioned that organisations possess the capabilities to respond to complex situations. An organisation's response to complexity could depend on how well it has acquainted itself with tools, methods and ideas derived from systems thinking ideas. Critical systems thinking provide this study with an approach to frame the problem situation and thus methodologies for the research study. Since the study is interested in exploring the use of complexity approaches, this suggests that the study concerns itself with complex issues and challenges within the strategic perspective. The tools and methods of research reflect an appreciation of the phenomenon of complexity that the study seeks to understand. The use of critical

systems approaches, though being a perspective, was chosen for its insistence on embracing a plurality of systems ideas (Jackson, 2001; Flood, 1990).These systems ideas embrace inter-disciplines that cut across sociological paradigms. Much as complexity science assumes the world in concrete terms, it also places much emphasis on people having the capacity to make sense of their own environment (Anderson, 1999b).

The study takes the view that ideas are the building blocks of theory and therefore are researchable. Various studies have given credence to the qualitative methods of study as capable of providing insights and approaches that can be applied to complex situations in order to make sense of interplays (Narayanan et al., 2000; Svyantek and Brown, 2000; Chan, 1993).

The advent of soft systems thinking has given qualitative studies a much needed credibility by providing theoretical tools and methods to stand on. Soft systems thinking is concerned with the behaviour and interpretation of structures that people encounter in their daily activities.  Organisations are increasingly using soft systems approaches, methods and tools such as rich pictures, human activity systems and feedback loops to intervene in complex situations. The study uses the qualitative research paradigm with a view to applying some of the soft systems approaches in the analysis, interpretation and making of recommendations.

### 1.5.1. Methodology

The research methodology seeks to provide a systematic way of applying the qualitative research in the problem of study. It has been mentioned that the qualitative research provides a fertile ground for the use of soft systems methods, tools and approaches.  The lens used to view the system of study is CAS which is complemented by influence diagrams and metaphors.

### 1.5.2. Data collection

Data collection method includes interviews with individual senior and middle managers from the department; observations and reading of documents from the department; and other sources outside the department. A wide range of observation techniques were employed to come closer to understanding the department. These techniques included participation in the activities of the department, interacting with documented data and observation during interviews.

The study utilises qualitative interviews with emphasis being on giving the interviewee the freedom to express himself/herself. The target group was middle and senior managers who are in the value chain of strategic management.

Since the department is a strategically managed department, meaning that all thoughts and actions are guided by the strategic agenda, the study is enriched by interviewing managers who are responsible for performance information to oversight structures, *viz.*, the Legislature, Treasury and Auditor General. The balance between the categories of Responsibility Managers[1] and General Strategic Managers assist the study to establish a balanced assessment of the department.

The process of deriving strategies by the organisation of study is influenced by a number of factors, some of which are not located inside the department. The national government plays a critical role in ensuring that the selection of strategies is context bound. In order to mitigate the element of human bias, which is always there when perceiving the world, the exercise of reading documents helps corroborate some of the articulations during interviews.

Reading of documents plays a critical role in unfolding the historical context of the issue of study. In addition to this, documents in the department provide insight on the use complexity approaches or an appreciation of complexity by the department. In this way, wrong conclusions based on a lack of information by managers are avoided by pointing to existing information on documents read.

### 1.5.3. Analysis and interpretation

The study relies on transcription and summarisation of tape recorded interviews to analyse and make interpretations of existing data. The aim of this exercise is to look for emerging themes from the interviews. The aim of observing situations is to seek to find out how people in the department arrive at taking strategic decisions and actions. The process depicting how decisions and actions are arrived at is then summarized in a journal of observations. The results from interviews, documents read and observations are organised using metaphors according to emergent themes and surface meaning. Once meaning is surfaced, the researcher proceeds to analyse meaning and make findings.

*Limitation of the study*

It is generally assumed that middle and senior managers of organisations are not specialists in the field of strategic management. In other words, none of these managers were appointed in their positions on the basis of having acquired a qualification in strategic management. Managers are therefore not expected to give scholarly answers, but are expected to provide general information on what they do when managing strategically. In such cases the researcher had a task to interpret meaning by ensuring that the voice of the interviewee was not lost during the process.

---

[1] In the department managers responsible for performance information are called Responsibility Managers and those who are indirectly responsible for performance information are referred by the study as General Strategic Managers.

In order to minimise distortions all interpretations are verified with the interviewees, however this does not guarantee that minor mistakes of interpretation could not occur. A record of interpreted data is kept for third party validation if the need arises.

Since the research took an approximated time of 12 months, this time factor placed limitations on the number of people interviewed, observations and the size of documents consulted. The researcher established that the department has more than 110 000 employees and more than 15 000 managers. Other resources (human and physical) limit the size of population covered by the research. Given the limited resources the study covered a small sample of managers at Head Office.

### 1.5.4. Delimitations

The study utilises metaphors to interpret meaning from interviews, documents and observations. Metaphors are suggested to be an important tool to establish meaning within the strategic perspective. Various studies and expositions have been provided in literature on the use of metaphors to establish epistemological assumptions and strategic perspectives (Morgan, 1980; Morgan, 2006; Jackson, 2000). The use of metaphors helps the study to overcome the possible limitation of middle and senior managers not being specialist in the field of strategic management. Selection of interviewees also focused on managers who are in the value chain of strategic management.

Since the study is of exploratory nature, recommendations made require further investigation on future researches. In this way, the number of people interviewed may be increased when subsequent specific researches are done.

### 1.5.5. Analysis and findings

In Chapter 4, the study analyses data gathered during the research stage. The processes of making sense of data gathered utilises some of the metaphors used by Morgan (2006) in his book *Images of Organization*. In this book, Morgan selects and links some metaphors within the strategy perspective. Questions 1, 2 and 3 of the research questions will be answered in this section.

### 1.5.6. Conclusion and recommendations

In chapter 5, the study makes conclusions and recommendations. The recommendations seek to suggest complexity approaches that the department needs to consider in dealing with complexity.

### *1.6. Conclusion*

This chapter highlights the most specific concerns of this study. Exploration on the use of complexity approaches within public service department in South Africa has not received much prominence. The

study outlines general challenges that are facing public sector organisations. The study identifies systems thinking approaches and complexity sciences where some of these challenges and models for complexity are discussed. The study also provides an outline of how an exploration on complexity approaches may be preceded.

<h1 style="text-align:center">Chapter 2 : LITERATURE REVIEW</h1>

## 2.1. Introduction

This section is a literature review of the various contributions that have been made by researchers and scholars alike in the field of strategic management. The study will seek to understand the perspectives on complexity in the field of strategic management and how these perspectives are applied in organisations to deal with complexity. In this section this study will draw on theoretical reflection emerging from the strategic management field on issues of organisations in relation to the use of complexity approaches in strategic management. The legal (formal) organisation called the KwaZulu-Natal Department of Education (department), which is a concern of this study, forms part of broader public sector organisations, which in turn is a subsystem within a larger societal suprasystem. The department is a complex system made up of interdependent variables that cannot be acted upon independently.

## 2.2. Scientific Management

Scientific management represents a movement for efficient men that gained prominence in the early twentieth century (Maqbool *et al*., 2011; Taylor, 1911). Frederick Taylor (1911) in his seminal paper advocated the use of scientific methods to describe employee jobs and the determination of working conditions. The overriding idea of scientific management was to prescribe efficient ways for maximising outputs with fewer inputs. The study suggests that scientific management relates to strategy insofar as it introduced differential job roles, the centralisation of planning to those who are managers, condensation of time between cause and effect, managing by analysis and linear management and leadership styles.

Scientific management contributed to the introduction of a layer of employees whose task was to manage and supervise other employees. This resulted in a chain of people from those supervising employees to those who supervised the supervisee. In today's public sector organisations, this method of doing work (value chain) is evident in tall hierarchal structures that dominate work. In recent past, a number of articles have appeared in strategic management literature to suggest that scientific management separates between planning and implementation (Caldari, 2007). It has also been argued by some writers in strategic management that the design school of strategy is influenced by scientific management insofar as it separates thinking from acting (Mintzberg, 1990).

The prescriptive nature of tasks demanded by scientific management is criticised for diminishing the ability of employees to act intuitively and to take initiatives that may lead to innovative ways of doing

work. In the strategy perspective, strategies are made deliberate before they are implemented. This suggests that top management takes the responsibility of designing strategies thus controlling the parameters in which implementation of strategies takes place (Mintzberg, 1990). Placing much emphasis on job descriptions also results in the segmentation of work and thinking. The concept of segmentation refers to a learning disability in the department, manifest in employee conduct which fails to take into account the general purpose of the department in relation to work, but only individual job descriptions.

Since scientific management derives its science from the discipline of science, causal factors tend to be investigated in a linear fashion. In this way, analysis is the preferred method of identifying causes. The relationship between cause and effect follows in series; the idea is to move backward in time series. The non-linear interactions that are propagated by systems and complexity approaches are considered relevant. It follows from thinking in series (linear thinking) that extrapolations about the future are based on the current state of the system as if the system does not change. Understanding the current state of the department is considered essential for predetermining the future.

### 2.3. *Strategic management*
The exploratory study on the use of complexity approaches in strategic management takes into account that the field of strategic management is broad and as such encompasses various thinking strands. The broadness of strategic management makes it difficult to derive any singular and unitary definition to reflect the entirety of the field of strategic management. Writers in the field of strategic management have attempted to provide a unitary definition and this has not yielded any noticeable success. Poister & Streib (1999, p.310) state that strategic management is *"...concerned with managing the organization in a strategic manner on a continuous basis."* David (1997,p.252) states that *" ...strategic management can be defined as the art and science of formulating, implementing and evaluating cross-functional decisions that enable the organization to achieve its objectives."* From the two definitions, it is clear that strategic management is viewed differently, with David referring to particular stages that characterise strategic management.

Much of the strategic management broadness as a field of study comes from the valuable use of strategic management in various fields of studies. Strategic management history suggests an entanglement across academic disciplines; this could be attributed to strategy being a matter that affects all facets of life from politics, business religion, philosophy, arts and many more. A reflection on the history of strategic management reveals that strategic management straddles many fields, including organisational science, sociology, philosophy and economics (Nag *et al*., 2007). It has been widely claimed in literature that unlike organisations whose scope and boundary can be defined on paper with clear jurisdiction, the same

cannot be said of strategic management as an academic field. The boundary of an academic field is largely determined through negotiation by scholars, such that if a majority of them agree on the nature of the field it also becomes possible to define the boundary (Nag *et al*., 2007). This suggests that there is no academic field which can act as a sole repository in the field of strategic management. To the benefit of this study, the fragmentation of strategic management will allow this work to draw from a rich tapestry of academic work which has been produced by various scholars in the field.

Among many issues that cannot escape this study, is the attempt to draw a link between the current strategic management practices and the historical evolution of strategy in organisations. Various studies agree that strategy gained prominence in the academe in the early 1960's (Faulkner, 2002; Mintzberg, 1990; Ansoff, 1991). Much of the current practices in strategic management by the public sector organisations build on the foundations laid by the prescriptive school. Whereas a lot has been written concerning the role of managers in strategy formulation, the design school firmly put managers as formulators of strategies and this is substantiated by the work of some leading writers in the design field (Ansoff, 1964; Ansoff and Brandenburg, 1971a; Ansoff and Brandenburg, 1971b). Notwithstanding that in recent times there is a growing skepticism about the efficacy of these schools, what is clear about the preceding referenced literature, is a clear commitment by these writers to contribute to challenges faced by managers and organisations alike in the workplace.

The idea of centralising strategy to a few individuals in the category of managers has since received much criticism from other scholars. Leading among the scholars who have critiqued the role assigned to managers, in particular Chief Executive Officers (CEO's), by the design school has been the school of strategy as emergence (Mintzberg, 1979a; Mintzberg, 1979b). This study also notes a contribution by Barney (1994 cited in McKelvey, 1999, p.298) who made an observation as follows "*...observed that firms are not just governed by one game run by the CEO but rather a myriad of games played throughout firms*". Even though the firm in reference from McKelvey is not a public organisation but a private sector organisation, the overriding principle is a common critique of the centralisation of strategy to a few individuals.

The designing of a strategy formulation process cannot be divorced from the leadership styles that leaders and managers exert in organisations. It is widely acknowledged in literature that managers still have a pivotal role in providing strategic leadership in organisations. In most cases, under strategic management, the strategic leadership that managers provide is expressed in strategic plans which in turn play some role in influencing the overall conduct of people in organisations (Burgelman and Grove, 2007). Exploring the management influence in strategic management processes will help this study to gain insight on the extent

to which insights on complexity approaches are embraced by management. The strategy making process is, among other things, supposed to help organisations develop new capabilities to deal with complex situations and be successful in the provision of services. Rapid change to develop new organisational capabilities has become a norm of strategic management against nonlinear challenges (Schreyogg and Kliesch-Eberl, 2007).

This study moves to focus on the debates around the credibility of deciding on a strategy on the basis of evaluating the organisation's strengths and weaknesses against opportunities and threats (SWOT) from the environment. There has been a wide ranging critique of this method, as derived from the design school, based on the increasing uncertainty posed by the environment, the cognitive ability of human beings, notably, to understand dynamic complex problems and the current theoretical assumptions in strategy formulation (Boisot and Child, 1999; McKelvey, 1999; Dooley and Ven, 1999; Levinthal and Warglien, 1999; Svyantek and Brown, 2000; Schneider and Somers, 2006; Jauch and Kraft, 1986).

Historical accounts point to a deliberate attempt in the academia in the early 1960's to infuse theory in the conduct of business as the business selects objectives albeit strategic objectives (Ansoff and Brandenburg, 1971a; Ansoff and Brandenburg, 1971b; Ghemawat, 2002). The resultant effect was that strategic objectives came to be decided through an elaborate process of subjecting the organisation through an evaluation of strengths and weaknesses against the environmental opportunities and threats. The critique of centralising the process of strategy formulation to a few managers remains an issue and takes a similar view expressed in preceding paragraphs.

A number of critical issues have been highlighted in the literature regarding the environment being evaluated in contrast to uncertainty. In earlier contribution on the subject of uncertainty, Cyert and March (1963 as cited in Jauch & Kraft, 1986, p.778) is quoted as follows *"...firms will devise and negotiate an environment so as to eliminate uncertainty...and make the environment controllable."* Clearly the assumption being made in the citation suggests that organisations have the capability to manipulate the environment in their favour. Cyert and March are not the only ones to have espoused this view, but accords with other prescriptions represented in the main by the design school. The promise of control over the environment has, however, remained elusive, as research is replete with examples of companies that have failed to survive the turbulences of the environment.

In recent times a number of findings have been made to suggest that in the United States of America (USA) less than 20% of companies that were listed in Magazines as in top hundred (100) in 1965 have survived (Burgelman and Grove, 2007). The phenomenon of companies becoming extinct is not only

limited to the US but extend throughout the world. Other scholars have sought to suggest why uncertainties appear to prevail over attempts at controlling the environment (Stacey, 1995; Stacey, 2003, Mintzberg and Waters, 1985; Morgan, 2006).

Attempts at understanding how management practices came to associate with a view that shapes life in the image of machines partly clarifies the SWOT dilemma associated mainly with the design school. It cannot be argued less that machines have transformed lives profoundly, raising humankind in productive capabilities to highs. It would seem that machines have inversely transformed humankind in ways of thinking to mechanical thinking. The traces of mechanical thinking almost pervade every facet of human life from political, socio-economic, thinking, feeling and emotions (Morgan, 2006).

In his observation Maxfield (1997) put mechanical thinking squarely at the door of Newtonian science; machines mainly developed out of knowledge emanating from Newtonian science. The underpinning assumptions of the design school about the environment within and outside organisations can be said to be derived from mechanical thinking. These assumptions are put succinctly by Maxfield (1997, p. 57) by suggesting that what is key to the operations of a machine *"...is that each part has a known, predictable behaviour in the system, and the connections of the parts results in the result for which the system is designed."*

The idea of a knowable behaviour in machines is thus imported in human life in similar ways to that of machines. At the other end of the strategic management field has been a growing multitude of perspectives that have sought to question planning based on the assumptions of certainty. The questioning is much evident in the work of Schreyogg and Steinmann (1987, p. 214) who claim that *"...one learns from daily experience that the future is foreseeable for a very limited degree...perfect or nearly perfect forecasts are impossible because the future depends upon actors who have considerable scope for choice."*

In the recent past, a number of journal articles (Milliken, 1987) have appeared attempting to highlight the underlying challenges behind individual's inability to predict accurately. Milliken (1987, p. 136) has offered a useful definition of uncertainty by stating that *"...uncertainty about the state of the environment means that one does not understand how components of the environment might be changing...also, the state of uncertainty may involve an incomplete understanding of the interrelationships between elements in the environment."* The strategic management field has overtime been seized with finding strategy formulation approaches which take care of the uncertainties in the state of the environment.

The idea of strategic control, among other approaches, has been welcomed by many in the field of strategic management as offering a plausible means to the state of uncertainty. In the paper written by Schreyogg & Steinmann (1987), a suggestion is made that strategic control should be taken as serving a "counter-balancing" activity for strategic planning. The writers seem to have concluded that strategic planning is an essential integral part of strategic management, but what seem to be issues of debate are the relevant approaches to deal with uncertainties. In order to minimise the effects of assumptions inherent in planning, some writers have advanced an argument for strategic monitoring dedicated to continuous monitoring of assumptions about the future, which are embedded, in strategic plans (Schreyogg and Steinmann, 1987; Eden and Ackermann, 1993).

### 2.4.    Systems Thinking Approaches

Whereas pure science as a discipline has helped us make progressive breakthroughs, in medicine, politics, technology and elsewhere, it has also brought to being serious limitations that are manifest in our behaviours. The practice in the science of breaking down things into indivisible elements in order to gain knowledge has become a way of life that permeates throughout organisations. It is a tendency in bureaucratic organisations for employees to describe the purpose of the organisation in terms of what they do rather than the general purpose for which the organisation exists (Senge, 2006). The former tendency suggesting that an organisation can be completely understood in terms of its components and the latter emphasising synthetic thinking, which is thinking in wholes. Systems thinking represent a movement that stresses on the principle of synthetic thinking as a way of understanding and dealing with complex challenges. The systems thinking movement is a diverse movement that represents a multitude of systems thinking approaches in dealing with complex problems. Most systems thinking approaches that have been commented upon in literature are those that look at optimisation of systems, understanding the structure of complex problems and improving control and communication.

The ideas on optimisation of systems are mainly represented by Operation Research (OR), Systems Engineering (SE) and Systems Analysis (SA). All of the mentioned approaches seek to deal with "real world problems" by, among other things, experimenting with problems outside the laboratories. Models are generated that seek to provide plausible solutions to real world problems. Although these approaches use models, they differ on the type of models they use.

Systems dynamics is a strand that focuses on understanding the structure of complex problems as a source of leverage. Structure relates to the interconnections between various variables of the system. Systems dynamics posit that the feedback loops in the structure of the system generates complexities in the system. Therefore its main focus is on the dynamic interaction in feedback loops. Once the dynamics of the

structure of the system is understood, it is then possible to decide on leverage points in the structure. Senge (2006) in *The Fifth Discipline* has developed a set of models that characterise typical complex problems in organisations.

Organisational cybernetics began as a science of control and communication in systems to deal with complex problems. Through the work of Stafford Beer (Jackson, 2003) organisational cybernetics later on developed into a science for effectiveness in organisations. Beer worked on the three concepts of earlier cybernetics; that is, black box, variety, and negative feedback to develop a model for organisational effectiveness. The variety principle refers to internal organisational capacity to match external variety in the environment. The black box principle propounds a perspective that what happens inside organisations is not easy to understand given the non-linear dynamics which are 'indefinable in detail' (Beer, 1959, p.04). Negative feedback refers to the ability of a system to correct deviations. Organisational cybernetics promotes a Viable System Model as a diagnostic tool and a basic architecture of organisational forms. Another one of the essential characteristics of an organisation is its innate ability to replicate itself through to its operational units.

Further work on systems thinking has focussed on the implications of the system being incomprehensible. Previous systems thinking approaches have been criticised for giving too much leeway to experts to determine boundaries of organisations. The consequent results of experts determining boundaries of organisations at times being the exclusion of important role players and leverages (Ulrich, 2003). By denying space to emancipatory ideas, systems thinking may tend to maintain the status quo. A systems thinking strand symbolised by Ulrich (Midgley and Richardson, 2007) emerges to emphasise the need to question the assumptions and values that embed anyone of the systems thinking approaches. Through Critical Systems Heuristics (CSH) of Ulrich, systems thinking place itself at the disposal of those who feel marginalised and those for reflective practice (Ulrich, 2003).

## 2.5. *Critical Systems thinking*

An inquiry to the challenging issue of how strategy is central to the organisational dynamics has been a burning issue in the academia throughout history. The work of Stacey (Stacey, 2003) provides an insightful understanding on the dynamics involved in strategically managing organisations; highlighting management practices and organisational issues that work to curtail change and others that promote innovation. In studying literature on strategic management, it would seem that writers have devoted much of their time writing from their philosophical outlook of the world (Jackson, 2001). Philosophy helps us to answer questions about the nature of the world, in particular, the relationship between ideas and reality.

Recent literature on strategic management suggests that there is a growing interest in integrating approaches across sociological paradigms.

Integrating various approaches from different paradigms has strengthened strategic management in that it has become possible for researches to borrow from all paradigms the methods and approaches that might be appropriate for strategic management processes in various organisational environments. Critical systems approach stands out as one of the important milestones in the systems thinking community to reconcile the various strands of systems thinking by providing an integrative theoretical framework which may be applied in various situations (Jackson, 2000). To this the strategic management field has been enriched with a repository of tools and methods coming from various strands for unraveling situations and application in complex situations.

### 2.6. *Complexity and Complex Adaptive Systems (CAS)*

In general, the word complexity has been used to refer to many things. Writers in strategic management have long referred to the phenomenon of complexity before the current established perspectives on complexity. In the earlier thinking on complexity some literature would describe complexity using terms such as uncertainty, mess management (Ackoff, 1981; Jauch and Kraft, 1986). In today's mainstream thinking, complexity refers to clear strands of thinking that share the same foundational knowledge on what constitute complexity. I refer to Dissipative Structures Theory, Chaos Theory and CAS as such theories that share the same foundational knowledge. In paragraphs that follow, I will discuss the general principles of complexity sciences with specific emphasis on CAS.

Unraveling the complexities of strategic management involves an assessment of interwoven variables and processes between people and their environment. Complexity science suggests the use of agent based models in order to mimic real life action of organisations facing complexities. A major difference between systems thinking approaches and complexity approaches rests on complexity approaches embracing complexity as an integral part of organisations. This requires a shift from static complexity, from understanding organisations as units, employees and hierarchies, to conceptualising organisations as a product of a limitless number of dynamic interplays that result in novel actions (McKelvey, 1999).

The issues of choice in strategy are central in strategic management as it reveals how the organisational dynamics are perceived in organisations. Complexity science offers an alternative approach of thinking, requiring a shift in assuming the problem situation can be known with certainty. The shift involves premising an understanding of organisations from the metaphor of a machine to that of CAS (Anderson, 1999b; Boal and Schultz, 2007; Holland, 1992; Boisot and Child, 1999; Lansing, 2003). The metaphor of

CAS is an attempt to illuminate organisational behaviour that is based on non-linear interactions that results in novelty.

In essence the focus is more on interplays as opposed to trying to break things down to smallest units in order to gain an understanding. Cilliers (2000, p.25) assists the study by highlighting that the reason for focusing on interactions is not merely for its own sake but informed by an understanding that *"...things happen during interaction and not in isolation"*. CAS seeks to enhance our understanding of change from mastery of a static environment to a fluid environment that encompasses humankind changing with the environment from within and without (Anderson, 1999b).

It is clear that, from the perspective of complexity, a problem situation cannot be fully understood given the complexities involved in the environment. In trying to know the problem situation, it would require a full view of all the interactions; such a view will be difficult given that it is improbable to know in advance the scale of interactions. Even if the scale of interactions were known, it is possible that by the time a strategic solution is found to a threat or an opportunity and or strength and weakness, the fluidity of the environment may be requiring new strategic solutions. Complexity writers like (Levinthal and Warglien, 1999; McKelvey, 1999) have used the term "fitness landscape" to characterise the intricacies involved in a journey to formulate and attain strategic objectives.

In the recent past, a number of complexity approaches have emerged to offer alternative ways of engaging with complex situations. Levinthal & Warglien (1999, p. 342) state that *"...by designing the surface on which the adaptation process take place, one may affect the quality of the adaptive process without the need to specify directly individual behaviour."* The designing of the surface takes the form of focus on the dynamics of interplays manifest in behaviour during the adaptation process as opposed to identification of objectives an organisation seeks to attain. Complexity science argues that in "rugged landscape" actors are only capable of understanding their immediate surroundings (Levinthal and Warglien, 1999).

It is also suggested by (Levinthal and Warglien, 1999) that rather than focusing on hierarchical designs of interaction organisations should move towards fostering "cross functional interactions". Such a fostering of distributed intelligence can be done through the devolution of control to where implementation takes place. It is also acknowledged by literature that subsystems within a bigger system have their own unique potential to produce strategies through interactions and interplays with their environment (de Rond and Thietart, 2007).

It is further suggested by writers that evidence emanating from complexity research posits that agents (individuals) in simulations operate using their own localised rules. The insight on research about agents using localised rules has steered a case for organisations to relax operating rules such that individuals can be responsive to environmental changes. The role of a leader (CEO) thus graduates to influencing and enhancing healthy interplays in the department. This point is further elucidated in Marion & Uhl-Bien (2001, p.196) in stating that leadership under complexities *"...involves creating the conditions that enable productive, but largely unspecified, future states".* Literature suggests that leadership should be viewed differently from affection to focusing on how to foster distributed intelligence (Marion and Uhl-Bien, 2001).

The issue of individuals operating using their own rules is a principle emanating from research models of complex systems (Tilebein, 2006). Tilebein (2006, p.1092) states that *"...in management science, agents equivalents can range from individuals to firms."* In organisations it is common practice that rules of behaviour are prescribed in policies and standard operating procedures, but complexity science goes beyond such rules to include unique individual rules that govern their behaviour. These rules are not to be known unless there is a deliberate attempt to surface them. There is always a danger that if these rules are not tested from time to time an organisation may not understand what has emerged behind the shadows.

A shadow organisation is a product of informal dynamic interactions and does not form out of the formal rules that are found in organisations such as those mentioned above (Stacey, 1995). Stacey (1995, p.485) suggests that *" ...for an organisation to be changeable its shadowy, invisible informal system – the shifting network of social and other informal contacts between people within an organisation and across its boundaries – must operate in a state of bounded instability."* It is therefore critical that emergent properties are surfaced because they also represent novel behaviours which influence the shifts in the landscape.

The principal question for strategic management is how it ensures that both formal and informal operations are kept in check. A number of methods and approaches have evolved over time in the strategic management field, to foster learning in organisations. Strategic management also involves strategic planning and strategic thinking; strategic planning is linked to reflecting in action and strategic thinking is concerned with thinking on action required for learning organisations. Strategic planning and thinking is part of the strategic management iterative process requiring managers to review performance on a regular basis or for a specific period, for example, weekly, monthly, quarterly and yearly. Such

performance reviews entail evaluating actual experience, reflecting on under or over achievements and extracting lessons, taking corrective or remedial action where required.

Much has been highlighted that strategies emerge in organisations not by the interactions of a few in organisations but by the interactions which involve everyone. Individuals in organisations have innate abilities to adapt and respond to situations guided by their own understanding of the environment and as such they contribute in their own way in finding a strategic fit in an organisation. It is also acknowledged by literature that subsystems within a bigger system have their own unique potential to produce strategies through interactions and interplays with their environment (de Rond and Thietart, 2007). In essence the top down approach is not the only way in which organisations can derive strategies but strategies also emerge bottom up, much in contrast to the views of those who hold the world view of mechanism.

The CAS metaphor has opened much exploration about how self organisation can manifest in social organisations. In the organisational learning community, the concept of self-mastery has been used to illuminate how self organisations take form in people (Huston, 2007). Huston (2007, p.27) describes the concept of self-mastery as follows:

 *"...always there, this invisible power within us – it appears suddenly, often unexpectedly, and then retreats again. But it's there. We've all experienced times of crisis when we and others have tapped into this source to do and be in ways we never thought possible. What's more, this source somehow allows us to take significant collective action in the absence of any structure, authority, rules and preordained roles..."*

A recent upsurge interest in organisational strategy has sought to look at strategy as a practice, suggesting that attention needs to move strategy to understanding what individuals do (Grand and MacLean, 2007). Interests in what individuals do suggest an increasing role for researchers as observers of what individuals do and also the facilitation of dialogues where such individuals converge to share insights on what they do. In a paper written by Cilliers (2000, p.25) it has been highlighted that the history of an organisation co-determines its nature and he further states that such a history is located in "…*all the individuals little interactions that take place all the time…"*. Strategic conversations can assume a central role in encouraging dialogues within an organisation. Various organisations have used scenario planning in strategic management as a means to encourage such conversations (Grant, 2003).

Since strategic choices involve selection (de Rond and Thietart, 2007), the likelihood of human errors, such as misrepresentation and exclusion of issues considered to be unimportant, in the selection process

cannot be guaranteed. There are various approaches which have been emerged in the strategic management field to attempt to deal with uncertainties. One of the approaches which appears to be popularly in use in strategic management is scenario planning. Scenario planning has proved effective in some organisations studied by Grant (2003) that have had to innovate planning under turbulent environments. Grant (2003, p.4) has described scenario planning as *"...not so much the creation of strategic plans as establishing the process of strategic thinking and organizational learning…"* Scenario planning is concerned with what Senge (2006) calls "learning disabilities" which are very much a part of public sector organisations since most are steeped in bureaucratic forms of organisation.

Public sector organisations operate in an environment where they have to interact with interest groups. The strategic management process has to provide for stakeholder involvement on issues of common interests. Managing partnerships becomes one of the responsibilities that managers have to contend with in strategic management. It becomes critical that the organisation utilise approaches which take into account the plurality of views that stakeholders have. The increased complexity that is added by the involvement of stakeholders could result in what Cilliers (2000a) calls self organisation to a "critical state." A critical state occurs when an organisation co-evolves with its environment such as stakeholders to the detriment of its well being. Jackson (2000) has provided insightful ideas through critical systems thinking.

The management of public policies is one of the core mandates of public sector organisations, thus a need to treat policies as critical artifacts that can influence the direction of strategies. It has been mentioned earlier when discussing scientific management that too much rules can inhibit adaptation. Complexity science is in contrast to scientific management in recognising that the behaviour of open systems is influenced by the interactions. In so far as the interactions are linked to rules, complexity science advocates the use of minimal rules (Anderson, 1999).

### 2.7. Conclusion

It is clear from the narration of various strategic approaches above that there is a lot in strategic management which has been done to develop models and approaches in the field of complexity. Complexity sciences is an emerging science that offers a lot in models that can help strategic management practitioners to use applied knowledge and skills from the field. It is also clear that recent information on critical systems thing provides a much needed intervention to consolidate systems thinking approaches for use in different context. Scientific management still has an important role to play although its use in complex situations has proven to be ineffective hence the development of other management approaches.

# Chapter 3 : RESEARCH METHODOLOGY

## 3.1. Introduction

Insights from studies on complex systems points to a need for constant exploratory studies in organisations to determine how well organisations are responding to complexity. The increasing complexity has galvanised organisations to adopt new approaches against traditional approaches premised on the ideal that the environment is always predictable and controllable. As an alternative to the premises of traditional approaches, a growing literature on leadership, management and organisational studies posits that the world is both knowable and unknowable to the extent that the environment is able to impose its constraints to human knowing and understanding (Baskin, 2004; Cilliers, 2000a; Mowles *et al.*, 2008; Heather and Matilal, 2005; Ring and Perry, 1985). Complexity science seeks to look at the challenges associated with knowing and understanding the unknowable by looking at the interactions in systems. The properties of complex systems in turn provide lessons that can be transferred to the field of strategic management in a form of approaches to deal with complexity.

The formulation and implementation of strategies becomes challenging under complex conditions as organisations have to deal with a number of characteristics that are manifest of complexity. The characteristics of complexity are presented in strategic management literature under many names such as ambiguity, uncertainty, turbulent, unpredictability, messy, fuzz and chaos, complex adaptive systems and many more (Jauch and Kraft, 1986; Grant, 2003; Morcol, 1996; Ackoff, 1981; Boisot and Child, 1999; Ansoff, 1964). Strategic management literature has responded to the challenge of complexity in varied ways through methods, techniques and models for improving survival capacity in complex conditions (Bracker, 1980; Poister and Streib, 1999; Cauwenbergh and Cool, 1982; Stacey, 2003).

## 3.2. Adopting an approach for intervention

The assumption made by the study was that the problem context of the organisation is complex and requires the use of complexity approaches. By the exploring the use of complexity approaches as a topic, the study was concerned with systems thinking ideas that are meant to deal with complex problems. In this context complexity science was considered to be within an envelope of systems thinking ideas that seeks to offer practical solutions for dealing with complexity (Zhu, 2007).

Much as complexity science assumes the world in concrete terms, complexity science wishes to achieve a place for human kind as having the capacity to make sense of their own environment based on people's

perceptions (Anderson, 1999b). Various studies have given credence to the qualitative methods of study as capable of providing insights based on perceptions from people and approaches that can be applied to complex situations in order to make sense of interplays (Narayanan *et al.*, 2000; Svyantek and Brown, 2000; Chan, 1993).

It has been mentioned that organisations possess the capabilities to respond to complex situations; responses to complexity could depend on what concepts and/or images of the situation are invoked. In appreciation of the approaches to be explored by the study, complexity science provides a basic set of principles that inform complexity approaches, and these principles were taken into account in seeking to understand complex challenges. The first of these principles seeks to point to our limited abilities to rationally comprehend situations before us. Secondly, that individual choice plays a significant role in shaping complexity. Lastly, that people tend to assume things differently and thus act differently.

Furthermore, strategic management activities take place in an environment which has been metaphorically characterised, by complexity science, as explained by CAS (Dooley and Ven, 1999; Anderson, 1999a; Holland, 1992; Stacey, 1995). Since CAS emphasises diversity of thinking, each agent's movements are infinite and as such causing constant changes in the environment, searches for adaptation and emergence. Along the same line Tilebein (2006, p.1088) describes CAS as follows: *"...according to complexity science, a CAS typically shows two kinds of emergent properties: spontaneous order due to interactions of system elements, and innovation due to evolution over time. This is why CASs are able to emergently change, adapt and (co-)evolve in harmony with their changing environments..."*

3.3. Research method

This is a qualitative study which embraces critical systems thinking as the core approach from which ideas that frame the research are selected. Critical systems thinking and a qualitative approach are not diametrically opposed; instead they have much in common for application in research studies. Critical systems' thinking is flexible and allows for adaptation to take place on the selection of methods, techniques and tools, that is, depending on the requirements of the changing environment (Jackson, 2000). Along the same lines (Ambert *et al*., 1995, p. 881) suggest that *"...qualitative family research is a broad term that covers a range of diverse epistemological assumptions and approaches, from the classical to the postmodern, from the interpretive to the structural..."*

Recent studies in qualitative research have contributed in providing this study with valuable insights for employing qualitative research in studies (Jacob, 1987; Ambert *et al*., 1995; Flick, 2009). Qualitative research provides the study with ideas on how to concentrate and probe on individual details. In addition, qualitative research provides ideas of gaining knowledge through direct interaction with people in their work environment. Qualitative research provides for a two way learning processes where the researcher and the researched could shift their boundary judgments as and when new facts of the situation emerge.

Critical systems thinking is multi-disciplinary; it recognises the importance of social science in helping systems thinking approaches locate the assumptions that are made in adopting any systems approach to organisational challenges and the systems practitioner's own need to reflect on their practices (Jackson, 2000) . In addition critical systems thinking as espoused by Jackson (2000), provides tools that can be used to classify problems is six quadrants, *viz*., simple-unitary, simple-pluralist, simple-coercive, complex-unitary, complex-pluralist and complex-coercive. In this way, critical systems thinking promotes reflective practice by stressing on the need for "critical awareness" as an approach to knowing what systems ideas are best suited for what social paradigm and social conditions (Jackson, 2000).

3.4. Data collection

Data collection methods from this study included: interviews with officials from the department, collection of documented data from the department and other sources outside the department, and observation using a wide range of techniques that can be employed to come closer to understanding the department. These techniques included participation in the activities of the department, interacting with documented data and observation during interviews. Since data that was collected concerned a subject field (strategic management) which the study considers to be vast, an attempt was made to focus on topics considered to be common in organisational settings.

In the selection of common topics, the study considered the work of Poister and Streib (1999), David (1997), Cauwenbergh and Cool (1982), Montanari and Bracker (1986), Mintzberg (1990) and Ansoff (1991) in conceptualisation of strategic management. What the study observed from reading the abovementioned literature was that the study's selected topics, however incomplete, are not excluded from the discourse of strategic management. The topics form part of what in strategic management would be referred to as making strategic choices (de Rond and Thietart, 2007). The topics in Table 3-1 below provided a structure that was used to link the kinds of questions the study sought to answer and complexity approaches that are found within the theories of strategic choice (Stacey, 2003).

| TOPICS TO BE COVERED | KINDS OF QUESTIONS TO BE ASKED |
|---|---|
| 1. Aligning policies and processes to achieve organisational goals. | A. What practices inform strategic management in the department? |
| 2. Identifying and communicating priorities throughout the organisation | What are formal routines followed in strategic management when strategising? How useful are the routines followed in strategic management to addressing the challenges of the organisation? |
| 3. Gathering data for planning purposes | |
| 4. Compilation of strategic and operational plans | What approaches are employed to control the attainment of set targets? |
| 5. Target setting, implementation gaps and resource targeting | How do individuals perceive their roles to be and that of top management in strategy formulation and implementation? |
| 6. Maintenance of matrix relationships | |
| 7. Implementation of strategic and operational plans | B. What are the obstacles to innovation, creativity and adaptation within the strategic perspective? Are there contextual factors which may impede innovation, creativity and adaptation? |
| 8. Monitoring and reporting of performance towards the attainment of strategic and operational plans. | How are divergent interests, unique to individuals, catered for during the formulation and implementation of strategies? |
| | C. To what extent do the department strategy-making practices align to insights on complexity? |
| | D. What changes to the strategy-making practices may be appropriate in the context of complexity? |
| | Are there instances of informal day to day interactions which have stabilized to form routines that can be aggregated to strategies? |
| | How have strategies based on shared ways of behaving, thinking and acting emerge and change? |
| | To what extent do the interviews, observations and documents account for the properties common to all complex systems? |
| | What explanations are provided regarding the make-up of the department? |
| | How are interactions encouraged through strategic management in the organisation? |
| | How does strategic management respond to a perspective that the rules of interaction at micro-level can affect the behaviour of individuals? |
| | How is the department able to handle, through strategic management, small scale changes which can trigger large scale changes? |

**Table 3-1: Topics to be covered and research questions**

Research informs that the capacity of organisations to respond to complexity may be determined by conceptual models that operate and inform activities of an organisation. This view has also been supported in the work of Morgan (2006) by providing an insightful understanding of some metaphors that can be found in organisations. Since there is a possibility that more than one metaphor can be found to exist in an organisation, this has raised an interest for this study to identify which metaphors dominate the department.

Since complexity science can provide information and knowledge of agents' interactions, it was critical to understand the dynamics which may be involved in the interactions of agents. It has been widely claimed in literature that organisations can benefit from the insights of complexity science (Levy, 2000; Cilliers, 2000a; Heylighen *et al.*, 2006; Stacey, 2003). The recent studies in strategic management, inspired by the

Complex Adaptive System (CAS) metaphoric approach to organisational complexity, have galvanised the use of complexity approaches in organisation (Tilebein, 2006). The insights from CAS were be used to form a critical aspect in the data collection approach of this study.

Since government organisations are constituted among other things to serve a delivery of specific services to the people, such as in education, health and welfare. It is a well recognised norm that public institutions like the department perform their duties regulated through legislation, policies and procedures. Much has been written in literature about public policy and administration, which points to these artifacts as central to the business of organisations, and public sector organisation being predominantly steeped in the traditional mechanical thinking (Ring and Perry, 1985; Poister and Streib, 1999; Miller, 1989). In mechanical organisations, Gharajedaghi & Ackoff (1984, p. 291) state that *"… judgment is further reduced by establishing policies that offer virtually no choice except to determine which policy applies at which situation…"* It was an interest of this study to establish how policies in the department apply in complex situations.

3.5. Research questions

Since it was a focus of the study to explore the use of complexity approaches in strategic management by the department, to achieve the focus of the study, four primary research questions have been developed as follows:

 1) What practices inform strategic management in the department?

 2) What are the obstacles to innovation, creativity and adaptation within the strategic perspective?

3) To what extent do the department strategy-making practices align to insights on complexity?

4) What changes to the strategy-making practices may be appropriate in the context of complexity?

Further from the primary questions, the study provides subsidiary questions to come closer to the issues of focus pertaining to strategic management by the department. The subsidiary questions are dealt with in some detail in the paragraphs to follow.

To answer the first question the study looked into practices by the department in use to bridge the gap between the projected future state and what obtains as a baseline. The understanding of practices was treated as twofold, that is, involuntary practices constituting routines emanating from the formal procedures from top management, and practices as routines emerging from what people do based on day to day strategic interactions. The latter practices as routines are described by Campbell-Hunt (2007,

p.796) as *"…larger groupings of interdependent social activity repeated overtime and serve to bring order to the milieu of practice…"* The study took a view that the dichotomy on practices is between practices that:1) Emerge based on what people do at a micro-level in the process of production and 2) Practices that are deliberate at a macro-level which tend to fulfill the desires of top management. The research question seeks to respond to the two dichotomies.

Since practices are also regarded as being situated on a limitless social context (Campbell-Hunt, 2007), it was critical to bind practices by means of secondary questions as sub headers to the four main research questions. The forthcoming questions in this paragraph dealt with issues which are interrelated to the first research question on practices that inform strategic management:

a) What are formal routines followed in strategic management when strategising?
b) How useful are the routines followed in strategic management to addressing the challenges of the department?
c) How do individuals perceive their roles to be and that of top management in strategy formulation and implementation?
d) Describe any emerging practices within the strategic management perspectives?

Flowing from the first set of question, the study looked for descriptors which may point to factors which impede the formulation and implementation of strategies to support and encourage innovation, creativity and adaptation. In attempting to answer the second question, which deals with obstacles to innovation, creativity and adaptation it became necessary to break down the question into the following:

a) Are there contextual factors which may impede innovation, creativity and adaptation?
b) How are divergent interests, unique to individuals, catered for during the formulation and implementation of strategies?

Recent studies have highlighted a growing interest in strategic management literature in exploring human capabilities in the formulation and implementation of strategies (Lansing, 2003; Boal and Schultz, 2007; Holland, 1992; Tilebein, 2006). Among the many studies on strategy formulation and implementation, complexity theory has delved into the complex nature of human interactions; the complexities that arise from human feelings and interpretations of the perceived environment by individuals and organisations alike.

Recent studies in complexity science suggest it is possible to encourage innovation, creativity and adaptation by focusing more on the nature of human and organisational interaction instead of strategies

driven by formalised plans. Complexity science offers an ideal model of CAS from which an understanding, of some of the governing principles that takes place in human beings and organisational interactions are explained (Holland, 1992; Cilliers, 2000a; Heylighen *et al.*, 2006; Campbell-Hunt, 2007). It became critical for this study to explore the use of complexity approaches by including the perspectives emerging from an understanding of CAS. The focus on human and organisational interactions also led to an understanding of how mental models, beliefs, perspectives, formal and informal relationships between individuals and groups shape organisations.

In line with complexity science it was necessary to ask specific questions, linked with insights from complexity sciences. These questions were identified as:

a) Are there instances of informal day to day interactions which have stabilized to form routines that can be aggregated to strategies?

b) How strategies based on shared ways of behaving, thinking and acting emerge and change?

c) To what extent do the interviews, observations and documents account for the properties common to all complex systems?

d) What explanations are provided regarding the make-up of the department?

e) How are interactions encouraged through strategic management in the department?

f) How does strategic management respond to a perspective that the rules of interaction at micro-level can affect the behaviour of individuals?

g) How is the department able to handle, through strategic management, small scale changes which can trigger large scale changes?

3.6. Interviews

The semi-structured interviews were designed to encourage unhindered, free interviewee participation. The aim of the interview process was to gain interviewees perceptions of strategy and associated approaches used in strategic management. The interviews were ensconced in the four research questions. Interviewees were asked to talk about:

- Their understanding of practices that inform strategic management in the department.
- Their perceptions of what could be obstacles to innovation, creativity and adaptation within the strategic perspective.
- Their perception about the extent to which current strategic management practices align to insights on complexity.

- Suggest appropriate changes to the strategy making practices in the context of complexity.

The interviewees comprise of four main categories of functional units at Head Office, that is, Finance, Planning and Support, Human Resources and Service Delivery Management. To ensure an in-depth study, the interviewees comprise of officials from Head Office functional units. The interviewees came from the following functional units:

- Strategic Management Support
- Monitoring & Evaluation
- Education Management Information System
- District Strategic Planners
- Development Planning
- Special Needs Education
- Assessment Services

Data was gathered by using open ended semi-structured interviews, participant observation and documents. Data gathering involved, semi-structured interviews, participant observation and documents read to avoid possible biases that could potentially result from the use of single sources. The process of using three data sources is a normal practice in qualitative studies, which is defined as triangulation (Bradley, 1993; Creswell and Miller, 2000). Since the researcher is an employee of the department, it became clear that arising from the researcher's involvement with the department, the study had to be aware and devise strategies to manage possible biases.

3.7. Documents read

The process of deriving strategies by the department was influenced by a number of factors, some of which were not located inside the department. For example, the national government plays a critical role in ensuring that the selection of strategies is context bound. In order to mitigate the element of human bias, which is always there when perceiving the world, documented data helped to corroborate some of the articulations during interviews.

Documented data played a critical role in unfolding the historical context of the issue of study. A wrong conclusions based on the lack of information by interviewees was avoided by pointing to existing information on documented data. Documents that were selected were described and justified for their relevancy with the research questions.

The researcher looked for documents which contain official positions, opinions and comments about the research questions. The specific documents in mention were minutes from strategic meetings, opinions and comments expressed in papers, policy documents on strategic management, discussion papers, legislation and government gazettes.

## 3.8. Observation

Observation took the form of participant observation. Denzin (1989 cited in Flick, 2009, p.226) defines participant observation as *"... field strategy that simultaneously combines document analysis, interviewing of respondents and informants, direct participation and observation, and introspection."* The focus of observation was on the descriptive cues and activities that happen live which help the study respond to the research questions. Field notes were taken from observation and recorded in a journal.

## 3.9. Analysis and interpretation

This study used metaphors to conduct analysis and interpretation aimed at unmasking the underlying paradigms and ways of doing things in strategic management in the department. Since the word paradigm has many meanings, this study used this word to denote what Morgan (1980) refers to as "explicit and implicit" assumptions held by the department through its artifacts and articulations about the nature of things. The use of metaphors was not without its own challenges of ontology and epistemology: Palmer and Dunford (1996) have highlighted the need for researchers to be critically aware of both ontological and epistemological challenges involved in surfacing assumptions.

The study relied on transcription and summarisation of tape recorded interviews to analyse and make interpretation of existing data. The aim of this exercise was to look for themes that were emerging from the interviews. The aim of observing situations was to find out how people in the department came to take actions which were then summarised in an issues log. The results from interviews, secondary data and observations were organised according to emergent themes and surface meaning.

The study derived meaning of data by contrasting metaphors with the relevant extracted data from sources. Relevancy was decided based on whether the extracted data from sources responded to the research questions in a valid way. Validity in qualitative studies presupposes among other things that a search for converging topics has been undertaken using triangulation. The table below represented as Table 3-2 Analysis and Interpretation Consolidation tool, is an illustrated example of how meaning derived from the interaction of source data and metaphor was used to suggest the dominant paradigm. The

equations suggested by Table 3-2 can be represented as follows: Extracted data from source and metaphor equals meaning.

| Research question: What practices inform strategic management in the department? | | |
|---|---|---|
| EMERGING ISSUES FROM RESEARCH | METAPHOR | MEANING |
| 1. The KZN DoE is mandated in terms of treasury regulations to produce and table a three year annual Performance Plan (APP). The APP must outline what it intends to achieve in a given financial year. It has to set targets for the three year period" | **Mechanism** | The rules and regulations define how strategic management issues are dealt with in the Department. |

**Table 3-2: Analysis and interpretation consolidation tool**

A critical question which this study sought to answer was how dominant paradigms were to be linked to meaning. This is a process which Anfara Jr *et al*., (2002, p.31) describes as *"…bringing meaning, structure and order to data"*. Each research question was allocated a code for referencing. Input from source documents was allocated a unique identity numbers for control purposes. In phase 2 the researcher independently analysed documents for key phrases and sentences that respond to primary and secondary research question. In phase three phrases and sentences that respond to the same question and source type were grouped together. In phase 4, the process continues as described in the preceding paragraph as illustrated in Table 3-2.

| Phases | System description of activities in the process | Objectives (To ensure that there is an audit trail.) | Description of key controls that address objectives | Name or description of system used |
|---|---|---|---|---|
| Phase 1 | The researcher ensures that each source document was allocated a reference code. | All source documents were recorded on the relevant system | Input sources documents were allocated unique numbers in sequential order.<br><br>The codes generated in the electronic system were recorded in all hard copies. | Microsoft Access Database system. |

| | | | |
|---|---|---|---|
| Phase 2 | The researcher independently analysed documents for key phrases and sentences that responds to the research questions. | All key phrases and sentences of the same source type were recorded on the relevant system | Input phrases and sentences were allocated unique numbers per each extract.<br><br>Reference page numbers of each data source are recorded in the electronic system. | Microsoft Access Database system |
| Phase 3 | A print-out from Microsoft Access Database system of the input from phase 2 is generated.<br><br>Phrases and sentences that respond to the same question and source type are grouped together. | Consolidated information was recorded on the relevant system. | A record of grouped phrases and sentences was generated. | Microsoft Access Database system |
| Phase 4 | A print-out from Microsoft Access Database system of the input from phase 3 was generated.<br><br>The process outlined in Table 3-2 commences. | All input document were recorded on the relevant system | A summary sheet in Table 3-2 was produced. | Microsoft Access Database system |

**Table 3-3: Process flow leading to Table 3-2**

One critical aspect in qualitative research when doing analysis involves searches for convergences of issues, themes and categories among different sources of data. This study argues, in similar ways to the work of Morgan (2006) and Jackson (2000), that all kinds of data sources are linked to world views. Locating the social paradigms from which issues, themes and categories are based assisted the study to unmask the hidden and unknowable facets of the situation (Heather and Matilal, 2005).

In the recent past, a number of articles have appeared in academic journals on the subject of metaphors (Morgan, 1980; Jacobs and Heracleous, 2006; Palmer and Dunford, 1996; Morgan, 2006). Metaphors can be used as a tool to surface assumptions embedded in the production of knowledge and ideas (Morgan, 2006). However powerful metaphors can be, they remain limited to providing partial explanations (Morgan, 1980). Palmer and Dunford (1996) offer a useful guidance to this study by highlighting the ontological and epistemological challenges of metaphor usage that organisational analysts need to be aware of. The study pays attention to the challenges highlighted by Palmer and Dunford by reflecting on the ontology and epistemology of the approach to analysis and interpretation. Reflecting on the ontological and epistemological challenges, is important to avoid what Palmer and Dunford (1996, p.702)

refers to as *"...neglect of the assumptions in the adopted approaches and the manner in which these assumptions can conceal blind spots in 'the' research outcomes."*

3.10. Determining validity

Various studies agree that the claim to have used a qualitative research approach would stand or fail the test of credibility on the basis of its accuracy in representing the views of the researched (Creswell and Miller, 2000). In the same line, qualitative research scholars have proposed a procedure called triangulation as a means to establish validity. The triangulation procedure involves a researcher using at least three different sources of information in a similar way to this study, such as interviews, observation and documented data. The triangulation is deemed to be a success when common issues, themes and categories are established from the different sources (Creswell and Miller, 2000; Bradley, 1993). This study ensured validity by performing searches for issues, themes and categories related to the research questions and study topic from data obtained from interviews, documents and observations.

As much as the study intended to stay on the field of research for a period of 4 months, it was flexible on time to allow the researcher to revisit the field to acquire more information provided there was a need for additional samples to establish persuasive narratives. The study sought to validate the final account of events after transcription as interpreted by the researcher from the interviews by referring them back to the informants to confirm whether they represent a true reflection of what transpired during interviews. Viewing of data by respondents facilitated validity checks and comments from participants. Comments emanating from validity checks by participants were incorporated into the final narrative.

A journal where all incidences related to the research are recorded is kept by the researcher. All the documents that were used, during the study, are preserved in the event of an external audit.

3.11. Limitation of the study

Since the study was planned to take approximately 12 months on the field, limitations were placed on the number of people interviewed, observed and the size of secondary data consulted. Understanding that the department has more than 110 000 employees and more than 15 000 managers, it was to be satisfying to cover all the layers in the department management hierarchy in order to make a far reaching impact. However, a small sample does not necessarily translate to less time but large volumes of data that must be analysed. If the research were to be enlarged to include more samples, it would require more time and resources beyond the capacity of the researcher. This accounts for the reasons why the study was only

limited to officials at Head Office in the department. Nonetheless future studies may need to consider the final product of this study as a steppingstone to a much wider focussed research.

The officials of the department are not specialists in the field of strategic management and hence may not be familiar with the jargon used in the strategy field. In the event the researcher found that during interviews the flow is hindered by strategy jargons, the researcher intervened and provided clarity. Care was taken to ensure that the voice of the interviewee is not lost during the process.

## 3.12. Delimitations

Interviews minimally involved the researcher clarifying certain concepts; there was a risk that objectivity could be lost in the process. The approach of triangulation by means of interviews, observations and secondary data analysis was employed to minimise subjectivity.

# Chapter 4 : ANALYSIS AND FINDINGS

---

4.1. Introduction

This chapter is divided into five sections. The first section provides a brief overview of how data was collected. The second section offers an analysis, interpretation and findings on strategic management practices, which the study finds prominent in the organisation of study. In the second section, the study utilises metaphors to provide interpretation of sources. The section discusses in general the strategic management approaches which the study finds prominent in the department. The third section discusses obstacles to creativity, innovation and adaptation as suggested by the analysis of sources. In the fourth section the study highlights the complexity approaches which emerge in analysing source materials of the organisation of study. The section draw its findings from sources and relates the findings to insights from complexity approaches as discussed in Chapter two of Literature Review. In the fifth section, the study provides a brief conclusion of this Chapter.

4.2. How data was collected

Data was collected over a period of twelve months. The approach to the collection of data involved interviews, document reading and the recording of observations in journal. In the first step, eleven people from the department were interviewed. Those interviewed included eight (8) people from Head Office and three (3) people from Districts. The people from districts were selected from a group of district planners who sit in the District Planners Committee that is co-ordinated at Head Office. The main task of the District Planners Committee is to compile district operational plans, operational reports and conduct performance reviews. The meetings of district planners are co-ordinated by the Head Office Planning Chief Directorate and the Service Delivery Branch. The latter is responsible for compilation of operational reports and operational plans while the Chief Directorate Planning is responsible for performance reviews. All interviews were recorded in an audio tape and later transcribed. The results of transcription produced hundred and forty six (146) pages.

Data collection also involved the reading of documents from multiple sources. The document read includes reports, plans, speeches, power-point presentations and policies. Figure 4-1 below describes the information finds in the documented data sources from the organisation of study. Other documents read but not mentioned assisted the study in making observations.

The researcher worked through metaphors identified by Morgan (2006) to interpret raw data from sources. The most prevalent metaphors that could be found by the researcher are mentioned in Figure 4-1 below. The method used in identifying what the researcher considered to be relevant metaphor for an extract is dealt with in Chapter 3.
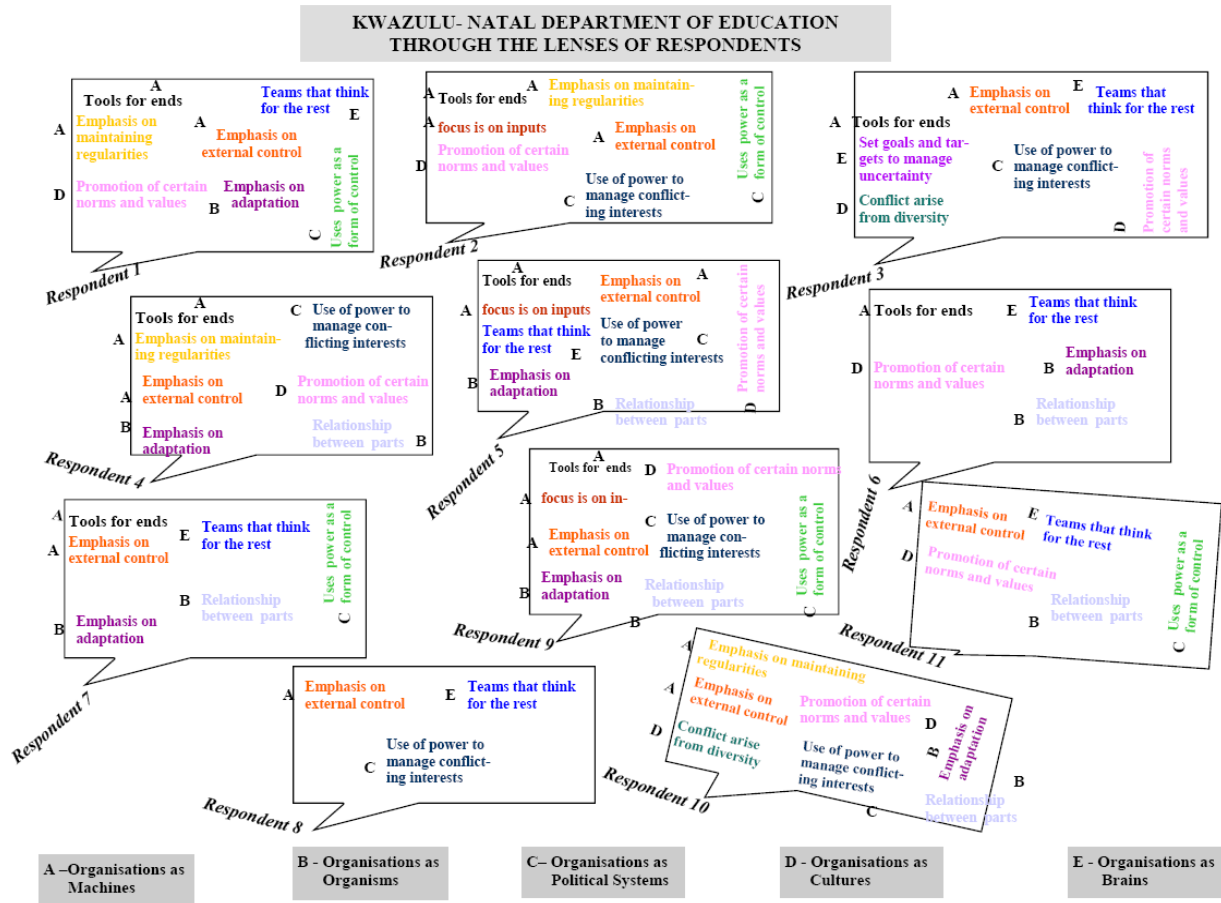


**Figure 4-1: Meaning attributed to metaphors in the department**

The study approached the question of interpreting data by searching for prominent metaphors that relates to the research questions. Information extracted from the original sources has enabled the study to define and understand the prominent metaphors in the organisation of study. In a total of sixteen sources which includes interviews and document read, the study finds five metaphors to be the most prominent in the department. The most prominent metaphors, as illustrated in figure 4-1, are mechanical, political system, brain, organismic and culture.

4.3. Practices that inform strategic management

4.3.1. The mechanism metaphor

The findings show that the mechanical metaphor is one of the central metaphors that are found in the department. Studies on strategic management suggest that organisations that relate to the machine metaphor are designed and operated using the principles that informs the workings of machines (Gharajedaghi and Ackoff, 1984; Machamer *et al.*, 2000). Organisations that are predominantly designed on the principles of machines are called bureaucracies (Morgan, 2006). By bureaucracy, I refer to organisations that emphasise accuracy, consistency, speed with which things are done, fixed principles for doing things and efficiency. In analysing data from interviews, four themes from the mechanical metaphor emerged, *viz.*, tools for ends, maintenance of regularities, focus on inputs and external control.

Some of the elements that I referred to as found in bureaucracies are illustrated in the Operational Plan of the department. The operational plan forms the third tier of accountability documents in the department. It defines how the department will operationalise its strategy along its organisational units in order to achieve outputs identified in the strategic plan. The structure of the operational plan is represented in Table 4 below. In observing the operational plan, one gets a picture of how the department pursues the attainment of the strategic goals, objectives and the vision; this pursuance is done in a manner that resembles the operations of a machine. The point about the department pursuing its operations corresponding to machines is dealt with in paragraphs to follow.

| Strategic Goal | Strategic Objective | Schooling 2025 Goals and Indicators | Activities | Performance Indicator / Targets | Time Frame | Budget |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |

**Table 4-1: Illustrative example of the Operational Plan in the department**

The study finds that key to the attainment of strategic goals and objectives in the department are the activities. Activities are meant to result in the attainment of strategic objectives which in turn take the department closer to achieving strategic goals. It is generally known that automated machines perform the role of producing results. However, in bureaucratic organisations, results are produced by people through activities and therefore people assume the role played by machines. It is therefore assumed in organisations as machines that change will result if the persons provided with the responsibility for activities do the activities as expected (Machamer *et al*., 2000). According to this view, doing the activities as expected is supposed to imitate a precision found in machines.

Also, it is expected in organisations as machines that specific activities get allocated to specific operational units. In this way, when an activity is not done it is easy to point out the operational unit that failed to perform. The operational units are expected to do activities with regularity. The regularity principle also serves as a pointer to possible dysfunctions. The role of operational units of the department is almost similar to that of a mechanical part which performs designated activities. In machines each part performs its specific role and when malfunctions occur it becomes easier to troubleshoot where the problem may be coming from.

One of the findings in Table 1 and on documents read (Task Team report on restructuring) points to the department's strategic approach being focussed on inputs. With regards to the strategic focus of the department being on inputs, the Task Team Report on restructuring describes it as follows:

*"...you will find that much of your resources are taken up by compensation for employees but it's very critical resources and we then don't manage them. From the strategic perspective we don't manage what is happening in the classroom yet we would spend more than 80% of our resources, deploy our resources in the classroom but we don't manage them because that's where the outputs are going to come from..." (Task Team Report on restructuring, p. 2)*

I also observed that the focus of the department has been on the provision of the means of teaching and learning rather than the results. The study observes that the department is focusing on building classrooms, toilets, schools, provision of nutritious food, educator salaries and many more. I find convergence in literature that department premising their ideas on mechanical thinking tend to focus on inputs with a belief that so long as they focus on inputs the predicted results will automatically come (Gharajedaghi and Ackoff, 1984). In line with this view, the department has developed a number of efficiency type performance indicators which suggest to me that the department's concern is that things are done with efficiency.

It is generally accepted that machines, among other things, improved the speed with which things are done. The issue of time on task has been long a concern of organisations. Also clearly spelled out in the operational plan is the time duration of each activity. The operational units of the department are allocated specific time frames to complete activities. Similarly machines have a time duration within which they have to perform their functions (Machamer *et al.*, 2000).

In Table 4-1, it is illustrated that most respondents believe that the strategy of the department is mooted externally. This refers to determination of decisions, policies, rules, procedures by the department. Since education is part of the broader governance system in the country, this means that the overall planning and management of education is done at a national level. Also issues of co-ordination, control, and policy making are foremost determined at a national government level. Even where the provincial department has space to determine strategies, most respondents believe that such strategies will not emerge from the bottom but somewhere at the top. Respondent 9 gave the following comment about on how strategy is perceived as something controlled externally.

*"...But at a provincial level you have the top management declaring that, now we should begin with our strategic planning process and... of course it will start at the top because they have that responsibility of informing everyone that now we are starting with our strategic planning and also give the overall framework as to what is required, what will be used, the documentation which will be used and where the department is headed for and what the national thinks about issues in general and specifically with issues regarding education..." (Respondent 9, p. 2)*

Some respondents attribute a failure to realised strategies of the department to the control that is exercised by top management. The implication of leaving out employees at lower levels in determining official strategies has generated a lived perception that thinking is for top management and doing is for employees at lower levels. Although some control and coordination may be devolved at lower levels, this is done with minimal power and room for judgment. I observed that the delineation of powers depends on the level and position of occupancy and that the role functions and responsibilities assigned with delineation are limited. The limitations imposed by the work environment suggest that lower levels employees can only do what they are empowered by policies of the department.

In further analysis it is clear that decision making in the department is concentrated between the Accounting Officer (AO) and the Executive Authority (EA). The AO is Administrative Head of the department whereas the EA is the Political Head of the department. The EA is also known as the Member of Executive Council (MEC). The department is structured along hierarchical lines with control being centralised to the executive. The organogram of the department depicts an organisation hierarchy from the EA to managers and the rest of the employees are not included. In literature on strategic management, it is suggested that organisations with an organogram such as the department one are typical bureaucracies (Morgan, 2006). Bureaucracies emphasise hierarchical authority, precedence in decisions follows a hierarchy.

The department has developed systems to maintain regularities. Standard operating procedures are in place; these operating procedures ensure that the department strategy process is predictable. Above that the operating procedures the department has a system of internal control. Respondent 1 describes the process of internal control as follows:

*The systems of internal control are the responsibility of the department's management and are designed to provide effective assurance that assets are safeguarded and that liabilities and working capital are efficiently managed. In line with the requirements of the PFMA and the principles of the King Reports (II and III) on Corporate Governance, the Internal Audit Function provides the Provincial Audit and Risk Committee and the organisational management with assurance that the systems of internal controls are appropriate and effective. This is achieved by means of the risk management process, as well as the identification of corrective actions and suggested enhancements to the controls and processes. (Respondent 1, P.47)*

The resultant effect of these regulations and controls, among other things, makes the department inflexible to adapt to changing conditions. This is typical of single purpose machines that cannot be used for any other purpose except what they are built to do. The study finds suggestions that the department is slow to respond to changes in the environment. The study notes that some literature finds it is common of mechanical organisations to experience challenges of slow adaptation. Other reasons attributed by the literature to the slowness of mechanical organisations to adapt points to the design factors, that is, machines tend to operate best when the conditions suite their purpose ((Varela and Maturana, 1972; Gharajedaghi and Ackoff, 1984; Machamer *et al.*, 2000; Morgan, 2006).

### 4.3.2. The organismic metaphor

The prominence of the organismic metaphor in the department is demonstrated in Table 4-1 by the two related themes which correspond to this metaphor. These two themes relate to emphasis being placed on the organisation's capabilities to adapt and a recognition that parts of the department relates with others. Units of the department can interact with the environment, provide feedback to the entire system and take limited decisions for the department. Those who take decisions are still top management relative to the positions they occupy in the hierarchy. Otherwise the overall responsibility of thinking for the department resides with the executive authority.

The study also observed that, as a practice the department's Strategic Plan[2] encapsulates a section which deals with SWOT. The strategic plan's SWOT section is also updated annually in a form of a document called the Annual Performance Plan (APP). SWOT analysis is a practice of scanning the environment for opportunities and threats and to use these to position the organisation where it can make use of the opportunities whilst eliminating threats (Mintzberg, 1990). Respondent 9 describe the process of strategic planning as follows:

*"...But before we even get there, we communicate with the stakeholders, the internal ones especially the senior management, the people that are driving the department to its desired destination. We sit down with them and we then do what we call SWOT analysis or we reflect on our past performances and then we identify challenges, we identify opportunities, strengths and weaknesses and threats. So, after having done that we then come with a strategy because if you have a challenge you need to address that challenge that is what informs policies..." (Respondent 9, p. 03)*

In looking at comments by respondents I find that the department is concerned with developing capabilities to survive, learn and adapt in the environment. The department considers as a responsibility of management the responsibility to find a good fit between the department and its environment. An understanding of the environment includes customers and stakeholders to which the department is accountable to. To encourage the promotion of values and principles that the department wishes to demonstrate to its customers and stakeholders, the study observed that annually the department holds a service excellence awards ceremony wherein the employees considered to have excelled in displaying service excellence are acknowledged. Furthermore, I observed that the department held a stakeholders summit[3] to receive inputs on the state of education and take recommendations on what needs to be done to improve the standard of education in the province.

Partnerships form another strategy with which the department deals with the scarcity of resources. The department works with business to source input factors where the department cannot afford costs related to inputs. The department takes advantage of business corporate social investment plans to form partnerships that complement its limited resources. The point being made is that the department engages in partnerships not as an end but as a means to survive the environment.

The relationship between the department and its environment is based on the principle of homeostasis. The organisational units of the department are given a room to adjust to changes in their plans within set

---

[2] This is a five year plan of the department which integrates education national and provincial priorities.

[3] This is a gathering of stakeholders in education wherein the department attempts to find a common platform of actions with its partners.

parameters. Such an adjustment to changes as a reflection of changes in the environment contributes towards the sustenance of the entire department (Merali, 2000). The emphasis on the organic relationship between the department and its environment are exemplified by the reporting systems that the department utilises. The study finds that the department dedicates time in monitoring its environment through a combination of strategies. The first of these strategies is to continually updating the Strategic Plan (SP) through the Annual Performance Plan (APP) based on environmental changes. The second common practice involves employees who are expected to report on the department's activities through quarterly organisational reports which are then consolidated into a single report to top management. The study observed that top management has a final say on corrective action after reading the consolidated reports. Individual units also play a role in correcting deviations at their levels against set targets.

It has been established that the department engages in activities to scope the environment. What the department does after scoping the environment is to adapt its structure and character to fit in with the environment. I observed during the research stage that the department is involved in the process of restructuring. This process of restructuring is informed, by among other things, by the need to adapt the organisational structure to the strategic plan. Respondent 7 characterise the need for a structure that adapts to needs as follows:

*"...we believe that one way of doing that is that the organogram of the department must be revised on a regular basis to meet the needs that emanate as we implement the needs of government. Depending on the needs that communities have outlined to government and therefore we can't have a structure that is set forever, the structure as far as I am concerned must be the structure that is fluid. You should have a structure that talks to needs..." (Respondent 7, p. 03)*

The department changes its character to align with policies which are sometimes generated by the department's national department. The national department shares concurrent powers with the department on basic education matters. In the line with the notion of the department adapting its character, there is recently a policy process underway to handover Further Education & Training (FET) to another department due to policy adjustments at national level. These changes stand to reshape the department's character as the provincial provider of FET education.

It is acknowledged by most respondents that relationships between organisational units and people exist within and without the department. External relationships are recognised in two ways, namely, as providing opportunities for the department and as a source of threats. The survivalist approach to the environment enables the department to avoid being irrelevant and ineffective (Han, 2007). Recent studies

suggest that other environments that can make organisations to be irrelevant and ineffective are informal networks (Stacey, 1995; Glor, 2007). Informal networks can wield a powerful influence that may force the department to act unintentionally.  Respondent 10 relates the effect of informal networks as follows:

*"...In any organisation you'd have your formal networks and you'd have your informal networks.  People would come together formally by way of an invitation a circular or a notice to a specific meeting or conference or seminar but that does not preclude them from meeting on their own informally over tea, during a smoke break and that is when you get the exchange of ideas that come down to the should of the organisation. The ideas that you share in the form of what I would refer to as the body of the organisation. But when you want to really go to the soul of the issues, how certain people are messing up, how certain networks are galvanizing to work against other networks so that they can seize power and take control of being masters over the resources. You don't get ...you wouldn't get that in a formal meeting..." (Respondent 10, p. 09)*

The study finds that that there is a prominent view that sees the organisational units playing a role of fostering cohesion and synergetic matrix relationships (Josserand *et al.*, 2006). In mechanical organisations the practices tend to make employees to work in silos. Unlike in mechanical practices, the organismic practices seek to foster team work.  The study observed that there are operations directed at improving school results from teams composed of employees across specialised units. The teams get deployed in schools that underperform and the individuals in teams tap on each other's specialised knowledge whenever in need.

In emphasising outputs the executive authority plays the role of specifying outputs that must be met in the time horizon of one year to five years as indicated in the appendix on extracts from sources in relation to the organismic metaphor. The means of achieving the outputs are left to the operational units of the department to decide. The study observed that during the period of research in the year 2010, the department's national department released a document titled Action Plan to 2014[4] with a list of outputs to be met annually in an incremental way up to year 2014.

---

[4] Action Plan to 2014 is a strategic plan from the National Department of Basic Education (DBE) which specifies strategies priories for the electoral cycle and the expected outputs for both DBE and provincial education organisations alike.

### 4.3.3. The culture metaphor

In the analysis of data, I find that the organisations as culture metaphor play a significant role in driving strategy for the department. The department places much emphasis on the norms and values that it promotes. Norms and values refer to prescribed ways in which each and every employee of the department is expected to behave. In placing emphasis on the way in which people behave, emphasis is also placed on the reasons that justify behaviour.

It is an unwritten rule in the department that employees who are not in management positions display attitudes that demonstrate that their role is to do what they get told by management to do. This attitude arises from the manner in which the organisation conducts its business. As been mentioned in the discussion on scientific management, in mechanical organisations thinking and acting is divided between management and employees. Management takes the responsibility for thinking and employees are expected to implement. Respondent 9, describe the attitude as follows:

*"...I think there is this culture of waiting to be told that is prevalent in the department. People will not be creative and innovative in terms of coming up with resolutions and approaches of dealing up with something...they wait to be told, they wait for someone to say you know this thing like the turnaround strategy that is there..." (Respondent 9, p. 05)*

A perception exists that employees at lower levels, who are highly qualified than their supervisors, feel that they are excluded in decision making because they pose a threat to under qualified supervisors. It is also suggested that job descriptions and specialization in the department tend to foster an individualistic culture. Individualistic culture instills a sense of doing that which the job description prescribes thus compromising team work. It also emerged from the findings that the vision of the department acts to provide the glue which unites people across specialised units.

The infusion of values is bidirectional; functional units of the department have an influence that they exert on the entire system and vise versa. The unit of the department whose function is to provide strategic management support plays a very influential role in influencing organisational practices in the area of strategic management. In the area of strategic planning, it is my observation that the strategic management unit would provide guidelines on the compilation of the strategic plans. The strategic management unit also takes responsibility to make inputs at national level on relevant performance indicators for the department.

The strategic management support unit portrays an image of strategy as something that belongs to people in higher positions. Similarly the study finds that the image that the department portrays in strategic planning is that of strategic planning being a preserve of a few individuals who wields power and with lower levels employees playing a very minimal role in making inputs.  The suggestion is premised on the general observation out of reading the extracts from respondents. Respondent 6 captures the attitude of employees with regard to strategies of the department as follows:

*"...The organisation is a strategy, it's a culture; it's the way of doing things. Therefore for me you cannot have people out there doing this thing without having some intensive platform of even an educator from the classroom to be part of the process at a conceptual level as a way of getting data. so, now, my participation, my role as I see it now it's just to get the document disseminated to people for them to implement to monitor if it is implemented to get reports and to consolidate reports and to send them up. I am not happy; I don't want to go further because you did not ask me what it is that I was expecting...is..." (Respondent 6, p. 05)*

The department is sensitive to the culture of society from which the department's culture is also influenced.  The study observed from the mission of the department that the department seeks to broaden access to education by ensuring among other things that it addresses the legacy of past education social discrimination practices. The study observed that in keeping with the department's mission to address the legacy of past social discrimination, the department's current financial expenditure is skewed in favour of the least poor learners and schools. In this way the department seeks to address its historic past social discrimination practices which have become embedded in society as a culture.

There is a sense that the leadership of the department lacks attributes to accommodate diversity of interests based on race, gender, political affiliations and so on. The study also finds a suggestion that the department is struggling to act as a cohesive unit due to a clash of paradigms arising from a multitude of people in the department with different political affiliations. There is a challenge in the department in that personalities dominate decision making processes rather than established organisational decorum. The study observes that established standard operating procedures are sometimes by-passed when issues for consideration are not agreeable to management. Personal discretion by managers tends to dominate decision making in the department.

### 4.3.4. The metaphor of political systems

The metaphor of the organisations as political systems was evident in two areas. In this metaphor the use of power is a central theme. In the department respondents believe power is used to manage conflicting interests and as a form of control. By control the study refers to the processes leading to decisions and control of information.

It was observable that the department operates on the basis of mandates derived from national government by the executive arm of government. In reading through documents and information from respondents it emerges that the Member of the Executive Council in Education (MEC) and the Accounting Officer have a final say in determining the vision and the mission of the department. This form of power is illustrative that the strategic choices of the organisation are determined by the alignment of such choices to the vision and mission.

It also became clear from interacting with sources that those goals and values pursued by individuals are derived from the cultural context from which the individual comes from. In South Africa a person who becomes an MEC gets the position on the basis of his/her political affiliation. In the analysis of sources it is indicated that the election manifesto of a majority party in government ends up being the business of the department to implement. It is the observation of the study that most of the priorities that the department pursues are similar to the election manifesto of the majority party in government.

Utilisation of power is by virtue of the formal position that an individual occupy. In some literature this kind of power is also referred to as the power of the desk (Morgan, 2006). The analysis of sources reveals that employees at lower levels attribute challenges related to formulation and implementation of strategies as related to how officials at upper levels of the department utilise this power. Individuals in the department are empowered by rules and regulations in varying degrees. The rules and regulations in turn are sometimes used to show who has the most power in the department (Lucas, 1987). In this category the use of policies and guidelines by officials is viewed to create a limited scope of thinking and implementation within the strategic management field.

It also emerged from the analysing sources that the department puts emphasis on control of the decision processes as a source of power. The study finds that most decisions in the department require the approval of the MEC, Accounting Officer and Top Management. In accounts from extracts it is clear that employees at lower levels feel that their role is to do what the top level management has decided. The study observed that the processes of strategic planning and reporting are regulated by the standard operating procedures. The standard operating procedures also act as a means of controlling how decisions

related to the strategic direction of the organisation are made. What is clear is that decisions are taken by managers up to the level of the MEC. Respondent 1 describes the involvement of employees of the department in strategy formulation in the following way:

*"...Yah! When it comes to the formulation of plans, yes! We are not involved; we get involved at times when plans are explained to us so that we understand what is it that we are going to implement. Eihmm...yah! That is a level of engagement and in some cases it's not even done that way..." (Respondent 1, p. 09)*

The interests that are associated with employment in the department are a product of organisational and societal culture. The study observes that the department has a deliberate strategy to affirm the previously disadvantaged groups in employment of employees. The analysis also revealed that there is a perception among some respondents that there is resentment to the policy of affirming the previously disadvantaged groups. The perception is that affirmation interferes with the career interest of those who consider themselves deserving of promotion posts.

Some of the respondents believe that conflictual situations which have existed for a very long time tend to become a way of life. In the long run the conflictual situations get entrenched in the department and are difficult to resolve. The study finds that the use of formal authority creates resentment that sometimes makes employees do things for compliance purposes. The study observed that most often in the department the strategic reports that are submitted to top management and oversight authorities are only done to comply with the deadlines. The study also finds that the strategic management unit has made complaints about some planned activities not being undertaken. The reasons for not doing planned activities in time tend to put blame on top management overriding powers. Top management is sometimes perceived to issue directives in conflict with other decisions.

It was also observed that other oversight institutions and individuals in the department derive power from the control of resources. The study finds that if the department does not submit its strategic plans to the provincial legislature, the department is unlikely to get budget approval. The study observes that the linking of budget approval to the approval of plans, act as a punitive measure to the department if it fails to follow the legal requirements of producing strategic plans. The sentiment expressing the relatedness of power and resources is also expressed by Respondent 7 as follows:

*"...So what you normally do is you plan, you develop the strategic plan then you get the budget and then you try and squeeze it to...you cannot extend the budget, all you can do in the strategic plan then you*

*compromise and reprioritize some of the targets and some of the interventions that have been identified in the strategic plan..." (Respondent 7, p. 03)*

The role played by informal networks which operates as alternative structure to the formal department also creates fluidity. The role of informal networks is widely discussed in literature especially how the informal networks assist organisations to manage crisis situations where there formal plans are ineffective (Stacey, 1995). The study finds that employment interests have created conflictual situations in the department wherein those who feel left out resort to the informal networks and start lobbying for promotions. The study shows that the emergent properties of a conflict are not limited to the formal components but to the informal networks as well (Sword, 2008).

### 4.3.5. The Brain metaphor

Figure 4.1 represents the most prominent issues under the brain metaphor in the department. What came out to be a prominent issue among respondents is that the department has in the main delegated the business of thinking in strategy to a unit called Strategic Management Support (SMS). This unit processes information coming from various units of the department and then make decisions on which of the information should be captured in the strategic plan and or organisational reports. The task of processing information allocated to the strategic management unit results in the strategic management unit producing a document with rational decisions about the future in the form of strategic plans. Respondent 8 describes the work of SMS as follows:

*"...You would find senior management would rather have a smaller group of people who sit and work with strategy so that the task can be concluded as swift as possible and in doing so they defeat the very, very essence of strategic management which is engaging as many stakeholders as possible both within the organisation and those from outside the organisation..." (Respondent 8, p. 04)*

The role of communication and decision making is a pivotal task in the department. The study finds that it is highlighted in extracts that the manner in which the department deals with issues concerning strategic management involves communicating information from operational units to decision makers and vice versa. The study finds that the department has an Education Management Information System (EMIS) which is utilised among other things to do trend analysis, learner population distribution and to take decisions about the allocation of resources.

The study observed that the unit strategic management support receives reports from other units on a quarterly basis on the performance of the department against set plans. The information received is then

processed to produce an executive summary which is forwarded to top management of the department. During the compilation of the strategic plan the study observed that inputs received from stakeholders and within the department was processed by the strategic management unit and thereafter sent to top management for further processing. The observation of the study is also corroborated by some respondents who confirm the same about the strategic planning process of the department.

The department tries to deal with complex issues by developing tools and information processing systems that help in making rational decisions in ways similar to the brain. The study finds that when doing strategic planning the department relies on the SWOT analysis tool to make rational decisions. The study observed that the strategic plan of the department has a box with four quadrants where strengths, weaknesses, opportunities and threats of the department are inserted accordingly in one quadrant per item.

The department is able to embrace its environment by utilising information received from the environment. The information received from the environment helps the department to ground its operations. The study finds from extracts that the Annual Performance Plan (APP) of the department is a means by which analysis of the environment is updated annually. The study observed that the department does not have a real time system from which changes in the environment are detected however the study noticed that the Strategic Plan, APP and Quarterly Reports provide significant information in relation to what is happening in the environment.

The department also attempts to deal with complexity by specifying a set of outputs that the organisational units must achieve. One of the highlights from sources is that top management prefers to let the organisational units deal with the volumes of data for decision making at implementation level and focus on the task of managing outputs. I observed that the department is undergoing a paradigm shift to focus on outputs. The paradigm shift is captured in the document on monitoring and evaluation circulated by the national monitoring and evaluation department in the Presidency (Office of the State President of South Africa). I observed that the department has committed to specific targets, as outputs, up to the year 2014 in its strategic plan document. In the extract below from the Strategic Plan of the department, the essence of the output approach is outlined.

*The Government has identified 12 outcomes to be achieved by 2014/15. The Province has a responsibility of making a significant contribution towards achieving these outcomes. The outcomes have a series of outputs that need to be achieved each year. The ones that pertain to education are Quality Basic Education and Skilled and Capable Workforce to support an inclusive growth path. These outputs would*

*be spelled out in detail in the performance milestones under each strategic objective (Department Strategic Plan, p. 46).*

4.4. Obstacles to innovation, creativity and adaptation

In the previous section on strategic management practices that are found in the department, it emerged that the department is concerned with adaptation to its environment. The study observes that the department seeks to adapt to the environment, by among other things, generating new ideas to deal with changes in the environment. New ideas are generated during formulation of strategies, that is, by using tools such as SWOT to do analysis. The strategic management unit consolidates and compiles the strategic plans of the department and top management rectifies strategic plans of the department. Also during the planning and implementation phase, the department has standard operating procedures, rules and regulations which regulate behaviour of all its units. The department also uses its vision, mission and values as glue that regulates behaviour towards the achievement of its objectives.

Studies on creativity and innovation have suggested that it is possible to shape the context and organisational setting under which conditions that promote the possibilities of creativity and innovation occur (Quinn, 1991). The study finds that sources on mechanical thinking, in figure 4.1, show that in essence control in the department is centralised at the top. With control being centralised at the top, the study also finds that the department employees relies on top management to take decisions. This reliance on top management to take decision places the tasks of innovation and creativity on a few individuals at the top. Once the few individuals have produced the innovation, it is expected of the other employees of the department to set in motion processes of attaining the innovation.

It is in the context of setting in motion a system that is meant to achieve innovations that come from top management where the obstacles to the attainment of an innovative idea is likely to surface. The system that the innovators in top management are dependent on to carry the innovation through has to have the required attributes to achieve the desired innovation. The attributes referred to are those that help the system to detect and correct deviations, manage oscillations, conflict and confusion that may arise. The Viable System Model (VSM) has been written about in literature to encapsulate the attributes mentioned in the preceding sentence (Beer, 1984; Pickering, 2002; Beer, 1959). I find that the department does not use a Viable System Model (VSM) as the basis of acquiring the requisite variety for innovation but instead uses a hierarchical model as a structure upon which innovations are based.

In support of the finding, I find that strategy in the department is regulated by Treasury Regulations (TR) 5.2.3 (b), (c), (d) and (h) which require, inter alia, the inclusion in Strategic Plans (SP) constitutional, legislative, operational and policy injunctions. The injunctions are supposed to clearly spell out the service delivery outputs for each agency, policy developments and legislative changes. In turn, the delivery outputs are factored in the budget of each agency    over the Medium Term Expenditure Framework (MTEF) period. This being the case also means that any innovation and creativity must seek to realise the predetermined objectives. The challenge with innovation and creativity seeking to realise the predetermined objectives is that the conditions may require something different from the predetermined objectives. In this way, predetermined objectives may act as a barrier to creativity and innovation in that they may stop new innovations and creative thoughts which fit the new conditions.

Further to rules for planning the study also observed that reporting requirements stipulate that the department should also compile Monthly In-Year Monitoring (IYM) Reports, and end of year reports. In section 40(3) (b) of the Public Finance Management Act (PFMA), it is a requirement that the Accounting Officer (AO) must, among other things, prepare and submit financial statements and an Annual Report (AR). Such a report must present the performance of the Department against predetermined objectives.  It is clear from the reporting requirements that a report produced by the department can only be an innovation in accordance with the predetermined rules.

4.5.  Alignment to insights on complexity

In Chapter 2, the study described and reflected on the insights from complexity approaches that have emerged over past years.

In the preceding paragraphs, the study has interpreted, analysed, and made findings on the various strategic approaches in the department. The study has done this without aligning these approaches to complexity sciences in strategic management.  In this section, I will analyse evidence and make findings on the extent to which the department's strategic approaches align to insights on complexity.  It is clear that none of the findings that will be discussed in paragraphs to follow relates to complexity sciences. The overall finding of the study is that complexity approaches of the department are embedded in the design school of thinking. An analysis of the design school was done in chapter 2 of literature review.

In the previous analysis, using the mechanism metaphor, I made a finding that rules and regulations define how certain situations are dealt with in the department. In general, some writers suggested that organisations tend to absorb internal complexity by adopting techniques to reduce the impact of complexity (Jauch and Kraft, 1986; Carroll and Gillen, 1987; Drucker, 1959). The study observed that the

department has rules and regulations from oversight authorities such as parliament, the Auditor General and Treasury. These rules and regulations seek to define the parameters for engaging in strategic management within the department. This suggests that rules and regulations form part of how the department seeks to absorb complexity.

It has been established that the department uses the SWOT analysis tool, to among other things, to manage complexity. In general writers have postulated that the use of tools and models to minimise complexity is a practice in some organisations (Clark, 1992; Jauch and Kraft, 1986). The study observes that the use of a SWOT analysis tool by the department seeks to scan the threats and opportunities from the outside. The study observed that analysing the organisational environment and subsequent yearly updates of the strategic plans serves to provide the department with certainty of its environment.

In the previous section a finding was made to show that the department is also managed through management focusing effort on the attainment of outputs. In focusing on outputs top management avoids getting into the details of what goes on during strategy implementation in various units of the department. In this way, the department absorbs complexity by specifying the desired outputs and leaving the rest of the details to be worked out at lower levels of the department. Therefore, instead of managing the rules, top management resorts to managing outputs as a way of absorbing complexity (Hoque, 2008).

In the previous section, looking at the department using the lenses of culture, the study made a finding that the department seeks to unite its units behind a common vision, mission and values. What the study observed is that the strategic management approach of the department seeks to inculcate the vision, mission and values in all its units.  The department uses the vision, mission and values to build a sense of common purpose to harmonise relations.

## 4.6. Conclusion

The department utilises a variety of practices in strategic management. The study has shown that the department is essentially a bureaucracy, although the department has made strides in utilising approaches from other strategic management fields.  The metaphors which emerged from interpreting sources provided some clues on the specific instances in which the department attempts to deal with strategic management issues by utilising a hybrid of approaches. The approaches of the department include cybernetic thinking found in the performance management system; organismic thinking with the notion of adaptation to the environment performed through a SWOT analysis, and inculcation of a unifying culture through the vision, mission and values.

The study shows that the department has not utilised recent insights on complexity but instead where traces of complexity approaches are found, they suggest a department embedded in rationalist thinking. The proposition on rationalist thinking is informed, among other things, by how the department adapts to its environment through a process of reasoning that takes place during SWOT analysis, and change in the department that assumes a movement towards predetermined goals which are outlined in the strategic plan.

# Chapter 5 : CONCLUSION AND RECOMMENDATIONS

## 5.1. Introduction

This chapter will discuss a set of recommendations based on the analysis and findings which are dealt with in Chapter 4. This chapter links with the research topic which seeks to explore the kind of changes in the strategy making practices in the department which may be appropriate in the context of complexity. The research topic together with the aim of this study will be revisited, after which, conclusions will be made. The study will revisit Chapter 4 and highlight prominent themes that emerge, and thereafter outline implications and recommendations under each theme.

## 5.2. Revisiting the research aim of the study

The study's main aim is to contribute to strategic management research by exploring the complexity approaches within the strategic management field as applied by the department. In order to achieve the aim of the study, the first research question sought to understand, in general, the practices in strategic management that are employed by the department. This question refers to generally used strategic management practices representing various strands of thinking on the subject of complexity within the strategic management field. The second research question looks at the possible obstacles in creativity, innovation and adaptation within the strategic management perspective. The obstacles assist the study to establish how individuals in the department relate to the strategic management practices.

How individual employees relate to strategic management practices assists the study to understand whether the existing strategic management practices are amenable to complexity. The amenability of conditions will be juxtaposed against available information from literature as covered in Chapter 2. The third question seeks to extract from the general what the study considers to be complexity approaches emerging from metaphors. The fourth question, which is the last, is to be answered in this chapter. This question seeks to discuss the changes that the department will need to consider given the findings and discussion on some aspects that deal with complexity in Chapter 2.

5.3. Discussing issues that emerged from the study

In Chapter 4, I   used metaphors to interpret data from generalisations made on strategy. In using a variety of metaphors, I sought to get a broader picture about strategic perspectives in the department. Studies on metaphors suggest that metaphors are able to provide partial and different dimensions of the subject under scrutiny (Morgan, 2006; Morgan, 1980; Jackson, 2000).   The generalisation on strategy emanates from reading documents and the interviews that were done in the department. The study then allocated interpretations within the various strategic perspectives. In the paragraphs that follow, the study has brought together findings in Chapter 4 under five themes, *viz.*,  rules and regulations; strategic planning and choices; closed, open, linear and non-linear organisations; informal networks; and learning, adaptation and change.  The themes under which strategic perspectives are discussed seek to link the findings with some perspectives on complexity.

5.4. Rules and regulations

In chapter 4, under mechanism metaphor, the study made a finding that rules and regulations determine how the department responds to situations. A fundamental problem that often faces managers is how to effectively control employees in the light of modern organisational demands for greater flexibility, innovation, creativity and initiative. One of the essential characteristics of strategic management, in the department is the design and control of strategies. Principally these strategies require means like policies for their success. The success of intended objectives and / or goals is basically dependent on designing and controlling. The control function in the department is focussed on correcting deviations from set activities. The management layer of the department is charged with the responsibility of correcting deviations by identifying steps that must be taken to correct deviations from planned activities (Schreyogg and Steinmann, 1987; Eden and Ackermann, 1993).

In contrasting the design and control strategies of the department with insight from complexity, we learn that in CAS, strategies emerge from interactions among people as agents (Anderson, 1999a). Accordingly, if interactions also determine strategies, then rules and regulations in strategic management must at foremost encourage interaction. Insight from CAS suggests that interactions at local level (between people) that influence the behaviour of a system results from simple operating rules. It is clear from the findings of the study that rules and regulations in use by the department are complex. These rules span from national organisations, oversight institutions that shares concurrent powers with the department and those that are generated internally in the department, like the Standard Operating Procedures (SOPS). The lesson from the study is that the means of achieving the department's strategy

should inter alia consist of simple and few rules. This suggests that the policy aspect of the department in strategic management should be composed of a few procedures, rules and regulations to encourage interactions.

### 5.4.1. Implications

The notion of simple rules having a bearing on emergent properties in the department, alert the study that the department cannot make a claim to accurately predict the kind of changes that will occur in future. Simplifying rules that determine interactions at local level suggests that the department should be expectant of strategies that will emerge from these interactions. As stated above, this proposition is derived from the complexity world view that coherent behaviour of agents in interaction arises in conditions where there are few simple operating rules (Cilliers, 2000a). One of the important considerations for organisations is that the emergent properties are not subject to analysis and therefore the department cannot pre-plan for strategies to emerge (Zhang, 2007).

### 5.4.2. Recommendations

An analogy of simple rules as espoused in the preceding paragraph lends itself to a paradox about the emergent properties (strategies). To the extent that it may not only be the agents (people) interacting on their own using their simple rules that result in the emergent strategies but also simple rules that come from management and  this creates a paradox.

A significant implication of this to the department is a fundamental shift to a mix of both intended and unintended strategies. The intended strategies of the department are mentioned in the previous chapter to be in the department's five year Strategic Plan (SP) and the APP.  The SP and APP express the strategic desired future of the department. The unintended strategies would be emergent properties at macro-level resulting from local interactions. At micro-level it may mean people at lower levels implementing deliberate strategies whilst given latitude to create new strategies by prescribing few operational rules.

The study therefore recommends that the department continues with its deliberate strategies whilst at the same time relaxing the rules that seek rigidity and conformity. Rules should be simple and encourage interaction.

## 5.5. Strategic planning and choices

One of the complex challenges facing organisations today is to find cohesive strategies that match all types of environments that are found in organisations (Levinthal and Warglien, 1999). These strategies are supposed to be a mix that takes care of the discontinuities and increments that characterise complex situations. A combination of factors suggests that the department understand its environment to be characterised by order. In Chapter 4, the study identified that the strategic planning approach of the department assumes that the environment of the department is stable. This was highlighted by most respondents in figure 4-1 by making statements that show that the department continually scans its environment for changes and thereafter adapts its strategies. In order to scan the environment the department uses a SWOT analysis tool, among other things, to build its arsenal of contingency strategies (Yasai-Ardekani and Nystrom, 1996). Once the environment has been scanned, the department devises strategies that assume an orderly environment.

### 5.5.1. Implications

Complexity writers have suggested that strategies that assume unchanging conditions may work well for the department in conditions where the landscape does not change. But the moment the landscape changes, albeit in varying degrees, uncertainty sets in and new strategies have to emerge (Schultz, 2009; Levy, 2000; Lansing, 2003). This stage of perceived uncertainty (of moving towards the edge of chaos) invariable changes the local interactive environment to increased ruggedness (Samoilenko, 2008). The study thinks of this stage as characterised by disagreements, conflicts and differentials over the right mix of actions and strategies required in varied organisational environments. The study sees the dimension of uncertainty elaborated above as having a direct implication on the department pursuance of its strategies to match all kinds of environments.

Also important is how the department's strategies respond to situations where order is completely lost (chaotic environment) and the perceived structures that hold together the department have disappeared. The study thinks of an example raised under the mechanical metaphor about employee strike action in the department. In view of the study, the department operates on perceived labour peace; the strategies of the department are geared towards an environment of stable labour peace. It is the observation of the study, that when there is employees' strike action, the entire management structure of the organisation collapses as some of the managers are members of Unions and also participates in employees' strike action.

### 5.5.2. Recommendations

The study recommends that one way of dealing with uncertainty is for managers and top management of the department to constantly monitor performance with the aim of adjusting strategies at least quarterly. The existing performance management system of the department, which requires reporting against predetermined targets and objectives quarterly and annually, can be adjusted for this purpose. It has been suggested in literature that manipulation of the environment in which adaptation takes place by changing organisational strategies can yield a change of behaviour and trajectory (Anderson, 1999b).

The other important consideration linked to the above recommendation is that manipulation of the environment does not seek to predict the outcome of perceived uncertainty and or lost certainty. Complex events do not recur unchanged in character or nature such that contingency strategies are prepared well in advance. The monitoring that the study proposes should result in strategies that seek to dampen the ruggedness of the landscape by altering local interactions and patterns of behaviour (Zhu, 2007). In view of the study, using the previous example of labour peace, employee strikes could end by embarking on strategies that channels the parties in conflict back to negotiations.

## 5.6. Closed, open, linear and non-linear department

In Chapter 4, the study finds that the department emphasises hierarchy in controlling behaviour among its employees. In essence lines of authority and accountability in the department follow a linear approach; the behaviour of each one employee is determined by the next person in the vertical line of authority. It is suggested that CAS such as the department operates on the basis of non-linear interactions (Levy, 2000; Cilliers, 2000a). This is a fundamental characteristic of CAS as it marks a departure from how organisations should think about controlling behaviour. In non-linear situation the behaviour of any one employee is influenced by actions and reactions in a network of local interactions. The same is suggested of the department: treated as a whole it enters into partnerships with other organisations in pursuit of its strategic goals. These partnerships have their own non-linear dynamics which affect the behaviour of the department and those in partnership with.

### 5.6.1. Implications

The study is able to explain that a hierarchical structure, such the one found in the department, causes a department to lack in capacity to adapt in changing conditions. As suggested in the preceding paragraph, line authority tends to constrain the behaviour (Machamer *et al.*, 2000). Individuals subjected to line

authority are insulated from the environment and tend to act in accordance to their job roles. This pattern of behaviour can also be related as an obstacle to innovation, creativity and adaptation (Senge, 2006).

The other important consideration in non-linear activities concerns the causal factors. In a linear department it is mostly assumed that the cause is closer to the immediate event. The tendency then is to look for solutions closer to the immediate event whereas the solution may lie somewhere outside one's own realm of influence. Senge (2006) has identified the causal challenge as influenced by, among other things, a lack of appreciation of the 'bigger picture'. Figure 5-1 below provides an illustrative example of how issues in education can have an influence on one another such that it may not simply be a matter of the nearest variable influencing another but the whole system.
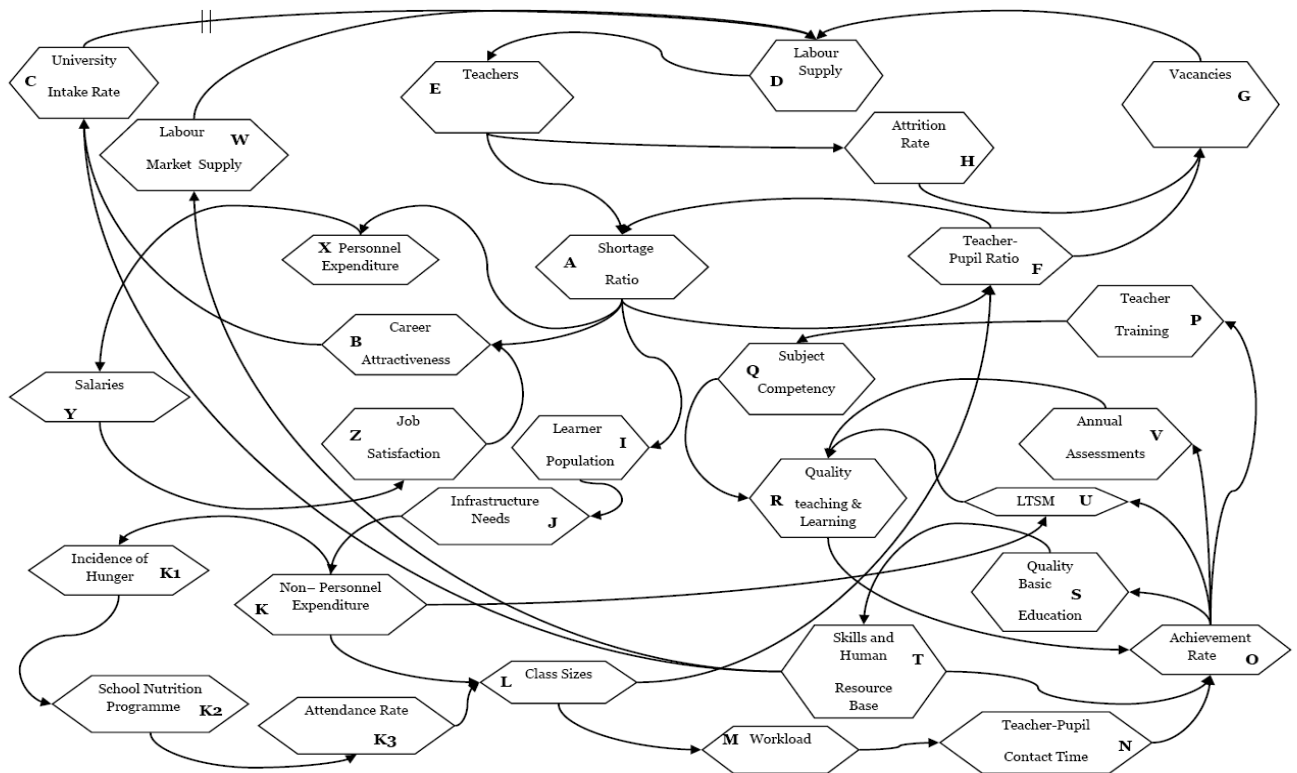


**Figure 5-1:** An illustrative example of education variables in an influence diagram

Currently, the department is facing challenges of an overall poor achievement rate within the system. A linear approach may seek to understand the challenge of a poor achievement rate (O) as from the lack of educator teaching skills and a poor teacher resource base (T). In contrast a non-linear approach will treat

the poor achievement rate (O) as resulting from a multitude of variables including variable A, B, I, J, K, F and many more.

### 5.6.2. Recommendations

The study suggests a shift of focus in how work is structured in the department. Instead of distributing work according to specialised functions, the department can consider distributing work across functional teams.  Work can also be allocated to more than one team and the benefit of this is to allow diverse perspectives to emerge. The department then has a choice to choose, from the diverse perspectives, the best possible solution. In literature, the standard of using multiple teams (increasing redundancy) to investigate and or solve a problem is something that has been embraced by some organisations (Morgan, 2006; Josserand *et al*., 2006).   Redundancy creation and distributed intelligence can help the department to supplement skills and knowledge where there is an identified need (Marion and Uhl-Bien, 2001).

The department needs to consider including the use of influence diagram's similar to figure 2 to conduct situation analysis. Figure 1 shows the situation as constituted by a network of issues arranged in a non-linear setting.

## 5.7. Informal networks

The issue of informal networks in a department has been identified in Chapter 4 as one of the important factors that influence strategies in the department.  The studies on Complex Adaptive Systems (CAS) suggest that informal networks are an inherent part of any department. Therefore, the study suggests that strategic control of informal spaces where people meet, namely, during lunch time in meetings, union meetings, telephoning conversations and other extramural activities is difficult using linear control methods.

### 5.7.1. Implications

The implication of informal networks suggests that inflection points in organisations may come from anywhere in the system. Such inflection points can have a multiplying effect that creates instabilities in the department. This suggests that it is not enough to focus attention on formal structures alone.  If taken into account a "shadowy" has a potential to unleash creativity, innovation and freedom as it is born out of voluntary association by individual agents (Stacey *et al*., 2000).

### 5.7.2. Recommendations

The department may need to create space for suggestions emanating from outside formal structures. This could be done by having suggestion boxes wherein anyone who feels like raising an issue can do so without any fear of being identified.

### 5.8. Learning, adaption and change

The study suggests that organisations, among other things, act on the environment in order to bring about its desired changes. As organisations stumble across challenges, they are sometimes forced to rethink how they do things and to question their assumptions. Some literature on organisational learning suggests that there are two types of learning that take place in organisations, *viz.*, single loop learning and double loop learning (Senge, 2006; Stroh, 2000; Hendry and Seidl, 2001). Single loop learning is suggested when an organisation focuses its attention on the current deviations. Double loop learning takes into account the current deviations and the underlying causes of such deviations thus enabling the organisation to question the assumptions made when a plan was conceived. It has also been noted by Waterman (cited in Fred R. David, 2005, p.8) that *"...in today's business environment, more than in any preceding era, the only constant is change. Successful organizations effectively manage change, continuously adapting their bureaucracies, strategies, systems, products, and cultures to survive shocks..."* It is inconceivable that there can be adaptation without some kind of learning from the environment and experiences (David, 2005). In chapter 4, the study established that the department has a system of correcting deviations against set targets. However the study could not find evidence to suggest whether assumptions made when setting targets are revisited during the reporting stages.

Adaptation in CAS is dependent on the initial conditions of each agent (person) in the department (Holland, 1992; Uhl-Bien *et al*., 2007). Subsystems have a history or an agent in a subsystem of an organisation will change in its own specific ways. This suggests that adaption varies depending on the time and space (history) of each person. In CAS an ability to learn is central for adaptation and change. The driver for change is the need to adapt to continually changing internal conditions. The one exception with CAS is that adaption cannot be predicted and induced by other agents.

### 5.8.1. Implications and recommendations

The implications arising from understanding the department as a CAS suggest that for learning, adaptation and change to take place the department must build the capacity of individuals to co-operate. This entails increasing the levels of interactions across various levels of the department to a point where the department acquires a dominant position over its environment (Uhl-Bien *et al*., 2007). In the

department, a leadership role which is inherently bureaucratic tends to focus on compliance to rules. It is suggested in literature that leadership in CAS needs to shift to catalysing change. In order to achieve a dominant position over the environment, the study suggests that the department also develops a battery of strategies that takes into account individual context of the department's environment.

## 5.9. Conclusion

The main lessons we have drawn from complex adaptive systems is valuable as the lessons transcend the understanding of organisations to their complexities. If there is anything that managers, leaders and organisations should understand, it is the remarkable and unique process of complex adaptive systems and systems thinking. Therefore, to benefit from the depth of understanding provided by complexity approaches, in particular CAS, it is important that the department takes into account the recommendations and the underlying elements in complex situations. It is also important that at the haste of applying complexity approaches based on CAS, organisations do not completely abandon other complexity approaches. The study refers to complexity approaches derived from other systems thinking strands. These strands have much to offer as shown by the influence diagram above, ideas on learning organisations and a holistic understanding of organisations through metaphors.

# 6. REFERENCES

.

1. ACKOFF, R. L. 1981. The Art and Science of Mess Management. Interfaces, 11, 20-26.
2. AMBERT, A.-M., ADLER, P. A., ADLER, P. & DETZNER, D. F. 1995. Understanding and Evaluating Qualitative Research. Journal of Marriage and Family, 57, 879-893.
3. ANDERSON, P. 1999a. Complexity Theory and Organization Science. PERSPECTIVE, 10, 216-232.
4. ANDERSON, P. 1999b. Complexity Theory and Organization Science. Organization Science, 10, 216-232.
5. ANFARA JR, V. A., BROWN, K. M. & MANGIONE, T. L. 2002. Qualitative analysis on stage: Making the research process more public. Educational Researcher, 31, 28.
6. ANSOFF, H. I. & BRANDENBURG, R. G. 1971a. A Language for Organization Design: Part I. Management Science, 17, B705-B716.
7. ANSOFF, H. I. & BRANDENBURG, R. G. 1971b. A Language for Organization Design: Part II. Management Science, 17, B717-B731.
8. ANSOFF, H. I. 1964. A Quasi-Analytic Approach to the Business Strategy Problem. Management Technology, 4, 67-77.
9. ANSOFF, H. I. 1991. Critique of Henry Mintzberg's 'the Design School: Reconsidering the Basic Premises of Strategic Management'. Strategic Management Journal, 12, 449-461.
10. BASKIN, K. 2004. Complexity, stories, and knowing. Philosophy.
11. BEER, S. 1959. What Has Cybernetics to Do with Operational Research? OR, 10, 1-21.
12. BEER, S. 1984. The Viable System Model: Its Provenance, Development, Methodology and Pathology. The Journal of the Operational Research Society, 35, 7-25.
13. BOAL, K. B. & SCHULTZ, P. L. 2007. Storytelling, time, and evolution: The role of strategic leadership in complex adaptive systems. The Leadership Quarterly, 18, 411-428.
14. BOISOT, M. & CHILD, J. 1999. Organizations as Adaptive Systems in Complex Environments: The Case of China. Organization Science, 10, 237-252.
15. BOISOT, M. & CHILD, J. 1999. Organizations as Adaptive Systems in Complex Environments: The Case of China. *Organization Science,* 10**,** 237-252.
16. BRACKER, J. 1980. The Historical Development of the Strategic Management Concept. The Academy of Management Review, 5, 219-224.
17. BRADLEY, J. 1993. Methodological Issues and Practices in Qualitative Research. The Library Quarterly, 63, 431-449.
18. BURGELMAN, R. A. & GROVE, A. S. 2007. Let chaos reign, then rein in chaosâ€"repeatedly: managing strategic dynamics for corporate longevity. Strategic Management Journal, 28, 965-979.
19. CALDARI, K. 2007. Alfred Marshall's critical analysis of scientific management. European Journal of the History of Economic Thought, 14, 55-78.
20. CAMPBELL-HUNT, C. 2007. Complexity in practice. Human Relations, 60, 793.
21. CARROLL, S. J. & GILLEN, D. J. 1987. Are the Classical Management Functions Useful in Describing Managerial Work? The Academy of Management Review, 12, 38-51.
22. CAUWENBERGH, A. V. & COOL, K. 1982. Strategic Management in a New Framework. Strategic Management Journal, 3, 245-264.
23. CHAN, S. S. 1993. Changing Roles of Institutional Research in Strategic Management. Research in Higher Education, 34, 533-549.
24. CHAPMAN, J. 2002. System failure: Why governments must learn to think differently, Demos.
25. CILLIERS, P. 2000a. What Can We Learn From a Theory of Complexity? EMERGENCE, 23–33.

26. CILLIERS, P. 2000b. What can we learn from a theory of complexity? EMERGENCE, 2, 23-33.
27. CLARK, D. N. 1992. A Literature Analysis of the Use of Management Science Tools in Strategic Planning. The Journal of the Operational Research Society, 43, 859-870.
28. CRESWELL, J. W. & MILLER, D. L. 2000. Determining Validity in Qualitative Inquiry. Theory Into Practice, 39, 124.
29. DAVID, F. R. 1997. Concepts of strategic management, Prentice Hall.
30. DAVID, F. R. 2005. Strategic Management concepts and cases, New Jersey, Pearson Prentice Hall.
31. DE ROND, M. & THIETART, R.-A. 2007. Choice, chance, and inevitability in strategy. Strategic Management Journal, 28, 535-551.
32. DOOLEY, K. J. & VEN, A. H. V. D. 1999. Explaining Complex Organizational Dynamics. Organization Science, 10, 358-372.
33. DRUCKER, P. F. 1959. Long-Range Planning: Challenge to Management Science. Management Science, 5, 238-249.
34. EDEN, C. & ACKERMANN, F. 1993. Evaluating Strategy-Its Role within the Context of Strategic Control. The Journal of the Operational Research Society, 44, 853-865.
35. FAULKNER, D. 2002. Strategy: critical perspectives on business and management, Taylor & Francis.
36. FLICK, U. 2009. An introduction to qualitative research, Sage Publications Ltd.
37. FLOOD, R. L. 1990. Liberating systems theory: Toward critical systems thinking. Human Relations, 43, 49-75.
38. GHARAJEDAGHI, J. & ACKOFF, R. L. 1984. Mechanisms, Organisms and Social Systems. Strategic Management Journal, 5, 289-300.
39. GHEMAWAT, P. 2002. Competition and Business Strategy in Historical Perspective. The Business History Review, 76, 37-74.
40. GLOR, E. D. 2007. Assessing organizational capacity to adapt. Emergence: Complexity & Organization, 9, 33-46.
41. GRAND, S. & MACLEAN, D. 2007. Research on strategy as practice from a creative action perspective. 23rd European Group for Organizational Studies (EGOS) Colloquium 'Beyond Waltz - Dances of Individuals and Organization'. Vienna University of Economics and Business Administration, Vienna, Austria.
42. GRANT, R. M. 2003. Strategic Planning in a Turbulent Environment: Evidence from the Oil Majors. Strategic Management Journal, 24, 491-517.
43. HAN, Y. S. 2007. POPULATION ECOLOGY, STRATEGIC CHOICE, AND COMPETITION. International Journal of Business Research, 7, 124-128.
44. HEATHER, H. & MATILAL, S. 2005. Complexity and catastrophe: Disentangling the complex narratives of the Union Carbide disaster in Bhopal. Emergence: Complexity & Organization, 7, 64-73.
45. HENDRY, J. & SEIDL, D. Year. Strategic change from a routine perspective. In: 17th Colloquium of the European Group for Organizational Studies, 5-7 July 2001 Lyon, France.
46. HEYLIGHEN, F., CILLIERS, P. & GERSHENSON, C. 2006. Complexity and philosophy. Arxiv preprint cs/0604072.
47. HOLLAND, J. H. 1992. Complex Adaptive Systems. Daedalus, 121, 17-30.
48. HOQUE, Z. 2008. Measuring and reporting public sector outputs/outcomes: Exploratory evidence from Australia. International Journal of Public Sector Management, 21, 468-493.
49. HUSTON, T. 2007. Inside out: Stories and methods for generating collective will to create the future we want. Cambridge, MA: The Society for Organizational Learning.
50. JACKSON, M. C. 2000. Systems Approaches to Management, New York, Kluver Academic/Plenum Printers.

51. JACKSON, M. C. 2001. Critical systems thinking and practice. European Journal of Operational Research, 233- 244.
52. JACKSON, M. C. 2003. Systems thinking: Creative holism for managers, John Wiley & Sons Inc.
53. JACOB, E. 1987. Qualitative Research Traditions: A Review. Review of Educational Research, 57, 1-50.
54. JACOBS, C. D. & HERACLEOUS, L. 2006. Constructing shared understanding: The role of embodied metaphors in organization development. Journal of Applied Behavioral Science, 42, 207-226.
55. JAUCH, L. R. & KRAFT, K. L. 1986. Strategic Management of Uncertainty. The Academy of Management Review, 11, 777-790.
56. JOSSERAND, E., TEO, S. & CLEGG, S. 2006. From bureaucratic to post-bureaucratic: the difficulties of transition. Journal of Organizational Change Management, 19, 54-64.
57. LANSING, J. S. 2003. Complex Adaptive Systems. Annual Review of Anthropology, 32, 183-204.
58. LEVINTHAL, D. A. & WARGLIEN, M. 1999. Landscape Design: Designing for Local Action in Complex Worlds. Organization Science, 10, 342-357.
59. LEVY, D. L. 2000. Applications and Limitations of Complexity Theory in Organization Theory and Strategy. In: JACK RABIN, G. J., MILLER, W.BARTLEY HILDRETH (ed.) Handbook of Strategic Management. Second Edition ed.
60. LUCAS, R. 1987. Political-Cultural Analysis of Organizations. The Academy of Management Review, 12, 144-156.
61. MACHAMER, P., DARDEN, L. & CRAVER, C. F. 2000. Thinking about mechanisms. Philosophy of Science, 67, 1-25.
62. MAQBOOL, M., ZAKARIYA, A. & PARACHA, A. N. 2011. A Critique on Scientific Management. Interdisciplinary Journal of Contemporary Research in Business, 3, 844-854.
63. MARION, R. & UHL-BIEN, M. 2001. Leadership in complex organizations. The Leadership Quarterly, 12, 389-418.
64. MARREWIJK, M. V. & HARDJONO, T. W. 2003. European Corporate Sustainability Framework for Managing Complexity and Corporate Transformation. *Journal of Business Ethics,* 44**,** 121-132.
65. MAXFIELD, R. 1998. Available: http://www.ndu.edu/inss/books/books [Accessed September].
66. MAXFIELD, R. R. 1997. Complexity and Organization Management. Complexity, Global Politics, and National Security.
67. MCKELVEY, B. 1999. Avoiding Complexity Catastrophe in Coevolutionary Pockets: Strategies for Rugged Landscapes. Organization Science, 10, 294-321.
68. MEEK, J. W., DE LADURANTEY, J. & NEWELL, W. H. 2007. Complex systems, governance and policy administration consequences. Emergence: Complexity & Organization, 9, 24-36.
69. MERALI, Y. 2000. The organic metaphor in knowledge management. EMERGENCE, 2, 14-22.
70. MIDGLEY, G. & RICHARDSON, K. A. 2007. Systems Thinking for Community Involvement in Policy Analysis. Emergence: Complexity & Organization, 9, 167-183.
71. MIDGLEY, G. 2008. Systems Thinking, Complexity and the Philosophy of Science. Emergence: Complexity & Organization, 10, 55-73.
72. MILLER, G. J. 1989. Unique Public-Sector Strategies. Public Productivity & Management Review, 13, 133-144.
73. MILLIKEN, F. J. 1987. Three Types of Perceived Uncertainty about the Environment: State, Effect, and Response Uncertainty. The Academy of Management Review, 12, 133-143.
74. MINTZBERG, H. & WATERS, J. A. 1985. Of Strategies, Deliberate and Emergent. Strategic Management Journal, 6, 257-272.

75. MINTZBERG, H. 1979a. An Emerging Strategy of "Direct" Research. Administrative Science Quarterly, 24, 582-589.
76. MINTZBERG, H. 1979b. Patterns in Strategy Formation. International Studies of Management & Organization, 9, 67-86.
77. MINTZBERG, H. 1990. The Design School: Reconsidering the Basic Premises of Strategic Management. Strategic Management Journal, 11, 171-195.
78. MONTANARI, J. R. & BRACKER, J. S. 1986. The Strategic Management Process at the Public Planning Unit Level. Strategic Management Journal, 7, 251-265.
79. MORCOL, G. 1996. Fuzz and chaos: Implications for public administration theory and research. Journal of Public Administration Research and Theory, 6, 315.
80. MORGAN, G. 1980. Paradigms, Metaphors, and Puzzle Solving in Organization Theory. Administrative Science Quarterly, 25, 605-622.
81. MORGAN, G. 2006. Images of Organization, London, Sage Publications.
82. MOWLES, C., STACEY, R. & GRIFFIN, D. 2008. What contribution can insights from the complexity sciences make to the theory and practice of development management? Journal of International Development, 20, 804-820.
83. NAG, R., HAMBRICK, D. C. & CHEN, M.-J. 2007. What is strategic management, really? Inductive derivation of a consensus definition of the field. Strategic Management Journal, 28, 935-955.
84. NARAYANAN, V. K., PINCHES, G. E., KELM, K. M. & LANDER, D. M. 2000. THE INFLUENCE OF VOLUNTARILY DISCLOSED QUALITATIVE INFORMATION. Strategic Management Journal, 21, 707.
85. NEWELL, W. H. & MEEK, J. W. 1997. What Can Public Administration Learn from Complex System Theory? *Administrative Theory & Praxis,* 19**,** 318-330.
86. PALMER, I. & DUNFORD, R. 1996. Conflicting Uses of Metaphors: Reconceptualizing Their Use in the Field of Organizational Change. The Academy of Management Review, 21, 691-717.
87. PICKERING, A. 2002. Cybernetics and the Mangle: Ashby, Beer and Pask. Social Studies of Science, 32, 413-437.
88. PLSEK, P. E. & GREENHALGH, T. 2001. Complexity Science: The Challenge Of Complexity In Health Care. *BMJ: British Medical Journal,* 323**,** 625-628.
89. POISTER, T. H. & STREIB, G. D. 1999. Strategic Management in the Public Sector: Concepts, Models, and Processes. Public Productivity & Management Review, 22, 308-325.
90. RING, P. S. & PERRY, J. L. 1985. Strategic Management in Public and Private Organizations: Implications of Distinctive Contexts and Constraints. The Academy of Management Review, 10, 276-286.
91. SAMOILENKO, S. 2008. Fitness Landscapes of Complex Systems: Insights and Implications On Managing a Conflict Environment of Organizations. Emergence: Complexity & Organization, 10, 38-45.
92. SCHNEIDER, M. & SOMERS, M. 2006. Organizations as complex adaptive systems: Implications of Complexity Theory for leadership research. Leadership Quarterly, 17, 351-365.
93. SCHREYOGG, G. & KLIESCH-EBERL, M. 2007. How dynamic can organizational capabilities be? Towards a dual-process model of capability dynamization. Strategic Management Journal, 28, 913-933.
94. SCHREYOGG, G. & STEINMANN, H. 1987. Strategic Control: A New Perspective. The Academy of Management Review, 12, 91-103.
95. SCHULTZ, R. 2009. Adjacent Opportunities: Engaged Emergence--Getting Beyond Enterprise Fortune Telling. Emergence: Complexity & Organization, 11, 104-105.
96. SEKHAR, R. C. 1981. Corporate Planning Styles in Public Sector. Economic and Political Weekly, 16, M75-M80.

97. SENGE, P. 2006. The Fifth Discipline, revised ed. New York: Currency Doubleday.
98. STACEY, R. D. 1995. The science of complexity: an alternative perspective for strategic change processes. Strategic Management Journal, 16, 477-495.
99. STACEY, R. D. 2003. Strategic Management and Organisational Dynamics: The Challenge of Complexity, Harlow, England, Pearson Education Limited.
100. STACEY, R. D. 2003. *Strategic Management and Organisational Dynamics: The Challenge of Complexity,* Harlow, England, Pearson Education Limited.
101. STACEY, R. D., GRIFFIN, D. & SHAW, P. 2000. Complexity and Management. Complexity & Management, 1-1.
102. STROH, P. D. 2000. Leveraging Change: The Power of Systems Thinking in Action. Reflections, 2, 51-66.
103. SVYANTEK, D. J. & BROWN, L. L. 2000. A Complex-Systems Approach to Organizations. Current Directions in Psychological Science, 9, 69-74.
104. SWORD, L. D. 2008. A Complexity Science View of Conflict. Emergence: Complexity & Organization, 10, 10-16.
105. TAYLOR, F. W. 1911. The Principles of Scientific Management (reprinted). Scien.
106. TILEBEIN, M. 2006. A complex adaptive systems approach to efficiency and innovation. *Kybernetes,* 35**,** 1087-1099.
107. UHL-BIEN, M., MARION, R. & MCKELVEY, B. 2007. Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly,* 18**,** 298-318.
108. ULRICH, W. 2003. Beyond Methodology Choice: Critical Systems Thinking as Critically Systemic Discourse. *The Journal of the Operational Research Society,* 54**,** 325-342.
109. VARELA, F. & MATURANA, H. 1972. Mechanism and Biological Explanation. *Philosophy of Science,* 39**,** 378-382.
110. WEICK, K. E., SUTCLIFFE, K. M. & OBSTFELD, D. 2005. Organizing and the Process of Sensemaking. *Organization Science,* 16**,** 409-421.
111. YASAI-ARDEKANI, M. & NYSTROM, P. C. 1996. Designs for Environmental Scanning Systems: Tests of a Contingency Theory. *Management Science,* 42**,** 187-204.
112. ZHANG, H. 2007. Exploring dynamics of emergence. *Systems Research & Behavioral Science,* 24**,** 431-443.
113. ZHU, Z. 2007. Complexity science, systems thinking and pragmatic sensibility. *Systems Research & Behavioral Science,* 24**,** 445-464.