

UNIVERSITY OF KWAZULU-NATAL
EXPLORING INNOVATION IN THE DEPARTMENT OF
CORRECTIONAL SERVICES: A COMPLEX ADAPTIVE
SYSTEMS APPROACH

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DECLARATION

I, Amon Thuthukani Ngubane, declare that:

The research reported in this dissertation, except where otherwise indicated, is my original research.

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Signed.....

Date:

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This study would not have been a success had it not be for the favour of my Lord and Saviour Jesus Christ. The wisdom and patience that He granted me in this pursuit made a long journey short and for that I will forever be thankful and full of praises to his name.

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DEDICATION

This study is dedicated to the two most important women in my life: my late mother, Christinah Ngubane, and my beautiful wife, Thembeke Ngubane.

ABBREVIATIONS AND ACRONYMS

AAPSA	All Africa Public Sector Innovation Awards
ABSA	Amalgamated Banks of South Africa
BCNY	Business Council of New York
CAPAM	Commonwealth Association for Public Administration and Management
CAS	Complex Adaptive System
CoE	Centre of Excellence
CPSI	Centre for Public Service Innovation
CSA	Correctional Services Act
DCS	Department of Correctional Services
FET	Further Education and Training
FSNC	Free State/ Northern Cape
LMN	Limpopo/ Mpumalanga/ Northern Cape
PSA	Public Service Act
RIIS	Research Institute for Innovation and Sustainability
SAINE	South African Innovation Network
SDI	Service Delivery Improvement
SECRO	Searching, Exploring, Committing, Realizing and Optimizing
SWD	Social Work Directorate
UK	United Kingdom
UNPAN	United Nations Public Administration Network
WPC	White Paper on Corrections 2005

ABSTRACT

This study used a complex adaptive systems approach to explore innovations geared towards the rehabilitation of offenders in the Department of Correctional Services. It examined how innovations came about in view of the complex adaptive nature of the department, which is defined as a complex system with agents having various schema and mental models. It used complex adaptive systems approach as a lens through which to view the emergence of correctional innovations. This was achieved through a multi-methodical qualitative research approach to data collection, using interviews and documentary data to unpack public sector innovation, with the Correctional Services' Service Delivery Improvement directorate as a unit of analysis. This study further explored the compatibility of the five bedrock principles of a complex adaptive system and how such principles have shaped the emergence of innovations in a public sector organization where all innovative efforts are geared towards the improvement of service delivery as opposed to profit-making for competitive advantage, as is often the case with the profit-making sectors. In view of the dynamic and nonlinearity nature of organizational systems, the use of a complex adaptive systems perspective provided this study with a pivotal tool to analyse innovation as an emergent property of a complex adaptive system rather than as a carefully planned organizational element emanating from either strategic planning or research and development initiatives of an organization. This is further strengthened by the lack of employment of complexity science in public sector organizations like Correctional Services in particular. The study sought to achieve ground-breaking work in using complex adaptive systems perspective in innovation within the Department of Correctional Services, a terrain that has not been ventured into before. It was seen to be of crucial significance to explore innovation using complex adaptive systems and to adopt a paradigm that was initially designed for the natural sciences, and has been adopted by profit-making organizations and cascaded to the non-profit making sector as represented by the Department Correctional Services.

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CHAPTER 1

INTRODUCTION

1.1 Introduction to innovation and complex adaptive systems (CAS)

Innovation has often been associated with organizations that are profit-oriented in their methods to establish competitive advantages and meet the necessary fitness landscapes challenges to eschew the environmental forces within which they find themselves. It is important to note at the outset that there has hitherto been no known research conducted into innovation employing a complex adaptive systems perspective regarding not-for-profit entities like the Department of Correctional Services (DCS). There is therefore a dearth of available empirical information from which to draw and establish a conceptual framework. This study, however, endeavours to capitalize on the plethora of research on innovation generally, and expands on such from a limited complex adaptive systems (CAS) perspective on innovation. It aims to fill the gap on the subject of innovation in the public sector using a complex adaptive systems approach as a lens through which innovation can be viewed. It explores various concepts and definitions that relate to innovation. Further, it expounds the complex adaptive systems approach and explores how such an approach can inform and enhance innovation and creativity in an organization like the DCS. This culminates in an integrative overview of innovation and complex adaptivity in organizations and the development of a conceptual framework applicable to organizations that are service delivery-oriented. This is achieved through the exploration of innovations in the DCS that are geared towards the enhancement of service delivery, the core of which is rehabilitation of offenders under conditions that are congruent with human dignity and safe custody.

1.2 Discussion of the problem

Established by section 7(2) of the Public Service Act of 1998, the Department of Correctional Services (DCS) is a public service that aims at the safe custody and rehabilitation of offenders so as to contribute to a safer South Africa and a better life for all. The DCS aims to achieve this through operating in a self-sufficient manner and, as far as practicable, according to the business principles as enshrined in the Correctional Services Act no 111 of 1998. It aims to achieve this through its vision of being “the best in the world in rendering correctional services with integrity and commitment to excellence”. It is an ambitious ideal that challenges the organization to seek all possibilities in carrying out a vision of this magnitude. Whether or not

the department is well positioned, as a complex adaptive system, to attain this ideal is worth exploring in another study. As a public service, the DCS is expected to take the legislative mandate of the Republic of South Africa, in as far as safety and security is concerned, and implement it in line with service delivery apex priorities. To this end, the DCS, as an organization with all complex adaptive systems characteristics, has to adapt, innovate and systemically position itself to share in the budget allocated by the state. Unlike the private sector where innovation is informed by fitness landscapes and the need to realize profit while taking into account significant environmental factors, the DCS is driven by service delivery objectives.

The national Department of Correctional has demarcated itself regionally instead of using the current national provincial demarcations even though it uses provincial names. It has 6 regions that are governed by Regional Commissioners viz. Western Cape comprising 10 Management Areas; Gauteng comprising 8 Management Areas; Northern Cape/ Free State comprising 6 Management Areas; Limpopo, Mpumalanga and Northwest (LMN) consolidated as one region and comprising 7 Management Areas; Eastern Cape comprising 8 Management Areas and KwaZulu-Natal comprising 7 Management Areas. The Department of Correctional Services has a staff complement of about 41 500 employees managing an offender population of about 158 921, both sentenced and unsentenced offenders, within 241 Correctional Centres/ facilities. The prison infrastructure was designed to cater for 118 154 offenders and is thus overpopulated by 40 767 (*source* Management Information System – Department of Correctional Services).

In the post-apartheid South Africa the Department of Correctional Services has ventured into a number of transformative process in order to align itself with a democratic dispensation. These transformative processes include the demilitarization process; the 7-Day Establishment aimed at reducing the compensation of employees with overtime pay, increasing employee salary spending by 45%; the transformation from a prison system with a focus on implementing court sentences of incarceration to correctional systems focusing on rehabilitation. The change of focus from a prison system to a correctional system necessitated the transformation of mental models for both employees (correctional officials) and the client (offenders) which would result in the endorsement of creative and innovative ways of rehabilitation.

In 2001 the Minister of Public Service and Administration approved the establishment of the Centre for Public Service Innovation (CPSI) whose mandate was to develop innovative, sustainable and responsive models for improved service delivery. The CPSI endorsed its definition of innovation as “applied creativity that is contextually relevant”. It aims to unlock

innovation in the public sector and create an enabling environment for improved and innovative service delivery. The CPSI's main functions are:

- To research and develop sustainable models for innovative service delivery to improve service delivery;
- To facilitate the creation, adaptation, piloting and mainstreaming of innovative solutions within the public sector;
- To create and sustain an enabling environment which entrenches a culture of innovation in the public sector through innovative platforms and products; and
- To ensure systematic and effective programme co-ordination and administration.

These functions are meant to enhance innovation in the delivery of effective and efficient services to the public by state department of which the DCS is one. The DCS took the initiative to enhance service delivery through innovative means in 2008 when it hosted the National Innovation Unlimited Conference for the DCS, the theme of which was 'Thinking out of the Box'.

Like all state departments, the DCS is a bureaucratized public service. Carlisle and McMillan (2006: 5) point out a critical element in this regard when they argue that "established research on creativity and innovation suggests that rigid procedures, bureaucratic regulations and hierarchical controls hamper creativity and open communications". This argument raises the following three critical questions that form the backbone of this inquiry:

- What innovations are there in a bureaucratic and highly controlled department like Correctional Services and how have they come about?
- Are Correctional Services innovations incremental, radical or both?
- If DCS is viewed as a CAS, how have Correctional Services innovations been influenced by the five bedrock principles of a CAS?

Further, in view of the CSPI's definition of innovation as "creativity that is contextually relevant" (A Pocket Guide To Innovation In The South African Public Sector, 2004:17), the key question that arises is, what are the innovations that have emerged in pursuit of service delivery improvement?

This study seeks to highlight key innovations that have emerged to propel the realization of the goal of the DCS, that is, the rehabilitation of offenders under conditions consistent with human dignity and safe custody, from a CAS perspective.

1.3 Focus of the study

Creswell (1994:2) defines the focus of the study as the central concept being examined in a scholarly study. Innovation is a broad area of study with various elements that are of vital importance in advancing scholarly research. In their report entitled 'Innovation Vital Signs', the Department of Trade and Industry (DTI) highlights the importance of innovation, pointing out that innovation has a key contribution to make in the achievement of national goals like economic growth, competitiveness, comparative advantage, national security and a higher standard of living. This study focuses only on the DCS' innovations for the enhancement of service delivery and the attainment of its policy mandates as instructed by government, using a CAS perspective as a lens through which DCS innovations emerged. This service delivery goal for the DCS is the rehabilitation and safe custody of offenders under conditions that are consistent with human dignity. This study therefore focuses on innovations that have emerged in pursuit of this goal from a CAS perspective.

Creswell (1994:2) argues further that a scholarly study may emerge through an extensive literature review, may be suggested by colleagues, researchers or advisors, or may be developed through practical experience. The key critical concepts explored in this study are innovation and complexity. Contrary to Creswell's sources for the emergence of a scholarly study, this study emerged after the researcher attended the 'Leading in Turbulent Environments' module, offered by the University of KwaZulu-Natal's Leadership Centre, where a CAS approach to organizational management was explored. After detailed insights were gathered from the module a keen interest was developed to investigate the emergence of innovation in the DCS as a CAS. This study sought to determine the extent to which a bureaucratized organization like the DCS can be innovative in its pursuit of rehabilitation and safe custody, taking into cognizance the complex adaptive nature of its systemic scenery. It should be stated from the outset that this study deliberately eschews the inclusion of traditional approaches to innovation that employ and promote research and design as key inputs to the process of innovation. The reason for the avoidance is owing to the unsystemic nature of such traditional approaches and the possibility that this may divert focus from the use of complex adaptive systems approach to the process of innovation. It is therefore the focus of this study to look at the emergence of DCS innovations from a CAS perspective.

1.4 Research goals and sub-goals

The goal of the study is to explore innovation in the DCS using a CAS perspective. It seeks to highlight key innovations in the DCS and explore how such innovations are influenced by the nature of the organization as a CAS. Such exploration is in view of the bureaucratized nature

of the DCS and how such bureaucracy tampers with innovation. It is therefore the goal of this study to employ a complex adaptive systems perspective to a public sector organization, exploring innovation geared towards service delivery improvement, viz. the rehabilitation and safe custody of offenders under conditions consistent with human dignity. This study sought to use CAS as a lens through which DCS innovations can be viewed and understood, thus making opening a pathway for the furtherance and enhancement of future innovations.

1.5 Research methodology

Babbie and Mouton (2001: 647) define research methodology as “the methods, techniques and procedures that are employed in the process of implementing the research design or research plans, as well as the underlying principles and assumptions that underlie their use”. The study will employ a qualitative research approach which Creswell (1994: 104) defines as “a process of inquiry for understanding a social or human problem based on building a holistic picture, formed with words”. It differs from a quantitative research methodology in that it “produces findings that are not arrived at by statistical procedures or any other means of quantification” (Strauss and Corbin 1998: 10). Denzin and Lincoln (1994: 2) provide the following definition of qualitative research: “Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them. Qualitative research involves the studied use and collection of a variety of empirical materials case study, personal experience, introspective, life story interview, observational, historical, interactional, and visual texts – that describe routine and problematic moments and meaning in individuals’ lives.”

1.5.1 Methodology of the study

Galliers (1994: 164) indicates that in order to successfully design or re-design business processes there needs to be:

- Participation so that there is a ‘buy-in’ and agreement on the appropriate solution;
- Significant learning about the issues that could affect the implementation of a solution;
- Formulation and understanding of the various alternative solutions that stakeholders recommend; and
- Agreement amongst stakeholders on the required activities to enable a relevant system to improve the situation.

Parnaby (1994: 503), Ormerod (1995: 280) and Weston (1999: 836) claim that paying considerable attention to these softer issues of cultural change, motivation and communication of the total vision are essential factors to ensure that the final systems are what stakeholders really want. The success of a system is solely dependent on the success of stakeholder participation and the effective communication of the vision. In soliciting critical stakeholder buy-in, the researcher scheduled a meeting with them so as to outline clearly all research objectives. Although there was not going to be an elaborate discussion of research findings which would have assisted in the formulation and understanding of alternative solutions, the researcher pledged to submit and present research findings upon completion of the study with recommendations.

1.5.2 Methods of data collection

In this study the data was collected using semi-structured interview guide which, according to Tutty, Rothery and Grinnell (1996: 56), have “predetermined questions or key words used as a guide”. The open-ended questions were developed to extract as much data as possible in order that a complex adaptive systems approach could be meaningfully applied. This allowed for follow-up questions to be made during the probing process as a way of finding richer meaning from respondents. Other sources of data were documents which the directorate of Service Delivery Improvement provided, for example innovation entry forms which detail the innovator, innovation and its objectives.

1.5.3 Data analysis

Since this study used more than one method to collect data (interviewing research participants and collecting documentary evidence), a multiple-data analysis method of triangulation which was adopted. This technique is described by O’Donoghue and Punch (2003: 78) as a “method of cross-checking data from multiple sources to search for regularities in the research data”. Also enriching the analysis of data was the adoption of eight steps for qualitative data analysis, as proposed by Tesch in Creswell (1994: 155). The eight steps for qualitative data analysis are:

- Step 1 Read through all the transcripts to gain the sense of the whole.
- Step 2 Obtain the substance of one of the transcripts and write thoughts in the margin.
- Step 3 Make a list of all topics gained through reading each transcript, cluster the topics into major, unique and leftover topics.
- Step 4 Code the various categories.

Step 5 Group together categories and draw lines between categories to show interrelationships.

Step 6 Decide on the final abbreviation for each category.

Step 7 Assemble the data and perform a preliminary analysis.

Step 8 Record findings.

These steps were customized to six fundamentals that were relevant to this study. Further details on their use are provided in Chapter 3 on research methodology.

Since this study explored innovation using a complex adaptive systems approach, Carlisle and McMillan's (2006) article on innovation and complex adaptive systems was used as a conceptual framework from which meaningful deductions were drawn.

1.6 Research questions

This study seeks to answer the following three critical research questions:

- What innovations are there in a bureaucratic and highly controlled department like Correctional Services and how have they come about?
- Are Correctional Services innovations incremental, radical or both?
- If DCS is viewed as a complex adaptive system, how have Correctional Services innovations been influenced by the five bedrock principles of a complex adaptive system?

1.7 Significance of the study

In view of the dynamic and nonlinearity nature of organizational systems, the use of the complex adaptive systems (CAS) perspective is of pivotal importance. This is further strengthened by the absence of complexity science in public sector organizations. The study aims to offer ground-breaking work in its exploration of the CAS perspective in innovation within the Department of Correctional Services. The CAS approach to innovation was initially designed for the natural sciences, adopted by organizations that are profit-making and cascaded to the non-profit sector. This study is unique in the Department of Correctional Services since the concepts enshrined in complexity science are not commonly understood and used in the DCS and perhaps in the public sector at large. Furthermore, the significance of this study is that it provides a unique perspective in understanding innovation using a complex adaptive systems approach.

1.8 Limitations of the study

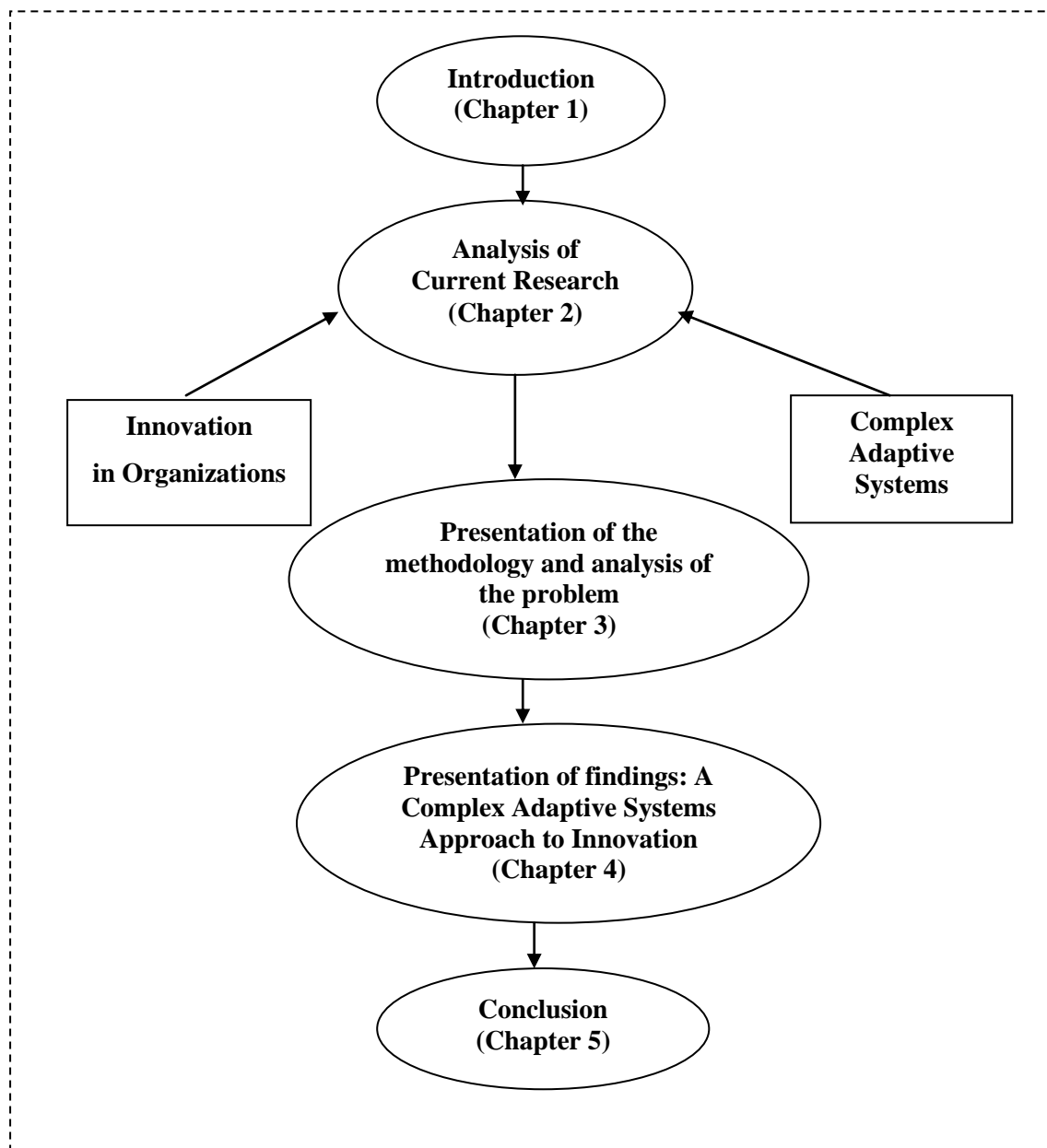
Due to the gigantic size of the Department of Correctional Services (DCS), commanding a workforce of about 45 000 employees, this study was limited to the national head office with specific reference to the Service Delivery Improvement Directorate, a directorate that is tasked with the management of innovation and the hosting of events that highlight the importance of improved service delivery, viz. the innovation conferences and national Correctional Award ceremonies. The study was confined to an exploration of the directorate's personnel and documents that are innovation-oriented. An assumption of this study is that the directorate was well informed of national innovations geared towards service delivery improvement. The reason for the study to be conducted at head office level is due to the fact that the researcher is based at head office and thus accessibility of the directorate would not have been problematic. It is also due to high vacancy rate in this directorate that only the Director: Service Delivery Improvement and her deputy director were the main participants or subjects of this inquiry. Further recorded data was received from various regions as recorded innovation submissions.

This study could have explored innovations both from Correctional Service delivery patterns towards rehabilitation and the innovations emerging from offenders to counter rehabilitation efforts. It could have investigated the endeavour of Correctional Services to change offenders' value systems through innovative measures to rehabilitation and the emergent counter innovations from offenders as dynamic agents within the complex adaptive correctional system. However, these were deliberately eschewed in order to confine the study to emergent innovations from agents of rehabilitation, correctional officials.

This study has been further limited by the dearth of literary research on innovation using a complex adaptive systems (CAS) approach. It relied chiefly on limited prior research to inform the baseline and it formulated a conceptual framework of limited scope in an area of innovation that has been so broadly researched without any emphasis on complexity as a founding theory. To that effect Carlisle and McMillan's (2006) research on innovation using a CAS approach has been primarily utilized as a lens through which innovations in the Department of Correctional Services could be uncovered.

1.9 Overview of the structure of the dissertation

Figure 1: Overview of the structure of the dissertation



1.10 Summary and conclusion

This chapter set out the conceptualization of this study, highlighting the background through which Correctional Services innovation initiatives emanate and the CPSI drive to enhance innovation in the broader public sector in view of its definition of “applied creativity that is contextually relevant” which has served as a bedrock on which all DCS innovations are based. This chapter further explored and justified the employment of a qualitative research approach

in a study of this nature. This was achieved through the exposition of the research methodology, including research design, data collection and analysis method, highlighting the significance of the study and the limitations thereof. The graphic overview of the structure of the dissertation provides an overview of the study.

CHAPTER 2

ANALYSIS OF CURRENT RESEARCH ON INNOVATION

2.1 Introduction

Innovation has been conceived as one of the most pivotal contributory factors to organizational success. It has been argued that the success of organizations in establishing market niches and maximizing profits has, to a very large extent, been influenced by the pace at which the organization innovates. Prajogo and Ahmed (2006: 499) concur with this position by pointing out that “from the beginning of the Industrial Revolution, innovation has been a key source of competitive advantage”. Technological systems that are currently used – be they computers, cell phones or cars – are a consequence of innovation. Current changes that have been seen through the globalization process, in technological or economic sectors, have been largely influenced by innovation. It has been classified as one competitive advantage that an organization can use in its production or processing of production to enhance its ability to dominate its rivals. There are many companies that have capitalized on the importance of innovation and have furthered their prospects of survival in competitive markets and their ability to thrive. Prajogo and Ahmed (2006: 499) further state that “research evidence has identified a range of benefits for those companies that have been able to successfully exploit innovation strategies to realize higher profits and market share”.

Given the role that innovation plays in propelling company/organizational success, it is imperative to explore some of the key features of what constitutes innovation. Research conducted by Tidd, Bessant and Pavith (2005) shows that services accounted for around three quarters of value and employment in the advanced economy, and innovation has become increasingly central to the performance of these services in the private and public sectors. This study explores innovation by looking at the various definitions that have been ascribed to it. Innovation is not merely product or service improvement, but rather it is something deeper and more complex. This study further explores factors that influence innovation in organizations, both private and public. It concludes by exploring innovation from a systems perspective, using a CAS approach to innovation to explicate the intricate dynamics that accompany creativity and innovation.

2.2 Perspectives on what innovation is

Innovation in both profit making and non-profit-making organizations is seen to have crucial benefits in advancing the goals of such organizations. This notion has led to the wide acceptance of the belief, as Baumol (2002: 79) points out, that “all of the economic growth that has occurred since the eighteenth century is ultimately attributable to innovation”, adding that “in a capitalist economy innovation rather than price is the primary competitive dimension, and less innovative firms will find their markets shrinking as they lose business to their more innovative competitors”. For the profit-making sector, it has been argued that innovation results in “new products and services, gives rise to new markets, generates growth for enterprises and creates customer value. It further improves existing products and processes; thereby contributing to higher productivity, lower costs, increased profits and employment” (Baumol 2002: 79). However, according to a CAS approach, these benefits are not linearly achieved without systemic dynamics that may yield totally divergent results from the expected ones due to unpredictability. From a CAS perspective, innovation is not a singular and independent activity but a multi-dimensional system of interacting factors, processes and agents. There has been a dramatic increase in the literature on innovation as the importance of innovation to entrepreneurship grows. In spite of this increase and the resulting vibrancy within the field, Johannessen et al. (2001: 1) argue that “prior research has not yielded a widely-held consensus regarding how to define innovation”. “Additionally”, they point out that “without a good working definition, we still lack good measures of innovation”.

The lack of a common definition of innovation has been problematic, culminating in what Johannessen et al. (2001: 1) refer to as “a resulting inconsistency that makes it difficult to conduct comparative studies as it is often unclear whether researchers are studying the same phenomena”. They argue further that “the picture that emerges from the diverse approaches underscores the point that a multitude of factors are interacting to induce innovation in economic life. The various perspectives are indicative of the lack of common definitions and measures of innovation”. The multitudes of interacting factors that they identify drive the phenomenon of innovation to systems dynamics. There are various definitions that have been provided by economists and public sector-based organizations in their pursuit to associate their meaning of innovation to their various fields of practice and needs.

The CPSI defines innovation as applied creativity that is contextually relevant (A Pocket Guide to Innovation in the South African Public Sector, 2004:17). This definition has been adopted to give meaning to all service delivery-oriented sectors of the public service. The CPSI definition of innovation does not highlight the importance or value of newness as is often the case with other definitions explored in this study. Its primary focus is on creativity that is

contextually relevant. Other definitions of innovation view it as constituting the intersection of invention and insight, leading to the creation of social and economic value. The creation of social and economic value, as enshrined in this definition, provides for the introduction of the concept of improvement, which, in the CPSI definition, may not be the case. The element of improvement is clearly outlined in the European Commission's (1995) view of innovation as covering a wide range of activities to improve firm performance, including implementation of new or significantly improved product, service, distribution process, manufacturing process, marketing method or organizational method. For the European Commission, innovation is seen to embrace a broader spectrum organizational dynamics accommodating both the profit and the non-profit sectors. It further defines innovation as "the successful production, assimilation and exploitation of novelty in the economic and social spheres" (European Commission, 1995: 9). This broader definition, as all-embracing as it is, does not provide measurability thereof. This therefore brings to the fore one of the major concerns as raised by Johannessen et al. (2001).

The Business Council of New York (2004) defines innovation as the blend of invention, insight and entrepreneurship that launches growth in industries; generates new value and creates high value jobs. For them, innovation means the design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational models for the purpose of creating new value for customers and financial returns for the firm. Congruent to the European Commission's view of innovation, the Oslo Manual defines innovation as the implementation of new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. Embracing the above quoted definitions is the definition adopted by Barnes and Conti Associates (2008: 1) that sees innovation as "the design, invention, development, and/or implementation of new or altered products, services, processes, systems, organizational structures or business models for the purpose of creating new value for the customers and financial returns for the firm". Other definitions have viewed innovation as "novelty in action" or "ideas that work", putting more emphasis on a new practice than on just new ideas (Hartley, 2005: 27). This definition draws its link from Cherkasky and Slobin (2007: 63-64) who defined innovation as "a disciplined process by which an idea is generated, realized, and evolved resulting in significant business value and an improved customer experience". They assert that innovation is not an activity that is complete in itself; it comprises three phases: idea generation, realization and evolution. They define the process of idea generation as the generation of "an idea worth realizing through ideation, research, analysis, synthesis and evaluation"; the process of realization involves "bringing an innovation idea to life and realizes the intended value through planning, design, testing, iteration, measurement and implementation". The third phase is the evolution phase where

innovation is “continuously improved until it can no longer deliver the intended value through reframing, optimizing, assessing, and extending”.

All the definitions that have been provided above are framed by the following concepts: creativity, newness, invention, development, market, evolution, generation, design, products, services, processes. Complexity theory concepts would include among other concepts the following: emergence, evolution, agents, interaction, dynamics, systems etc. However, Johannessen et al. (2001: 1) highlight critical questions that could bring about some degree of uniformity in the understanding of innovation as defined by the various innovation exponents. The common denominator of ‘newness’, as seen in most innovation definitions explored above, is problematic in that, as argued by Johannessen et al. (2001: 1) although newness is a theme in all of these definitions, they do not agree on three basic questions about the nature of newness: what is new, how new, and new to whom? Johannessen et al. go on to argue that specifying what is new is important for distinguishing innovation from mere change (Slappendel, 1996) because all innovation presupposes change, but not all change presupposes innovation. Additionally, none of the above definitions addresses the issue ‘how new?’ – that is, the degree or extent of newness that constitutes an innovation. Finally, the issue of ‘new to whom?’ is also unresolved.

2.3 Innovation categories and types

There are seven different innovation categories that Hartley (2005) views as critical elements in examining innovation either in the public or private sector. These are: “product innovation – which he views as the creation of new products; service innovation – the development of new ways in which services are rendered to customers; process innovation – new ways in which organizational processes are designed; position innovation – new contexts or users; strategic innovation – new goals or purposes of the organization; governance innovation – new forms of citizen engagement, and democratic institutions; rhetoric innovation – new language and new concepts development”(Hartley 2005: 28). However, there are innovations that are seen to be multi-dimensional; innovations that integrate various innovation types and categories. Whereas Hartley (2005) identifies seven innovation categories, Barnes and Conti Associates (2006: 74-76) identify four pivotal targets for innovation viz. product innovation; positional innovation; process innovation and paradigm innovation. Product innovation for them is “outputs that have value for internal or external customers”; process innovation being “sequences of activities that enable tasks to be accomplished”; positional innovation being “the selection and communication with customers”; and paradigm innovation which is about “seeing the world differently and redefining the way we and others think about the business”.

Carlisle and McMillan (2006: 2) have differentiated between two types of innovations: exploitative and explorative. Exploitation innovation is described as a “short term performance drive geared towards exploiting existing knowledge, competencies and capabilities, making incremental improvements to sustain competitive edge”. Exploration innovation is described as referring to “longer term survival involving exploring new knowledge and new environments in which to build new competencies and capabilities for the future”. Contrary to Tom Peters (1999: 29), who stresses the need for “radical ‘frame-breaking’ discontinuous innovation at the expense of incrementalism” arguing that “the only sustainable competitive advantage comes from out-innovating the competition”, Carlisle and McMillan (2006: 2) argue that these activities need to be balanced to sustain current performance and archive organizational renewal. They therefore argue that “exploration requires a short term view of how to make the most of existing competencies through incremental improvements”. Leonard-Barton (1992: 111-125) points out that the most preferred innovation among organizations is exploitation-oriented innovation leading organizations to fall into what he refers to as the ‘competence trap’ in which existing competencies become obsolete before new ones have been developed.” Many organizations, he adds, are more effective as incremental innovators. He, however, suggests a need for “the engagement of both divergent and convergent learning, radical and incremental innovation, exploration and exploitation in the longer term innovation efforts”. This view poses an element of a balanced and stable equilibrium which complexity theorists perceive as problematic. Carlisle and McMillan (2006: 3) point out that “incremental innovation geared to efficiency may drive out radical innovation making the two incompatible”. However, adopting a complexity perspective challenges this notion as it argues that complex adaptive systems adapt to environmental conditions in which they find themselves either exploitative or explorative or both. Carlisle and McMillan (2006: 3) explicate that a “complex adaptive system does not differentiate between the long term and the short term – it simply self organizes appropriately”.

The notion of a balance has to be contextualized. The assessment research findings that suggest that organizations prioritize exploitative innovation (Leonard-Barton: 1992) may not necessarily apply to organizations that are non-profit oriented like the public sector. This implies that conclusions of this nature have to be contextual to make relevant meaning. It is worth noting that their research evidence for the prioritization of exploitative innovation is referring to firms whose primary objective is profit production. Whereas the notion of ‘balance’ and dual applicability of exploitation and exploration innovation may be construed as impossible for firms, as pointed out earlier, it may be an advantage for bureaucratized and highly controlled public service organizations. Carlisle and McMillan (2006: 3) argue that

“complex adaptive systems are able to undertake short term exploitation activities as required and to invest in longer term exploration as needed”.

Webb et al. (2006: 30) raise two critical components of innovation emanating from the five generations of innovation models suggested by Rothwell (1994: 33-53), viz. “the technology push model; the market pull model; the coupling model; the integrated model; and fifth generation – the systems integration and networking model”. The two critical components emanating from these models are continuous and discontinuous innovation. Webb et al. argue that continuous innovation is an approach suited for stable environmental conditions and the mental frameworks “based on clear and accepted rules of the game”. Discontinuous innovation, they argue, means “there are no clear rules, and that these emerge over time, with a high tendency toward lack of clarity and high ambiguity”. Dvir et al. (2004) point out that “while continuous innovation was suited for path-dependant strategies and refined, stable operating routines, discontinuous innovation calls for path-independent strategies based on an emergent, probe and learn approach, where operating patterns are emergent and fuzzy”. Simultaneous implementation of different types of innovation, viz. incremental and discontinuous innovation has been regarded as impossible. O’Reilly and Tushman (2004: 74) have emphatically argued that “the same organization cannot successfully pursue various types of innovation”.

Olson and Eoyang (2001) suggest four categories of innovation: “New-to-the-market-products – products that are new both to the company developing them and to the market place using them; Line extensions – products that are new to the market place but not to the company; Me-too-products – those that are new to the company but not to the market place; Products modification – existing products that have been simply modified”. Hartley (2005: 27) argues that “some writers reserve the notion of innovation for ‘radical’ or ‘breakthrough’ novelty while others emphasize a spectrum of innovation from large scale dramatic, ‘head-line making’ innovations to small scale, incremental changes”. Moore, Sparrow and Spelman (1997: 276) argue that “not all organisational changes qualify as innovations. Some are simply too small, obvious or idiosyncratic to warrant much analytical attention. Those changes worth recognising as innovation should be globally (or at least locally) new to the organisation, be large enough, general enough and durable enough to appreciably affect the operations or character of the organisation”. The novelty and newness of ideas are what Hartley (2005) points out to be the main distinguishing factor between innovation and invention. Innovation categories and types as highlighted above indicate the varying degree to which innovation can be viewed or construed. It is this very differential positioning that renders the subject of innovation a broad area with divergent positions. This may also be one of the contributory

factors to the lack of a common definition of innovation. In his attempt to provide an all-embracing definition, Torild Alise W. Oddane (2008: 30) defines innovation as “collective, open-ended activity aimed at the creation and implementation of new, appropriate products or processes in order to generate significant economic benefit and other values. An innovation in terms of the outcome of a collective, open-ended activity is a product or process that generates significant benefit and other values. A product or process is innovative to the extent that members of a relevant social group independently agree on it being innovative”.

2.4 Innovation: a holistic approach

There are various perspectives on what innovation is. Some definitions suggest that innovation is an invention process where something novel is made to enhance organization competitiveness or product and production process is improved to enhance company/organizational competitive advantage. Tidd (2001: 169-183) describes innovation as “new ideas and practices brought into implementation”. He further argues that “it may also include reinvention or adaptation of an innovation in another context, location or time period”. This perspective of innovation had earlier been negated by Lynn (1997: 96) who argues that innovation should not be “seen as another name for change or improvement or for even doing something new lest anything qualifies as innovation”. He views innovation as an “original, disruptive and fundamental transformation of an organization’s core tasks”. Concurring with Tidd (2005), Moore and Hartley (2008) prescribe that innovation should be perceived as “a key means to go beyond the quality improvement approaches of the 1980s and 1990s into a step change in the overall efficiency, effectiveness and responsiveness”.

These above definitions of innovation have made a crucial contribution to further enhance innovation from a systemic perspective. Von Stamm (2008: 1) has identified some crucial differences between creativity and innovation. For her, creativity implies “coming up with ideas” but sees that process as incomplete without implementation. Her explication perceives creativity as a cornerstone for innovation which she refers to as the “building block for innovation”. Innovation in this regard is seen as the end product of successful creative idea generation plus implementation – which is putting ideas into practice. The putting of ideas into practice comprises three aspects which Von Stamm (2008:1) presents as: “idea selection, development and commercialization”. Creativity as a critical point of departure for innovation is perceived to be an individualized act, whilst implementation requires a group effort. Her deliberation provides for a vital point of associating creativity to existing body of knowledge. For Von Stamm (2008) the body of knowledge is as vital as the novel idea and creative people spend years and years acquiring and refining their knowledge base. The level of creativity as

an individual act varies from individual to individual. However, it is a process that can be “supported through training and by create the right work environment and atmosphere”.

In their assessment of the work environment Amabile et al. (1996) identify five environmental components that are critical in affecting creativity, viz. encouragement of creativity; autonomy; resources; pressures and organizational impediments. The first component, which is encouragement of creativity, they describe as entailing encompassing information flow and support for new ideas at all levels of the organization, from top management, through immediate supervisors, to work group. The second component of autonomy or freedom refers to the “day-to-day conduct of work, as a sense of individual ownership of and control over work. The third component refers to “materials, information and general resources available for work”. The fourth environmental component, pressures, refers to “both positive challenges and workload pressure”. The fifth and final environment is organizational impediments to creativity, which she argues, include conservatism and internal strife Amabile et al. (1996: 1154-1185).

An important observation by Von Stamm (2008) is the nature of creativity stimulation, arguing that it cannot be imposed. Effective stimulation to creativity is inspiration. Creativity endorses intangible softer individual systems like intuition. Such an approach to creativity which is a cornerstone to innovation is systematic in that it holistically encompasses key and critical environmental components that have either progressive or adverse effects to innovation. She argues that in order for people to be creative they have to think differently; hence in order to be innovative they have to behave differently.

For Von Stamm (2008: 3) innovation is “a frame of mind”. In advocating a systems approach to innovation, she (2008) emphasizes the significance of a holistic approach. She highlights five key areas in organizations that need to be aligned to the innovation ambition.

She firstly argues that an organization needs to have a vision that is innovation-aligned to develop and select meaningful concepts. Such a futuristic state is captured in the company’s vision and strategy. Secondly, she links the organization’s vision and strategy to the leadership style of the organization, arguing that it needs to support and encourage innovation. This, she argues, is attainable when the leadership is committed to enhancing an environment that encourages experimentation, exploration and collaboration and in which failure is tolerated. This position is emphasized by Prajogo and Ahmed (2006: 450) when they point out that the element of leadership is of more crucial significance “when innovation is concerned with radical change as it requires a level of learning and change that is often disruptive, risky and costly”. This, Prajogo and Ahmed (2006: 450) argue, “requires energy (resources and power)

which is primarily owned and controlled by top management, to overcome organizational inertia”. Thirdly, Von Stamm (2008) points out that processes can become obstacles for innovation if they are used as means of control; rather, she argues, they are to be used as enablers and thus can support a culture of innovation.

Fourthly, the conduciveness of the physical work environment plays a role of crucial significance in supporting behaviours that are likely to lead to innovation. Fifthly, company culture also is seen to be playing a critical role in the enhancement of a holistic approach to innovation. Von Stamm (2008) points out some culture attributes that epitomize an innovative organization, viz. challenging the status quo, prototyping, collaboration, experimenting and learning from failure. Finally, she argues for the importance of one of the most crucial organizational aspects that is rarely taken into account on innovation ventures: the environment within which the organization is located. She argues that no organization operates in a vacuum thus the context serves two critical aspects: firstly, understanding of the wider context and secondly, linkages with external constituencies.

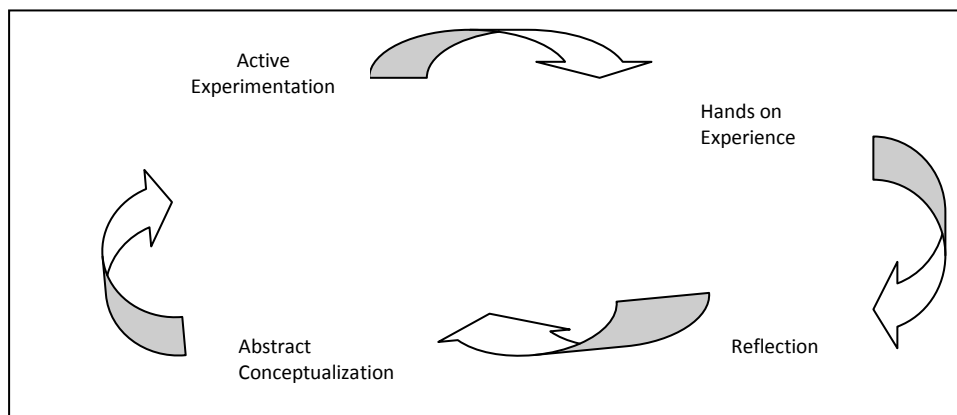
The link that has been drawn by Prajogo and Ahmed (2006: 450) between what they term “innovation stimulus, innovation capacity and innovation performance” has been overlooked by Von Stamm’s (2008) exploration of innovation. Prajogo and Ahmed (2006: 450) have argued that in order to “achieve innovation performance, organizations first need to develop the behavioral and cultural context and practices for innovation (i.e. stimulus), and only within such conducive environments is it possible for organizations to develop innovative capacity in research and development and technology so as to more effectively deliver innovation outcomes and performance”. Their research findings highlight that innovation stimulus and innovation performance are in effect mediated by innovation capacity, a critical point that Von Stamm (2008) disregarded in her analysis of a holistic approach to innovation.

2.5 Organizational learning and innovation

Learning is key to successful innovation. Cheng and Van der Ven (1996: 593-614) argue that “in stable conditions with higher degrees of control, learning tends to be a narrowing and converging process of testing hence in chaotic conditions it is a process of expansion, divergence and discovery”. The latter facilitates radical innovation, the former incremental innovation. However, organizational learning that has seemed influential for business purposes (Van Reekum, 2005: 144) has been the adoption of Kolb’s (1984) theory of learning referred to as “experiential learning”. In this theory, Kolb (1984) proposes a learning cycle, arguing that learning is a continual process.

As reflected in Figure 2, Kolb (1973: 2) bases his argument on the notion that “learning is a cyclical process, which needs to contain elements of each quadrant of the cycle before learning is possible.” He describes the learning cycle as: “immediate concrete experience as the basis for observation and reflection. These observations are assimilated into a ‘theory’ from which new implications for action can be deduced. These implications or hypotheses, serve as guides in acting to create new experiences” Kolb (1973: 2). One could argue that if innovation, as outlined earlier, is more about the creation or invention of something new, the learning cycle provides a crucial leverage for enhancing innovation. This it does organizationally by allowing for the process of reflection in order to conceptualize how things could be done differently based on experience.

Figure 2: Kolb’s Learning Cycle (1973:2)



In line with the views explicated by Kolb on experiential learning, Fonseca (2002) perceives innovation from the perspective of complex responsive processes of relating and thus provides a description of innovation as ‘a new patterning of our experiences of being together, as new meaning emerges from ordinary, everyday conversations taking place in the working environment’. The emergence of new meaning is seen to be crucial even by systems thinkers like Jackson (2007: 122) when he argues for the emergence of new mental models. Jackson argues that “learning requires an empowered workforce operating under favourable group dynamics that allow new mental models to emerge so that learning can be double loop”.

Jackson (2007: 122) argues for the use of the ‘edge of chaos’ concept, one of the key characteristics of complex adaptive systems, to articulate how learning and self-organization can be enhanced. He argues that complexity theory concludes that all complex adaptive systems can operate in either of the three zones: “a stable zone, an unstable zone and at the edge of chaos, a narrow transition zone between stability and instability” Jackson (2007: 122). In the stable zone, he points out, organizations ossify. In the unstable zone, he argues that

organizations disintegrate. However, at the edge of chaos, he points out that spontaneous processes of self-organization occur and innovative patterns of behaviour can emerge. He advocates that in order for organizations to be successful in creativity and innovation, they have to operate at the 'edge of chaos' zone.

2.6 Public sector innovation

Hartley (2005: 28) highlights that there are sceptical views of innovation in the public sector. He argues that "innovation is generally taken as a given for private firms: it is part of the competitive landscape. For the private sector, innovation is often seen to be a virtue in itself as well as a means to ensure competitiveness in new markets, or to revive flagging markets" Hartley (2006: 22). However, strengthening the significance of innovation in the public sector, he points out that "it has sometimes been assumed that the corollary of this is that since public services do not usually operate in competitive markets, innovation is not a necessary element of their functioning. However, a number of writers disagree, arguing that innovation is important for the public sector, albeit for different reasons". Hartley (2006: 22) points out that "yet, in the post war period there has been substantial innovation, which becomes more evident in reflecting how innovation arise", a view that he further entrenched in the report for the Department for Communities and Local Government, London (2006: 23) by arguing that "innovation is as central to the functioning of the public sector as it is to the private sector, though for different reasons. While the driver for innovation in the private sector is competitive pressure, for the public sector, innovation is necessary if new services are to be developed and to meet the needs of a dynamic and changing society". Hartley (2006: 22) argues that in the private sector innovation focus is on "managers and staff as sources of innovation, both working inside the organization, and networking outside it". However, he argues that in the public sector consideration should be made on the "role of policy-makers and policy advisors in the innovation process". Whereas, innovation in the private sector, as the literature shows, is more focused on new product development and thus enhances competitive advantage, the contrast is valid for the public sector, the focus of which is more on service delivery improvement. Hartley (2005: 30) points out that in the public sector, "innovation is not a physical artefact at all, but a change in the relationship between service providers and their users". It is more about augmenting service performance for the purpose of increasing public value.

Highlighting the importance of innovation in the public service, Albury (2005: 51) argues that "one- size-fits-all services – if they ever existed – are not suited to an ever more diverse and heterogeneous society with rising expectations of 24-hour/seven days' a week access, tailored provision and service quality. To meet this challenge requires all public service organizations

to be innovative, for public service managers and professionals to have the skills, opportunity and motivation to innovate effectively and successfully”. Hartley (2005: 30) further highlights that the difference in emphasis between the private and the public sector lies in the goals that innovation seeks to achieve as determined by *modus operandi* for such organizations. He argues that “in the private sector, successful innovation is often seen as a virtue in itself, as a means to ensure competitiveness in new markets or to revive flagging markets”. In the public sector successful innovation is “justifiable where it increases value in the quality, efficiency or fitness for purpose of governance or services”. In their workbook on managing innovation, Barnes and Conti Associates (2008: 180) highlight five crucial elements from which innovation is valued. Innovation can either bring about one or all of these values, viz. economic value, strategic value, social value, environmental and or personal value. They argue that social value implies “becoming a better citizen by improving conditions, relationships or the well being of others”. This value is often the one that the public sector seeks to achieve.

The other important aspect of innovation within the public sector is the relationship innovation has with improvement. In illustrating this interconnectedness, Hartley (2005: 30) raises four dimensions. The first dimension pertains to environmental stability and organizational inertia – the state of no improvement and no innovation. The second one is about improvement, but no innovation. This is a state in which he argues that an organization engages in continuous improvement methodologies. The third dimension is that of “innovation but no improvement”. This dimensions, he argues, “increases choices but not desired by service users; loss of organizational performance due to learning curve and operational bugs; innovation unsuccessful but provides useful learning for the organization; and innovation not valuable”.

In his report, ‘Innovation and its Contribution to Improvement’, Hartley (2006: 8) points out that “many public service innovations are intangible because service and organisational innovations are based not on a product which can be seen, but on changes in relationships – for example, between service providers and users, or between different parts of the organisation or its partners – and so are often less easy to perceive except for those directly engaged in the activities. It is therefore valuable to add a subjective element to the definition: that the innovation is perceived as new by a proportion of key stakeholders”. This position significantly contributes to enhanced understanding of the notion of measurability of public service innovation. However, it draws a necessary distinction between the private and public sector innovation.

2.7 Innovation: a complex adaptive systems perspective

Complexity theorists point out that organizations are dynamical systems. Carlisle and McMillan (2006: 3) see organizations as “complex adaptive systems comprised of agents (people) who experiment, explore, self organize, learn and adapt (in varying degrees) to changes in their environment”. Making a significant contribution on what distinguishes complex adaptive systems from just complex systems, they argue that “complex adaptivity could be described as a successful evolutionary response to the survival needs of certain species”. It is that adaptive capability that mark them out from systems which are simply complex. Complex adaptive systems exist at different levels. They argue that they exist “at the individual, team, divisional and group level and also in a much larger web of external complex adaptive system – their economic, social and political environments”.

The perception of individuals as agents with schema in complex adaptive systems implies that they are adept at self organizing; at manipulating their environmental; at turning things to their own advantage; but most of all at learning and adaptation. This position strengthens the notion of innovation as an emergent property of a complex adaptive system given the nature of exploration and experimentation by agents within an organization. It eliminates the strategic choice paradigm of having absolute control of what happens in the organizations as directed by those who are at the top of the organization. In their endorsement of CAS approach in managing organizations. Carlisle and McMillan (2006: 4) suggest that organizations need not take “too rigid a stance in approaches to innovation, but to respond flexibly as internal and external environments demand.”

2.7.1 Exploring the five bedrock principles of complex adaptive systems

As much as the metaphor of complex adaptive systems has a criteria that classifies it as explored above, it also has five critical characteristics that epitomize it. These five key characteristics that epitomize what is referred to as ‘complex adaptive systems’ are: sensitivity to initial conditions; self-organization; strange attractors; edge of chaos; and fitness landscape. Since there is a constant and persistent interaction between systems, in this case organizations, and their environment, systems inevitably develop these characteristics.

The nature of organizational dynamics and interconnectedness of agents within systems, in view of their co-evolution, evolution and adaptation renders a critical necessity to discuss organizational implications for the key characteristics of complex adaptive systems synergistically. When organizations are operating at the edge of chaos, it should be noted that they are seen to be operating at the zone that is far from equilibrium. Such operation is close to chaos, however, even if organizations descend into a chaotic state there is a bifurcation process

that allows for self organization since within the vast array of chaos there exist some tips of order which are referred to as strange attractors. It is at the level of sinking deep into chaos that organizations are tested on whether or not the environmental landscape proves them fit or unfit. The fitness landscape provides for an evaluation platform, where an organization is high on landscape picks and is successful or is at the lowest valley level. This exploration view helps organizations to be open to environmental forces with and within which they co-evolve, evolve or adapt.

Although these five bedrock principles characterize a complex adaptive system, Pascale (1999: 84) clearly states there are tests that a complex adaptive system need to pass in order to qualify as a complex adaptive system. He argues that it must first “be comprised of many agents acting in parallel. It is not hierarchically controlled.” Secondly, he argues that “it continuously shuffles these building blocks and generates multiple levels of organization and structures”. Thirdly, “it is subject to the second law of thermodynamics, exhibiting entropy and winding down over time, unless replenished with energy. Fourthly, he argues that it must “exhibit a capacity for pattern recognition and employ this to anticipate the future and learn to recognize the anticipation of seasonal change”.

2.7.1.1 Sensitivity to initial conditions

What other systems theorists, like Jackson (2003: 114) refer to as sensitive dependence to initial conditions, is also called the ‘butterfly effect’. This derives its metaphoric expression from the meteorologist, Edward Lorenz (*see* Jackson, 2003: 114), who discovered that “tiny changes in a systems initial state can alter long-term behaviour significantly”. His discovery dealt a serious blow to proponents of predictability of systems since the duplication of initial conditions of particular social systems to precision is merely an exercise in futility due to its impossibility. Strategic planning tools like scenario planning are dealt a serious blow with this conception, the decay of which has been imminent in the recent past. This is as a result of the explanation that precise duplication of initial conditions of a social system is impossible, therefore crafting a scenarios to predict what the future entails may mislead some social systems. Jackson (2003: 114) further postulates that “the behaviour of systems of many types becomes completely unpredictable in the medium and long term”.

2.7.1.2 Self-organization

Complex adaptive systems have a capacity to self-organize amidst chaos and perpetual complexity. MacIntosh and Maclean (1999: 297-316) define self-organization as “a process whereby a new order spontaneously emerges out of a chaotic state”. Pascale (1999: 85) points out that “emergent complexity is generated by the propensity of simple structures to generate

novel patterns, infinite variety, and often the sum that is greater than the parts”. Complex adaptive systems are epitomized by the presence and continuous interaction and networking of many agents with a variety of schemata. This perpetuates the emergence of unguided novelty. However, self-organization should not be construed as a panacea to an organization that has declined from the ‘edge of chaos’ zone into uncontrollable chaos. Self-organization serves with the emergence of novelty at particular zones within the organization. This helps explain the need organizational leaders and managers have to capitalize and strategize to enhance the emergent novelty without controlling it to their advantage.

2.7.1.3 Strange attractors

Another key characteristic that epitomizes complex adaptive system is a ‘strange attractor’ which Newman (1996: 246) defines as “non-periodic trajectory in the state space that exhibits sensitive dependence to initial condition”. His definition supplies the necessary explication of how self-organizing patterns emerge within systems that are not predictable. He further argues that “as the state of a chaotic system evolves toward the attractor in its time space, it will never be exactly in the same state twice, and any nearby points in the state space will diverge exponentially under the dynamical evolution of the system”. Jackson (2003: 116) points out that strange attractors “keep the trajectory followed by an otherwise unpredictable system within the bounds of a particular pattern, without ever requiring it to repeat itself exactly”. One could draw a conclusive assumption that as a complex adaptive system is epitomized by strange attractors, and the fact that strange attractors exhibit dynamic operation that makes precise repetition undoable, systemic behavioural prediction becomes impossible. However, such predictive impossibility should be seen as epistemic. The implication for strategic planning is that since systems behaviours are unpredictable, one would be engaging in an exercise in futility by projecting a long-term course of direction that an organization has to take using strategic planning. Unpredictability of systems through emergent patterns that do not repeat themselves thus possess a definite threat to strategic planning efforts that are incognizant of such facts.

2.7.1.4 Edge of chaos

While classical organizational management theorists are seen to be comfortable with their theoretical frameworks based on stability, predictability, linearity and equilibrium, complexity theorists are keen to oppose such conceptual stances. Complex adaptive systems decay and die when operating in conditions that are consistently equilibrium inclined. Pascale (1999: 86) postulates that complex adaptive systems are at risk when in the state of equilibrium, since “equilibrium is a precursor to death”. They require operating at the edge of chaos which is far from equilibrium. This far from equilibrium operation yields unpredictable creativity and novel

evolution that make systemic adaptation a voluntary prospect. Pascale (1999: 86) argues that novelty best emerges at this zone in the organizations. The implication for strategic planning is that when organizations need novelty, creativity and innovation, they should strive for the shift from equilibrium and rigidity to the zone of the edge of chaos.

2.7.1.5 *Fitness landscape*

A fundamental attribute of complex adaptive systems is their co-evolution with an ever-changing environment. The concept of “fitness landscape” was coined by Kauffman (1995: 468) observing that numerous systems co-evolve within the same co-evolving environment resulting in the creation of a landscape that has high peak, peaks and valleys. The implication for organizations is they are said to be at the highest peak of the fitness landscape when they are at the zone which others refer to as the “golden era zone”. However, due to shifting systems and ever changing environment organizations also shift from peak to valley. Jackson (2003: 119) argues that “if a system finds itself on a high peak, then it is highly evolved and can gaze contentedly at competitors. But if it is in a fitness valley it is in a poor situation”. The fact that moving from peak to peak has got nothing to do with the strategy that an organization has adopted implies that organizations depend on luck rather than proper execution of planning to move valley to peak and high peak.

2.8 Complex adaptive systems and innovation

It is crucial to note that one of the important systems elements is their connectedness. Complex adaptive systems are therefore connected systems. Jackson (2003) refers to this connectedness as relationships, wherein he argues that because relationships are paramount in dynamic systems, different relationships evoke different potentialities from those involved. Lewis (1994: 16-17) argues that an ossification process occurs when there is no connectedness within the systems. Carlisle and McMillan (2006: 6) argue that if organizations are to operate as complex adaptive systems they “need to ensure that they connect both externally and internally”. They argue that the significance of external connectivity is to “foster excellent communications and links to the diverse environments in which they exist and which they influence”. This process which cannot be controlled by leadership within organizations, but which influences the shape of organizations, is referred to as “fitness landscape”. It is defined as “the environment in which organizations compete”.

Kauffman (1996: 468) suggests that “when fitness of variants on a landscape is average, it is best to search for new possibilities a distance away from the space of possibilities in the current space”. It is this opportunistic exploration, brought about by the environment on which organizations compete that radical innovations emanate. He argues that there is likelihood for

it “to be beneficial for an organization to focus more on its innovation resources in the search for radical innovations and vice versa”. This exploratory aspect provides an organization with a competitive advantage wherein incremental innovations may not be beneficial to the organization by allowing the organization to search for new possibilities of radical innovations, putting the organization to what they call “new competitive space of possibilities”. This new competitive space of possibilities positions the organization to radical exploration thus augmenting opportunities for creativity and innovation, as it adapts to both internal and peripheral organizational dynamics.

2.9 Innovation management

Contrary to a complex adaptive systems approach that views innovation as emergent and an unpredictable occurrence within an organization, Barnes and Conti Associates (2008: 13-34) view innovation as an organizational activity that needs to be planned, monitored and managed. They argue through their meta-model that innovation undergoes a well calculated route called “innovation journey”. Their exploration of the innovation journey is a five-phased approach comprising of searching, exploring, committing, realizing and optimizing, the process the researcher has given an acronym SECRO. Their definition of innovation management entails the acceptance of responsibility for “establishing, maintaining and improving innovation processes”.

Barnes and Conti Associates (2008: 13-34) have provided explanations for the key concepts in the five-phased innovation journey. For them, searching, as the first innovation management phase, implies the process of “framing the inquiry; facilitating creativity; identifying opportunities; hunting and gathering ideas”. The second phase, exploration, implies the process of “investigating ideas; selecting promising ideas; experimenting to narrow the field and validating ideas”. The third phase, committing, implies the process of “preparing a business case; influencing stakeholders; making decisions and allocating resources”. The fourth phase, realising, implies the process of “creating and sustaining high performing teams; managing the process; managing political issues and driving for timely results”. The fifth phase is optimizing, the process that differentiates innovation from creativity. In this final phase there is an assessment of value created; realization of maximum value; improving of the innovation process and the celebration of achievements.

Whilst the process of innovation is construed as a manageable process, Barnes and Conti (2008: 13-34) acknowledge its complexity. They argue that “effective management of innovation requires an understanding of the complex and varied thinking, planning, communicating, influencing, co-ordinating and other skills that are needed at different points

in the journey”. A complex adaptive systems approach would argue that management is an orderly process whereas innovation is often disorderly and is likely to bring about a certain degree of novelty that could be contrary to foreseeable orderly patterns. It emerges out of self-organization as a complex adaptive system manoeuvres its environment at the ‘edge of chaos’ zone through experimentation and exploration.

2.10 Innovation and complexity: a conceptual framework

The various and varying definitions of innovation provide an interesting insight in that there is a plethora of perspectives that provide an invaluable output in exploring what could or could not be innovation. This stems from the premise that for the South African public service, innovation is creativity that is contextually relevant. Hence, for innovation theorist like Von Stamm (2008), creativity is just a building block to innovation. It is also interesting to note that other innovation exponents argue against the coding of any improvement or creativity as innovation. As pointed out earlier, Lynn’s (1997: 96) argument that innovation should not be seen as another name for change or improvement or for even doing something new lest anything qualifies as innovation holds true in the context of this study. It holds true in the context of this study in that it may determine whether a conclusion could be drawn between Correctional Services as being creative or innovative. Although no literature has been found that directly defines innovation from a complex adaptive systems approach, based on the definitive concepts of innovation and complex adaptive systems literature, the following complex adaptive systems definition of innovation would be appropriate: a systemic emergent evolution of a new or improved product or process through dynamic and unpredictable interaction of agents with themselves and their environment culminating in durable stay at the peaks of organizational fitness landscape.

It has been pointed out throughout this review of literature that innovative organizations strengthen their competitive advantage by innovatively and creative sailing through what complex adaptive system approach refers to the ‘fitness landscape’. The conclusion drawn is that this cannot be linearly achieved. This study draws closer to a complex adaptive systems approach that points out, as earlier argued, that for the profit-making sector, innovation results in “new products and services, gives rise to new markets, generates growth for enterprises and creates customer value. It further improves existing products and processes; thereby contributing to higher productivity, lower costs increases profits and employment” Baumol (2002: 79). However, according to a complex adaptive systems approach, these benefits are not linearly achieved without systemic dynamics that may yield totally divergent results from the expected ones due to unpredictability. It has been vigorously argued that in a complex adaptive system, innovation is not a singular and independent activity but a multi-dimensional system of

interacting factors, processes and agents. Therefore innovation in organizations is not achieved by linearity, cause and factor approaches, but rather it is achieved when interactive systemic organizational dynamics culminate in unpredictable outcomes through the interaction of agents.

Innovation exponents like Carlisle and McMillan (2006: 2) have differentiated between exploitative (incremental) innovation and exploration (radical) innovation. Others like Leonard-Barton (1992: 111) have argued for the position of organizational success incremental innovation. This position however, is suppressed by his suggestion for a need to engage both divergent and convergent learning, radical and incremental innovation, exploration and exploitation in the longer term innovation efforts. With this view an element of balance and stable equilibrium emerges which complexity theorists perceive as problematic. Carlisle and McMillan (2006: 4) argue against this notion, finding these approaches to be incompatible with incremental innovation geared to efficiency having the possibility of driving out radical innovation. Adopted in this study is a complex adaptive view that challenges this notion. It argues that complex adaptive systems adapt to environmental conditions in which they find themselves either exploitatively or in an explorative manner or both. McMillan's (2006: 5) propelling view that a "complex adaptive system does not differentiate between the long term and the short term – it simply self organizes appropriately" chiefly enriches the point that this study purports.

2.11 Summary and conclusion

This chapter has explored the various definitions of innovation as provided by different relevant role players in the field of innovation. Although there have been differences in focus as to what innovation is all about, common has been the link between innovation and creativity. Various types of innovation were also explored arguing that innovation can be either incremental or radical. It has been clarified that in the public sector, unlike the private sector where the focus is mostly on innovation to maintain and advance competitive advantage, innovation often takes the shape of incrementalism.

Innovation has been seen to be the culmination of creativity and successful implementation. This implies that creativity and successful implementation are key factors that influence innovation success. It has to be noted that there are other elements that have a crucial role to play in making innovation a success, as explored by Amabile et al. (1996: 1154). In their model for assessing the climate for creativity, they point out five elements that influence innovation. These are: encouragement of creativity; autonomy; resources; pressures and organizational impediments. Unpacking these components, Von Stamm (2008: 3) argues that

“they fall into two categories: they are either stimulant to creativity (tapped by scales assessing organizational and supervisory encouragement, work group support, sufficient resources and challenging work), or obstacles to creativity (tapped by scales assessing organizational impediments and workload pressure)”.

A systems approach to innovation was discussed with particular attention paid to complex adaptive systems approaches. This highlighted the bedrock characteristics of what epitomizes a complex adaptive system. Inferences and conclusions were drawn arguing in line of systems dynamics that innovation cannot be linearly achieved given the fact that all systems have agents with differing schema that self-organize appropriately as they adapt to and with the environment within which they find themselves. Von Stamm (2008) highlights two components of innovation, referred to as cycling worlds: operational and innovation cycles. She postulates that the importance of acknowledging that an organization needs both innovation and operation; and successful innovative organizations seem to manage the balance between the two cycles without compromising either.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The Department of Correctional Services, as part of the public sector service delivery improvement, established a directorate at its national head office known as the Directorate: Service Delivery Improvement. The mandate of the directorate was to improve the services that the department renders using creative and innovative ideas to enhance service delivery. In order to attain this goal the directorate established what it called ‘centres of excellence’ which are correctional facilities that are adequately resourced to fuel effective service delivery and replicate successes nationally. The Directorate: Service Delivery Improvement is the core hub for all innovations that happen in the department of correctional services. It is the directorate that is solely responsible for all innovative activities as it drives all innovation initiatives. This study sought to explore innovation in the DCS using a CAS approach, with particular focus on what innovations the Service Delivery Improvement directorate is aware of and how they came about. It sought to extrapolate from the five bedrock principles of complex adaptive systems findings that influenced innovations. All departmental innovations were geared towards the enhancement of rehabilitation and the improvement of service delivery.

3.2 Research goal objectives

Citing the Webster’s Third International Dictionary (1961), De Vos et al. (2005:107) define both goals and objectives as “the end toward which effort or ambition are directed”. The goal of this study is to gain an understanding of whether or not the DCS is innovative, employing a CAS approach. It seeks to explore innovation in the DCS using a CAS perspective. This was achieved by highlighting key innovations in the DCS and how such innovations are influenced by the nature of the organization being a complex adaptive system. It is therefore the purpose of this study to employ a CAS perspective to a public sector organization, exploring innovation geared towards service delivery improvement. This study explores innovation in the DCS using the directorate Service Delivery Improvement as a unit of analysis. This study seeks to explore innovation using the five bedrock characteristics of a complex adaptive organization to identify the emergence, development and evolution of innovations within the DCS. In pursuing this goal, this study looks into whether or not there is creativity and innovation in the DCS by interviewing the director and her deputy in the Directorate Service Delivery Improvement unit of the DCS

In enriching its data coherence and validity, documentary evidence of national innovation entries from all correctional centres that participated in innovation awards ceremonies and innovation entries for both national and international innovation bodies was sought, studied and interpreted through the process of triangulation.

3.3 Research design and methodology

This study uses a qualitative research approach which De Vos (1998: 240) describes as a “multi-perspective approach to social interaction aimed at describing, making sense of, interpreting or constructing this interaction in terms of meanings that subjects attach to it”.

Babbie and Mouton (2004) explicitly differentiate between research design and research methodology. They define the research design as a structured framework of how a research process is to be conducted with the aim of solving a research problem. They differentiate with precision between the two in that they perceive research methodology as referring to “research methods, techniques, and procedures that are employed in the process of implementing the research design or research plan” Babbie and Mouton (2004: 104), which this chapter seeks to explore.

3.4 Research paradigm

According to TerreBlanche and Durrheim (1999: 36) paradigms are all-encompassing systems of interrelated practices and thinking that define for researchers the nature of their inquiry along three dimensions: ontology, epistemology and methodology. Ontology explicates the nature of reality to be studied and what can be known about it. Epistemology explores what nature of the relationship between the researcher (knower) and what can be known. Methodology explores how the researcher may go about practically studying whatever he or she believes can be known. They define a paradigm as a “system of interrelated, epistemological and methodological assumptions that act as perspectives that provide a rationale for the research and commit a researcher to particular methods of data collection, observation and interpretation”. This research employs an interpretive paradigm as it interviewed directors of innovation in the DCS Service Delivery Improvement directorate, people who are directly involved with innovation, with emphasis more on experiential data than on causality. Since this research employs an interpretive/ constructivist paradigm, which aims to understand and reconstruct, it is of crucial significance to explore the notion of paradigm in detail and justify the choice of the interpretive research paradigm. TerreBlanche and Durrheim (1999: 37) put forward three paradigms, namely, positivist, interpretive and constructionist. The interpretive paradigm is deemed more relevant and appropriate in this study in that it provides a better platform compared to the positivist and empiricist, which aims

at prediction, controlling and explaining. The interpretive paradigm renders a balanced and a relevant stance in that it allows a researcher to be fully involved as an instrument of data production and thus acquire knowledge while gathering data.

3.4.1 Data collection methods

This study employs a multi-methodological approach in that it uses interviews which Tutty et al. (1996: 27) view as the most common method of data collection that can be regarded as “the universal mode of systematic inquiry”. Babbie and Mouton (2002: 289) concur with this perspective as they point to the fact that the individual interview “is one of the most frequently used methods of data gathering within the qualitative research approach”. This approach allows for a thorough engagement with research participants in extracting, interactively, as much information as necessary for the research to be meaningful. This data collection method is described by Kvale (in Sewell, 2001:1) as attempting “to understand the world from the participant’s point of view, to unfold the meaning of people’s experiences to uncover their lived world prior to scientific explanations”.

3.4.1.1 Interviews by conversation

In order to accumulate sufficient data to make sound conclusions in this research, a ten-question semi-structured interview questionnaire was designed. Unlike an architectural blueprint, the semi-structured interview questionnaire was designed as a guide to allow for the emergent, development and unfolding of further questions. Questions in the semi-structured interview schedule were open-ended. The reason for choosing this flexible interview schedule was due to the fact that there were only two interviewees to participate in this research, since the researcher was only going to research the Service Delivery directorate in the national head office of the DCS. There could have been more interviewees had it not been for the high vacancy rate that availed only the director and her deputy.

In order to refine the interview schedule a consultative process was entered into with a former employee of the Service Delivery Improvement directorate who was thought to be better informed of the context. The consultative process yielded positive results as some of the questions were reviewed for clarity. The interview schedule which had fifteen questions was reviewed and reduced to ten questions covering the three major themes of the research, viz. innovations in the DCS; leadership role in enhancing innovation and the complex adaptive systems approach. The interviews were about one hour long and yielded about sixteen pages of verbatim transcription of data.

3.4.1.2 Documentary evidence

Soft copies of documentary evidence comprising national Correctional Services entries by the nine provincial commissioners' offices for evaluation and entry to various national and international innovation bodies were received. These copies were either faxed or emailed to the Directorate: Service Delivery Improvement. All entries were printed and yielded 193 pages of data for analysis. Entries to the following international bodies were received: Commonwealth Association for Public Administration and Management (CAPAM); All Africa Public Sector Innovation Awards (AAPSIA). National entries were made to departmental Innovation Awards Ceremony, the Centre for Public Service Innovation (CPSI) and Impumelelo Awards.

3.5 Data analysis

Since this study used more than one method to collect data, which was interviewing research participants and soliciting documentary evidence, a multiple-data analysis technique of triangulation which O'Donoghue and Punch (2003: 78), described as a "method of cross-checking data from multiple sources to search for regularities in the research data" was adopted. This approach is seen to be helpful in increasing the credibility and validity of research findings. Further exploring triangulation method of analysis, Bryman (unpublished) sees it as "the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings".

Whereas triangulation enriches both the methodology and analysis, this study further adapted Tesch's (in Creswell, 1994:155) eight steps of data analysis by using only six steps that were applicable to the study. Themes, sub-themes were identified in line with this approach and data was categorized accordingly. The six critical steps were adapted in the following sequence:

- Step 1 After the completion of the word-for-word transcription process, transcripts were carefully read through for sense-making.
- Step 2 There was no selection of interesting interview transcripts in the process due to the fact that only two interviewees participated in the study. Notes of meaningful insights that linked to the five bedrock principles of a complex adaptive system were made on the margins of both transcripts
- Step 3 The process of triangulation to validate findings was conducted, wherein interview transcripts were correlated to the documentary evidence that was received from the directorate. Related themes were grouped together.

Step 4 Coding of themes was established, for example centre-initiated innovation tallies with bedrock principle 1 –CII/BRP1.

Step 5 Themes were established, for example replicable innovations; innovations that improve service delivery etc.

Step 6 After the thematization process, data grouping was conducted wherein the sense-making process was established as conclusions were drawn.

All recorded data were transcribed and yielded 32 typed pages using font size 12 and 1.5 line spacing. All documentary data of innovation entries from all participating Correctional Centres received as soft copies were printed for analysis and yielded a total of 193 pages. Innovation entries were identified per province and notes of how they came about were taken resulting in meaningful links being drawn between innovations and the six characteristics of a complex adaptive system.

In order for this study to determine the degree of diversity in Correctional Services innovations, Hartley's (2005) seven categories of innovation were tabulated in accordance with the twelve innovations that were the findings of this study. This was done so as to explore the extent to which correctional services is innovative and thus inform the complex adaptive systems dynamics of the organization.

3.6 Research site and research participants

Situated at the National Department of Correctional Services Head Office in Pretoria, the Directorate: Service Delivery Improvement is a management and administration unit tasked with the responsibility of enhancing service delivery in the department by employing innovative and creative service delivery improvement strategies. Due to the high vacancy rate, the directorate had only three employees during the time of data collection, viz. the director, her deputy and an admin secretary. Since this directorate is the hub of departmental innovations, it was chosen as a unit of analysis given that all emergent organizational innovations are registered in this directorate.

3.7 Ethical considerations

It is quite crucial that every research endeavour to visit and revisit the ethical matters of doing research. This is primarily aimed at protecting the interests of participants and respecting their roles as the researched. In his article entitled 'Planning Ethically Responsible Research', Sieber (1992) pointed out that ethical applied researchers recognize the interests of all parties concerned in an issue and plan research so that those issues are respected, which has both a

practical as well as a moral obligation. He further argues that the ethics of social research is about creating a mutually respectful, win-win relationship in which participants are pleased to respond candidly, valid results are obtained, and the community considers the conclusions constructive (Sieber: 1992).

The researcher honours the ethics of conducting a study with the Service Delivery Improvement directorate. To that effect, approval was sought and granted by the Department of Correctional Services research ethics committee. Further to that, the two research participants approved their voluntary participation by signing consent forms as required by university regulations. This research is not a self-centred venture aimed at reaping data and not giving back to the participants. It is hoped that through this study both the researcher and participants are going to be enriched and that the study would be of mutual benefit to both the researcher and the researched. This study subscribes to the following ethical measures as expounded by Sieber (1998:163):

- Consent – an explicit agreement to participate;
- Privacy – a person’s interest in controlling the access of others to themselves;
- Confidentiality – concerns data (records about the person, for example notes, a videotape of the person) and the agreement as to how the data are to be handled in keeping with the participants’ interest in controlling the access of others to information about themselves.

3.8 Significance of the study

Innovation has been studied significantly both in the private and public sectors. Innovation employing a complex adaptive systems approach has been researched particularly in the private sector and less in the public sector. The lack of such an approach to innovation within the public sector is one reason why this study is significant. Its significance lies in its the use of a complexity paradigm to explore the emergence of innovation in the Department of Correctional Services. This study ventured into a field that has not been sufficiently researched, thus finding leverage that could serve as bedrock from which further research could be established.

3.9 Limitations of the study

Without underscoring the value of interviewing techniques, the fact that the researcher was serving the Department of Correctional Services Head Office at the time the research was conducted may have influenced the respondents adversely. Unlike unobstructive or non-reactive research, which Babbie and Mouton (2004: 375) define as referring to “data gathered

by means that do not involve direct acquisition of information from the research subject”, this research may have been influenced by senior-subordinate relationships between the researcher and the respondents, culminating in respondents providing information to justify their managerial positions. However, documentary evidence of innovation entries may also serve as unobstructive data to mitigate and ameliorate the above explicated limitation.

This study was also limited to researching innovations that are geared towards the enhancement of service delivery, deliberately eschewing other innovations within the system that may have enhanced organizational outlook without directly influencing the rehabilitation processes. It was also limited to correctional officials’ initiatives; hence, offenders may have, hypothetically, meaningfully and innovatively contributed to their own rehabilitation as incarcerated but free agents within the system.

3.10 Summary and conclusion

This chapter provided a detailed account of the research methodology and the research paradigm that was appropriated for this study. It explored the adoption of a qualitative research methodology and an exploratory interpretive research paradigm as most relevant to the study of this nature. This study explored a triangulation processes both methodologically and in the analysis of data. Interviews and documentary evidence were sought and interpreted in pursuit of validation of research findings. Thus a multi-method data collection system was used. In validating conclusions and mitigating against the limited number of respondents, a triangular data analysis strategy was adopted. This yielded positive results in that a six-step data analysis strategy was adapted from Tesch’s eight-step data analysis process.

CHAPTER 4

PRESENTATION OF RESULTS

4.1 Introduction

The differential application and purpose of innovation by the public and private sector poses a difficult but manageable complexity to the whole study of innovation. Whereas much focus on the private sector is on newness to enhance competitive advantage in a hypercompetitive and knowledge-based society, the public sector endorses elementary stages of innovation like applied creativity that is contextually relevant to enhance efficient and effective delivery of services, as is the case with Correctional Services. The difficulty of conclusively determining whether the DCS is innovative or not, lies in the adoption of a definition; innovation complexity and CAS as a systemic process of learning away into the future while managing uncertainty effectively. It is also pivotal to point out from the onset that another difficulty in the determination of innovativeness in the DCS lies in the complexity of the innovation process within a correctional system. The adoption of a CAS model as a theoretical foundation upon which deductions are made in determining the innovativeness of DCS is further compounded by the definition of the concept 'system' as a 'collection of elements connected together to form a purposive whole with properties that differ from those of its component parts' Armson (2011: 134). In order for such determination to be meaningful a holistic systemic approach is to be adopted: looking at innovation holistically, hence innovation "involves numerous factors acting separately but often influencing one another" (Trautt 2008: 77), It is this understanding that enhances the presumption that the parts of the system cannot be understood in isolation but in terms of their relationship with each other and with the whole.

Whereas some definitions of innovation view it as the creation of something new, others have warned against such simplistic endorsement lest any change or improvement be referred to as innovation. As the name suggests, the Directorate: Service Delivery Improvement has had a number of improved services registered under its name, though not at all influenced by it, as this study proved. DCS innovations seem to be unguided and emergent results of a complex adaptive system. The prevalent uncertainty in the organization does not prevent innovations from emerging, hence they are unguided and unmanaged. Therefore an adoption of a definition of "applied creativity that is contextually relevant" shields elements of uncertainty in that innovation would be embracing of anything creative and relevant to a particular context within

the DCS, hence the management of uncertainty is the central feature of managing the innovation process (Trautt, 2008).

The primary aim of this study is to explore innovation in the Department of Correctional Services with the Directorate: Services Delivery Improvement as the unit of analysis since it is both the driver and the facilitator of innovation. It has emerged in the course of this study that there has been a lot of improvements and creative ideas implemented in the DCS. If then, the adoption of the definition of innovation as “applied creativity that is contextually relevant”, as explicated by the CPSI, the conclusion would be that the Department of Correctional Services is innovative. However, if Lynn’s (1997) argument that innovation should not be seen as another name for change or improvement or for even doing something new lest anything qualifies as innovation, all innovations from the Correctional Services would be disqualified as innovations. They could fit best the elementary phase of creativity. Cherkasky and Slobin’s (2007: 63) definition of innovation as “a disciplined process by which an idea is generated, realized, and evolved resulting in significant business value and an improved customer experience”, has been adopted by this study as it sums up DCS efforts to improve the delivery of their rehabilitation services in order to enhance safety and security of the South African society. As a reflective practitioner the researcher sought to present potential innovative practices within a correctional system that are geared towards one systemic goal of rehabilitating offenders and thus contribute to the national drive of a better and a safe South Africa for all.

It was earlier indicated that there has been no known research conducted into innovation employing a CAS perspective regarding non-profit entities like the DCS. The presentation of the research findings integrates the researcher’s reflectivity on DCS practices as a security and highly controlled environment in its enhancement of rehabilitation. In view of the above statement, the researcher endeavors to incorporate secondary data and utilized theoretical framework developed from the reviewed literature to extrapolate evidence that is congruent to innovation from a CAS perspective.

This notion is however, problematized by the department’s White Paper on Corrections which advocates the creation of an effective organizational culture in which effective and sustainable rehabilitation can take place and where programmes and processes exist to assist employees to take more initiative, set more challenging goals, be more innovative and become better leaders and managers. The taking of initiatives could then be ascribed to the view that an organizational culture conducive to innovation is established in view of the fact that all innovations from the Department of Correctional Services are initiated from the lowest levels of the organization.

4.2 A summative view of Correctional Services innovations geared towards rehabilitation of offenders

The table below summarizes the innovations that Correctional Services has categorized according to the seven different innovation categories developed by Hartley (2005):

Table 1: Summary of Correctional Services Innovation

INNOVATION CATEGORY ACCORDING TO HARTLEY'S 7 INNOVATION CATEGORIES	CHALLENGE THAT THE INNOVATION SOUGHT TO OVERCOME	INNOVATION	INNOVATION OBJECTIVE	INNOVATION BENEFICIARY AND BENEFITS
Service Innovation	Proper Treatment of babies whose mothers were incarcerated	IMBELEKO PROJECT - 2010	To help in the management and treatment of babies incarcerated with their mothers epitomizes the goodwill of providing a positive environment for nurturing child development.	Infants of female offenders
Service Innovation	Shortage of resources to deliver on rehabilitation through educational programmes.	AMAJUBA PROJECT- 2010	Waterval Correctional Services partnership with Amajuba Further Education and Training (FET) College to enhance rehabilitation programmes through education and	Wide scope of courses offered. The average pass rate of 60% with some offenders in Waterval Med. B getting up to 90%. Workshops at Ekuseni renovated and equipped. Enhanced the re-

			training at Ekuseni Youth Development Centre.	employability of offenders.
Service Innovation	Lack of good condition School Desks for learners in Bloemfontein	SCHOOL DESK REFURBISHMENT PROJECT - 2009	Refurbish school desks and provide them to needy learners using prison labour.	Big business and over a 1000 desks.
Service Innovation	Lack of classroom facility for offenders	CONVERSION OF AN OLD RESEVOIR INTO A MULTIPURPOSE ROOM - 2008	Provision of a multipurpose facility to enhance rehabilitation programmes of teaching and learning.	Enhanced rehabilitation facility
Product Innovation	Offenders with no formal qualifications and who could not be allocated to work spans.	JACKET MANUFAC-TURING OUT OF OLD BLANKETS - 2008	Use offenders to manufacture jackets using old blankets to supply the needy during the winter season.	Donations were made to different organizations. An article about the project was even published in the periodical <i>Die Landbouweekblad</i> Offenders contribute to poverty alleviation. Recycled material used productively
Service Innovation	Prevalence of violence in schools	SCHOOL CRIME PREVENTION PROGRAMME -	Touring of Correctional Facility by	35 school trips to Correctional Centres

	surrounding Leeukop Correctional Facility.	2008	learners to conscientize them of the consequences of making wrong choices.	
Service Innovation	Offender need to give back to the community.	ITHUBA LESIBINI – 2009	Waste-House Project addresses energy efficient and environmental issues. The significance of the project is that all houses have been built with 90% waste material. Recycled building material had to be obtained.	Not available
Product Innovation	Destitution and streets kids, resulting in a need for offenders from Goodwood to give back to the community.	SLEEPING BAG - 2009	The Sleeping Bag Project is aimed at manufacturing sleeping bags from old news papers, plastic bags and cello-tape.	400 sleeping bags donated to the homeless; 300 still under production
Service Innovation	Financial illiteracy to offenders prior to release.	DCS/ABSA PARTNERSHIP FOR FINANCIAL MANAGEMENT - 2010	To teach offenders financial management skills as part of the pre-release programme.	Offenders

Service Innovation	Offender movement and long waiting period for visitors to access their imprisoned relatives.	PRISON VISIT TELEPHONE BOOKING SYSYEM - 2008	To allow for customer care principles of servicing both offenders and their relatives conveniently and effectively.	Offender visitors
Service Innovation	Pollsmoors: three kitchens catering for 7500 offenders; a need to have enough supply of processed vegetables from the Department of Agriculture.	HLUMANI “Let’s Grow” INNOVATION - 2009	To increase cost effective food supply.	Offenders and surrounding community members.
Service Innovation	Lack of sporting facilities for offenders.	MBOMBELA SPORTS FIELD - 2010	Provision of rehabilitative sports facility for offenders	Offenders and the surrounding community
Service Innovation		MANGAUNG BIRDS PROJECT - 2010		Offenders

Hartley (2005) highlighted seven innovation categories that have direct implication for this study. They have a direct implication in view of the fact that they explore the degree of diversity of innovations within an organization. He tabulated the following seven categories as critical elements in examining innovation either in the public or private sector:

- product innovation – which he views as the creation of new products;
- service innovation – the development of new ways in which services are rendered to customers;
- process innovation – new ways in which organizational processes are designed;
- position innovation – new contexts or users;
- strategic innovation – new goals or purposes of the organization;

- governance innovation – new forms of citizen engagement, and democratic institutions;
- rhetoric innovation – new language and new concepts development.

Ten of the above twelve summarized innovations fall under the same category of service innovation which Hartley (2005) defined as the development of new ways in which services are rendered to customers. The development of new products, like the sleeping bags and blanket jackets, serves to indicate innovation both for the rehabilitation process and providing a cost-effective service to communities surrounding correctional facilities where innovations evolved.

Moore et al’s (1997) argument that not all organizational change qualifies as innovation as outlined in Chapter 2 of this research poses a significant understanding of what could be classified as innovation or a good idea. They argue that some are too small, obvious or idiosyncratic to warrant much analytical attention. They point out that “those changes worth recognizing as innovation should be globally (or locally) new to the organization, be large enough, general enough or durable enough to appreciably affect the operations or character of the organization”. This position which is further endorsed by Lynn (1997: 96) who argues that “innovation should not be seen as another name for change or for even doing something new lest everything qualifies as innovation”. However, from a CAS perspective innovations are an inevitable product of a system that epitomize properties of a CAS. Table 2 draws such a link or connection between innovation and CAS bedrock principles with a tick (✓) symbolizing an affirmation and a cross (X) symbolizing a deformation.

Table 2: Connection between DCS innovation and the five CAS bedrock principles

INNOVATION	Sensitive to initial Conditions	Self Organization	Strange Attractors	Edge of Chaos	Fitness Landscape
IMBELEKO PROJECT – 2010	X	✓	✓	✓	✓
AMAJUBA PROJECT- 2010	X	✓	✓	✓	✓
SCHOOL DESK REFURBISHMENT	X	✓	✓	✓	✓

PROJECT – 2009					
CONVERSION OF AN OLD RESEVOIR INTO A MULTIPURPOSE ROOM – 2008	X	✓	✓	✓	✓
JACKET MANUFACTURING OUT OF OLD BLANKETS - 2008	X	✓	✓	✓	✓
SCHOOL CRIME PREVENTION PROGRAMME – 2008	X	✓	✓	✓	✓
ITHUBA LESIBINI – 2009	X	✓	✓	✓	✓
SLEEPING BAG - 2009	X	✓	✓	✓	✓
DCS/ABSA PARTNERSHIP FOR FINANCIAL MANAGEMENT - 2010	X	✓	✓	✓	✓
PRISON VISIT TELEPHONE BOOKING SYSYEM – 2008	X	✓	✓	✓	✓
HLUMANI “Let’s Grow” INNOVATION - 2009	X	✓	✓	✓	✓
MBOMBELA SPORTS FIELD -2010	X	✓	✓	✓	✓
MANGAUNG BIRDS PROJECT - 2010	X	✓	✓	✓	✓

4.3 Other achievements with regard to innovation in the Department of Correctional Services

The DCS has boasted a number of innovation achievements. It has enhanced its innovation management systems through the Innovation Management Project which, they have argued, has grown from strength to strength in the year under review, continuing to provide leadership on the processes. The DCS submitted eleven entries for the CPSI Public Sector Innovation Awards. The Mangaung School Desk Refurbishment Project and Goodwood CoE Mbombela Sports Field Project were finalists and were awarded First and Second Runners-up in the category: Innovative partnerships in service delivery. They received training on innovation to the value of R30 000; serving to show that learning is of paramount importance to innovation; CAPAM International Awards (Commonwealth Association for Public Administration and Management). The DCS submitted two projects: the Imbeleko Project (SW Directorate) and the Goodwood CoE Sleeping Bag Project). South Africa submitted six entries, of which two were from the DCS.

In Nov 2009 the DCS launched an eNewsletter ('Innovation in action') profiling innovation in the organization. Three eNewsletters were produced in 2009/10. These newsletters have been published on the Centre for Public Service Innovation (CPSI), South African Innovation Network (SAINE) and United Nations Public Administration Network (UNPAN) website. Due to demands from the Innovation stakeholders, the DCS developed an Innovation internet site (link from DCS internet), to be accessed from the DCS Internet.

The DCS was invited to present 'DCS as an Innovation Case Study' at the DPSA Minister's call for entries for the CPSI Innovation Awards. This has yielded positive results for DCS: an excellent working relationship with the Development Bank's Innovation Component was developed; the Innovation Management Project documentation was finalized; and the business case, project charter, project plan and DCS Innovation Framework was signed off by the Interim Innovation Board members in the 2009/10 Financial Year.

The DCS Innovation Framework was endorsed by the Acting National Commissioner in the year under review. This was construed by the DCS as a major achievement for a project of this nature.

The Research Institute for Innovation and Sustainability (RIIS) offered to do an Innovation dipstick Index Survey for 50 DCS users and produce an analysis report at no cost to DCS. Preliminary findings indicated the DCS' overall performance was 71.1% – the South African Benchmark is 54.8%.

In March 2010 the DCS was approached by CPSI and Palama to form part of a pilot project to review the content of a training course on Innovation Management in the Public Sector. The course was to be accredited at NQF level 5 – and aimed initially at SMS level. Valuable inputs were provided, drawing from DCS experiences. The course content is to be revised.

CPSI launched an Innovation Journal during Aug 2009: Ideas that work. The DCS Krugersdorp visitation innovation project featured in the launch edition.

Innovations in the DCS have gained recognition from various national and international bodies, ascertaining that DCS is an innovative organization taking into cognizance the endorsed public sector definition of innovation.

4.4 Analysis of Correctional Services innovations from a complex adaptive systems approach

Although this study could not epitomize in detail all the five bedrock principles of a complex adaptive system there have been a number of such features in the way Correctional Services innovations have emerged. It is also crucial to highlight that in a correctional system where there is a prevalent tension between attainment of correctional safety (stability through control) and creativity (engagement in creative processes, the creation of an innovative enabling environment is treaded upon with caution. This tension of ensuring control and adherence to policy prescripts through static routines to accomplish daily tasks of a secure correctional system may result in significant creation of impediments to innovation.

4.4.1 Sensitivity to initial conditions

Tiny changes in a systems initial state can alter long-term behaviour significantly. All the rehabilitative innovations uncovered in the Department of Correctional Services, as exhibited in Figure 2, were found not to be immediate upon incarceration so as to influence criminal mental models from the onset of the rehabilitation path as enshrined on the White Paper on Corrections 2005, thus influencing offender behaviours. Correctional innovations are not seen to be influencing offender behaviour at the point of incarceration; rather they engage offenders at the point when they have adapted to Correctional Services' conditions. The argument that tiny changes in a system's initial state can alter long-term behaviour implies that the rehabilitation intervention point is at the entry point of the correctional system. All Correctional Services rehabilitation innovations are geared to effect correctional agents after having adapted to the correctional system. Changing of correctional agents' value system in order to change the long-term behaviour significantly requires adherence to initial conditions in any complex adaptive system.

4.4.2 Self-Organization

This refers to the emergence of a new order out of a chaotic state. All correctional innovations emerged as a new order out of a chaotic state as exhibited in Figure 2. The emergence of these innovations is influenced by the chaotic state not only within correctional facilities, but also from without as is the case with the school desk refurbishment project. This innovation emerged out of a chaotic state involving learner schoolbook damages. As the innovation originator states, “The idea of this project came one evening when I assisted my son with math homework and saw a hole in a page, which was the result of his pen going into a hole in the desk, whilst writing. I then realized that I have the means available, in terms of inmate labour to ensure that disadvantaged school in the greater Bloemfontein area, to assist schools in revamping school desks. Never did I think that the need was so great”. The case of offenders studying under trees and rehabilitation exercises cancelled due to rain, as was the case at Klerksdorp where a reservoir was converted into a multipurpose room, is indicative of the self-organization principle of a complex adaptive system. “One day in February it was raining heavily. It was when we realized there was a great need for a shelter to be used as a classroom because the education programme was disturbed. The learners were used to shelter under the tree as a classroom”. This chaotic state, as a result of resource scarcity, brought about an ordered innovation emerging as a resolve to rehabilitation efforts.

The ‘Imbeleko’ innovation initiative was as a result of the plight of babies in Correctional Centres, as stated in the executive summary of the project: “In South Africa the plight of babies in Correctional facilities is a phenomenon capturing the attention of the citizens”. Whereas in the private sector, where innovations arise mostly for profit, in the public service delivery-oriented sector, innovation takes the shape of emergence geared towards the restoration of order from a disorderly state. The Imbeleko project was initiated due to a chaotic state of infants of incarcerated mothers not having a conducive environment for their upbringing. This project is said to be geared towards “the management and treatment of babies incarcerated with their mothers which epitomizes the goodwill of providing a positive environment for nurturing child development by placing babies out of Department of Correctional Services (DCS) facilities and to the care of the significant others, (relatives and willing community members), and to improve living conditions of those in DCS facilities by converting the prison environment into a child friendly environment where babies are accommodated with their mothers”.

4.4.4 Strange attractors

This refers to the non-periodic trajectory in the state space that exhibits sensitive dependence to initial condition rendering precise repetition undoable. An attempt to replicate the sleeping

bag innovation proved not to be as easily doable as was the case in the Western Cape when Leeukop attempted to replicate the project. As one respondent pointed out, “There is currently an initiative that replication process that needs to be finalized at Leeukop. Leeukop will do sleeping bags. The problem with that is material. The plastic is quite expensive and we battling to get sponsors for that. Western Cape had sponsors for the plastic and cellotape and the newspapers they get that donated and that was sufficient for entries and still carrying on with it they haven’t stopped doing that, but be haven’t kick-started the process.” The visitor telephone booking system is not as easily replicable as the department would like for it to be. One respondent stated, “That was an innovation, exactly what needs to be replicated throughout the regions. Each Correctional Centre has to have an electronic booking system. It may take time. It’s also part of the service delivery improvement plans”. The acknowledgement that the electronic booking system may take time renders precise repetition undoable as purported by the strange attractor complex adaptive system bedrock principle. Can DCS innovations be replicable? Interview respondents believe they can; however, CAS systems argue against this notion based on dynamical nature of organizations and unrepeatability. Even if innovations are replicated, precise replication cannot be guaranteed.

4.4.5 Edge of chaos

While classical organizational management theorists are seen to be comfortable with their theoretical frameworks based on stability, predictability, linearity and equilibrium, complexity theorists are keen to identify the opposite of such conceptual stances. Complex adaptive systems decay and die when operating in conditions that are consistently equilibrium-inclined. Pascale (1999: 86) postulates that complex adaptive systems are at risk when in the state of equilibrium, since “equilibrium is a precursor to death”. Another significant premise worth noting is that equal to the value ascribed to equilibrium in organizations is chaos. An organization in chaos ceases to function as a system. The most productive state to be in is at the edge of chaos where there is maximum variety and creativity, leading to new possibilities. These new possibilities give rise to innovation as was the case in DCS emergence of innovations.

Organizations require operating at the edge of chaos which is far from equilibrium. This far-from-equilibrium operation yields unpredictable creativity and novel evolution that make systemic adaptation a voluntary prospect. Respondents differed on the premise that it is the state of chaos that has culminated in the evolvement of innovations. As one respondent pointed out, “I would tend to not necessarily disagree, but have a different view. You can even still innovate even when things are stable”. However, a different view has been highlighted, pointing out that “I think we have always been at the border of a little bit of chaos whether we

like it or not. And I mean for the past few years in terms of instability, leadership instability, both at the national and regional level there has been a lot of unknown, what's gonna happen, who is gonna be your next Regional Commissioner whose... Corruption is rife. Leadership direction has not been stable". Carlisle and McMillan (2006:5) have identified such as one fundamental aspect that leads novel survival strategies. They point out that "it is often argued that at the 'edge of chaos' firms are most like to successfully develop novel survival strategies because expansive and exploratory learning leads to new discoveries".

4.4.6 Fitness landscape

This refers to organizational co-evolution with an ever-changing environment resulting in the creation of a landscape that has high peak, peaks and valleys. Innovations in the Department of Correctional Services (DCS) have emerged to serve as a redress to a disorderly and a chaotic state the organization has been in its rehabilitation path. However, the innovativeness of these innovations has been gagged against other organizations' innovations through various national and international innovation management bodies. Although the submissions to innovation bodies were not meant to assess the fitness level of the organization, they showed whether the DCS is indeed innovative or not. There are four organizations where DCS innovations were submitted, viz. Commonwealth Association of Public Management and Administration (CAPAM) (two innovations submitted: the Imbeleko Project and the Sleeping Bag); Impumelelo Awards (one innovation: Sleeping Bags); All Africa Public Sector Innovation Awards (AAPSIA) (two innovations submitted: Imbeleko Project and the Sleeping Bag); Centre for the Public Service Innovation (CPSI) (all 12 innovations submitted). In this public service innovation environment the DCS has sailed in landscape peaks as it contested against other public service organizations. One respondent stated "the sleeping bag project from the Western Cape was one of the winners in the Service Delivery Improvement category and its partnership with the public sector. And as a result of our exposure to the public sector innovation awards we participated last year as well and we won two categories the first one and the second runner up the same centre, Goodwood Centre of Excellence entered another project the Mbombela Sports field project and they were the second runners up. The first runner-up was the Mangaung Private prison where they submitted school desks project refurbished school desks and give them back to the surrounding community. They were the first runner up". These innovation successes promoted DCS endeavours to innovate, as one respondent pointed out "that (meaning innovation successes) really set us on the road to really promote innovation and we also profiled the other innovations at various occasions". Although, in essence, these submissions did not determine whether or not the organization sailed or sank in the fitness landscape, they played a pivotal role in promoting capacity for DCS innovations.

Their attempt to push for the submission of more innovations in the same categories did yield positive outcomes. One respondent pointed out that they have been unsuccessful in some entries made to the innovation organizations that promote public sector innovations. She pointed out that, “what we found is that we’ve been; the type of projects that we submit are on the same category. So we are actually competing against ourselves which is not a good thing. So we said that in this year we would like to diversify a little bit. We ask for entries in the five different categories so we got them increasingly submitted entries, 11 entries this year. But we unfortunately we were not successful”. Such failure was a learning curve that meant that they had to improve their innovation management strategy. One of the reasons given for entries that failed to win is that the organization had not adhered to better innovations from other organizations within the public sector, but rather to poor management of innovation processes. One respondent pointed out that poor compilation of submissions was one other reason that led to failure: “The regions have not been very good about the return dates and then there is a rush to get the application forms in. The preparation of the documents was not, in my opinion, up to standard. But we submitted it nevertheless and I think if I was part of the adjudication team, I got some of the applications that we submitted I probably would not have considered them myself”.

4.5 Organizational impediments to innovation

Whereas Amabile et al. (2006), in their assessment of work environment, identified five critical environmental components that influence innovation, organizational impediment to creativity did crop up in the Department of Correctional Services. One respondent pointed out that “the officials get the credit for the innovation. And then they, the supervisors are not thinking new, they are thinking old and they don’t like these officials that think different. Think out of the box. Here at Head Office we find the same as well. But we don’t really care, we are just going ahead”. The other respondent pointed out that “I think, in the main, the other thing is that innovation is regarded as an ad hoc activity. It does not form part of the way we do things; hence, I mentioned the issue of organizational culture”. Other significant impediments to innovation are more about the mental models of critical stakeholders in the rehabilitation process viz. correctional officials. It was pointed out that people would disregard innovation on the basis of policy implementation. As one respondent pointed out, “some say ‘How can I become innovative because I am just here to implement policy?’ You know others would say I am just here to develop policy. So that restricts, you know, the thinking”.

4.6 The nature of DCS innovation support systems

Amabile et al. (1996) identified five environmental components in their assessment of the work environment that are critical in affecting creativity viz. “encouragement of creativity;

autonomy; resources; pressures and organizational impediments”. All have been identified as prevalent in the Department of Correctional Services innovation efforts. Although the Department of Correctional Services idea-generation and creativity efforts are not a direct result of its management or leadership creating and enhancing a conducive innovation environment, it emerges that innovations are a result of the self-organization principle of a complex adaptive system.

Pressures and organizational impediments are found to be at the supervisory level of the organization thus rendering Correctional Services not having a conducive environment for innovation. This is found in the following response to the question of organizational impediments: “At the Management Area level what we found is that Area Commissioners are threatened by officials that are innovative and supervisors as well, because supervisors do not get any credit for the innovation. They do not get the support from the supervisors because it was not their idea. And then they... the supervisors are not thinking new, they are thinking old and they don’t like these officials that think different. Think out of the box. Here at Head Office we find the same as well”. Support for new ideas at all levels of the organization, from top management, through immediate supervisors, as identified by Amabile et al. (1996), is not adhered to, thus rendering the conducive innovation environment difficult. The other respondent pointed to organizational culture as the main culprit in posing as a barrier to innovation, arguing that “... there is lot that you can say about barriers. I have mentioned management style. The culture and when I talk culture we also talk in terms of not necessarily the attitude of people, but also the way in which we do things. You know, people will say ‘How can I become innovative because I am just here to implement policy?’” This explication further dislocates the second component of autonomy or freedom which is the “day-to-day conduct of work, as a sense of individual ownership of and control over work”; merely implementing policy rules out all possibilities of ownership.

However, in its endeavour to curb impediments to innovation the DCS has developed systems to enhance innovative thinking. The DCS has developed an Innovation notebook – a hand system and email mechanism to register new ideas, which will eventually be replaced by an electronic registration system. This innovative solution is in line with the notion that it is necessary to encourage creativity by allowing ‘information flow and support for new ideas at all levels of the organization, from top management, through immediate supervisors, to work group’.

4.7 Discussion of research findings

This study has provided an innovative perspective on how DCS innovations came about using a CAS approach. This study adopted an approach –unique in the public service – of using complexity theory that enshrines organizational uncertainty to provide basis for innovative thinking. It should be noted, though, that although this study explored innovation using complexity theory as its bedrock, it has endeavoured to highlight key innovations in the DCS based on the adoption of the definition by the DCS which favours any applied creativity that is contextually relevant, thus justifying all discovered creative activities geared towards service delivery improvement as innovations regardless of the exposition to the contrary. It has emerged in this study that although there was no determination of distinct variables regarding demographic representativeness, in view of the adopted definition, DCS is innovative. However, DCS innovativeness could be discarded as completely lacking creativity and innovation should a definition that enshrines newness be adopted, as is the case with definitions adopted by private sector organizations. The non-adoption of newness as the essence of innovativeness in the DCS, as is the case with the private sector organizations and other entrepreneurial ventures, renders DCS innovation shallow as innovations.

Whereas an argument for a balance between incremental and radical approaches to innovation has been highlighted by Carlisle and McMillan (2006), the innovations uncovered by this study in the DCS are incremental and exploitative innovations. Contrary to the assertion that incremental innovations are prevalent in stable organizational systems, DCS innovations have been an emergent of instability which resulted in self-organization. There is nothing radical and or exploratory about the DCS innovations in the context of a complex adaptive system. Carlisle and McMillan (2006) have argued that “many organizations are good at incremental innovations, but less successful at radical innovations which may partly explain a recent stress on the latter”. This is true to DCS innovations in that all its innovations are incremental and exploitative, lacking ground-breaking and radical elements that epitomize technologically-inclined organizations. All thirteen DCS innovations, viz. Imbeleko project; Amajuba project; School desk refurbishment project; Conversion of an old reservoir into a multi-purpose room; Jacket manufacturing out of old blankets; School crime prevention programme; Ithuba Lesibini sleeping bag DCS/ABSA Partnership for financial management; Mbombela sports field; Mangaung birds project; Prison visit telephone booking system and Hlumani “Let’s grow” Innovation, are established measures to exploit prevalent dilemmas within the system. They are problem solving-oriented unlike innovations that enhance market niches as is the case in the private sector. From a complex adaptive systems approach, this focus on one aspect of innovation, i.e. incremental, is indicative of a self-organizing principle within an organization that organizes either incrementally or exploitatively. These innovations have been

fundamentally incremental in that they sought to attain short-term gains, hence their referral classification as mostly projects. One of the key properties of a complex adaptive system is its ability to adapt to their environment through self-organizational behaviours of exploration and experimentation, as Carlisle and McMillan pointed out. A primary innovation that provides a reflection of this is the “conversion of an old reservoir into a multipurpose room”, emanating from an individual correctional officer whose concern was lack of physical learning resources for rehabilitation purposes.

Incremental innovations epitomize highly controlled environments, as pointed by Carlisle and McMillan (2006:5) from Eckvall (1996), that “evidence suggests that incremental innovation is more likely to occur when control mechanisms veer towards the tighter end of the organization – bureaucratic spectrum, while radical innovation is more likely in looser, less tightly controlled conditions”. As a security and highly controlled organization which has been able to be innovative, DCS has operated at an emergent complexity zone that is neither chaotic nor stable. Complex adaptive systems, when operating at an unstable environment, disintegrate; hence, when operating at stable environment they ossify. This therefore necessitates an ‘edge of chaos’ zone of operation.

The first finding that this study has uncovered is that all DCS innovations have emerged out of necessity, thus enhancing mechanisms and systems that the organization utilizes to enhance rehabilitation. This has served as a crucial contributor to systems thinking as all these innovations were not guided by the research and development designs of the organization neither were they propelled by the directorate Service Delivery Improvement whose primary task it is to enhance innovation. This, in essence, explicates complex dynamics that exist within an organization yielding unanticipated, but positive outcomes for the organization. These innovations cannot, however, be measured to determine the extent to which they positively contribute to rehabilitation since the transformation of mental models is an uncertain venture that is dependent on the receiving agent, in this case offenders.

Secondly, of the thirteen DCS innovations, eleven are service-oriented and only two are product-oriented. As a service organization, not a product-producing entity, these innovations could be construed as meant to enhance the delivery of services in essence to rehabilitate offenders. This, however, does not mean that diversification of innovation orientation cannot be enhanced in a service-oriented organization. The two products that DCS registered as innovations, sleeping bags and jackets, were not produced for the use within the DCS, but to help mitigate poverty in the broader society. Such innovations, if put under the lens of the private sector entrepreneurial research, could be construed as unoriginal and unauthentic in

view of the concept of newness. They may be mere changes adopted to enhance rehabilitation efforts and keeping offenders busy while serving their sentences.

Thirdly, there is a prevalence of organizational impediments to innovation. These are negative idiosyncrasies that emanate from those that are to create a conducive environment for innovation, viz. supervisors. The prevalence of this impediment results in innovations being steered towards the enhancement of services and lack of diversification and experimentation. To mitigate these impediments there are three key innovation stimuli that the DCS has adopted, viz. appointment of innovation champions; training of successful innovators; and recognition through awards ceremonies. These have led to more innovation submissions in the past three years, since the launch of the DCS innovation Board in 1998.

The fourth finding worth exploring in this study is the balance between stability and instability, with the identification of DCS as having both pockets of stability and instability. This has culminated in the lack of adoption of the strategic choice managerial perspective of driving innovation within the long-term strategic framework of the organization to allowing innovations to emerge from within the system. Although DCS innovations cropped up out of a controlled security environment, they have emerged through various instabilities that respondents pointed to, ranging from leadership uncertainty to supervisory scepticism to supporting innovation. The argument by Carlisle and McMillan (2006) that “complex adaptive systems comprise of agents (people) who experiment, explore, self-organize, learn and adapt (in varying degrees) to changes in their environment” is evident in the manner that an innovation occurred in which an old reservoir was converted into a multi-purpose learning facility. Environmental and organizational conditions of lacking resources to enhance rehabilitation created a conducive environment for learning and innovation. It was an emergent development of a complex adaptive system. This finding is further enhanced by the definition that complex adaptivity is a “successful evolutionary response to the survival needs of certain species”.

Environmental conditions, both internal and external, have been key to learning and adaptation in the DCS culminating in self-organization that led to successful experimentation in the context of a correctional system. One could hypothesize that since DCS’s internal environment is highly controlled security establishment, ossification would be inevitable. This controlled environment has not led to stability and equilibrium in the internal state of the organization resulting in rigidity and lack of innovativeness. To the contrary, the DCS has operated at the edge of chaos which has led to the emergence of innovations through self-organization. All thirteen DCS innovations are symbolic of how environments within which organizations find themselves influence the system in its adaptation and evolution. From a reflective

practitioner's perspective the Imbeleko project whose primary goal is to help in the management and treatment of babies incarcerated with their mothers projects a systemic understanding of the societal challenges. The Amajuba project whose mandate is to enhance community involvement in the rehabilitation processes through education and training; the school desk refurbishment project; the conversion of an old reservoir into a multi-purpose room; jacket manufacturing out of old blankets; school crime prevention programme an initiative geared towards fighting crime at school level so as to influence societal ethical responsibility; Ithuba Lesibini; the sleeping bag; DCS/ABSA partnership for financial management; the Mbombela sports field; the Mangaung bird project; a prison visit telephone booking system; and the Hlumani "Let's grow" Innovation, all epitomize an emergent and evolution of a CAS.

4.8 Summary and conclusion

The emergence of DCS innovations can be ascribed solely to the five bedrock principles of a complex adaptive system, as this study has shown. This has been demonstrated by the manner in which all thirteen identified DCS innovations have emerged. This has therefore shown that, as a complex adaptive system, DCS innovations are a result of an organization that operates at 'edge of chaos' zone, culminating in self-organization patterns of behaviour. It is these pockets of self-organization at the edge of chaos that have culminated in the emergence of DCS innovations. This study sought to explore the extent to which DCS is innovative using a complex adaptive systems framework. However, the innovativeness of the DCS lies chiefly on the adoption of the definition of the CPSI that endorses all creativity that is contextually relevant. However, as is the practice with most public sector organizations, innovation may not necessarily imply newness, but rather improvement of the way services are rendered. The challenge imposed by other definitions of innovation would to some degree negate the innovativeness of the DCS in that the common factor among all definitions is the concept of newness even though newness has been further problematized by the immeasurability thereof.

CHAPTER 5

SIGNIFICANCE, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

The application of complexity theory's complex adaptive systems methodology in unpacking DCS innovations and as a knowledge generation tool would have met some scepticism in view of its advocacy of uncertainty and unpredictability. However, its application and employment has furthered the prospects of its adoption as useful theoretical framework for analyzing various organizational interactions and justified why organizations like DCS still would be innovative in the light of the 'edge of chaos' state. One would have been tempted to conclude that orderly systems are likely to be the most innovative; hence, the argument that such orderly states culminate in organizational ossification as a result of lack of creativity and exploration. Whereas orderly is not completely shut out by the complexity theorist, disorder is also not fully endorsed as it may culminate in disintegration within the organization. It is the 'edge of chaos' state where self-organizing properties emerge and innovative exploration becomes inevitable. This study has proven that DCS innovations have not come about as a result of well structured innovation plans, but rather as an emergent endeavour to solve what emerged as an 'edge of chaos' state allowing agents within the system to innovate to enhance the delivery of services.

5.2 Significance of findings

The claims that this study make are not made unrealistic by the limited data. Using two in-depth interviews and documentary evidence was within the system's boundary and reflect the outsider providing a new level of reflexivity to feedback into the system of corrections. This study has highlighted the one-dimensionality of DCS innovations and highlighted the need for diversification. It has further highlighted the limitations that emanate from a definition that does not pose as serious a challenge as is the case with the definitions adopted by the private sector, where newness forms the bases of innovation. The research findings have further strengthened the need for looking at innovation barriers as unproductive and the need for the research of a development wing of the DCS to pay special attention to organizational learning and multi-skilling of the workforce to advance creativity. Allowing people to make mistakes while advancing organizational goals allows for complex adaptive systems emergent properties of exploration and self-organization.

Firstly, research findings of this study have highlighted the incremental and or exploitative nature of DCS innovations, thus exposing the one-sidedness of the system, proving that complex adaptive systems do not necessarily make a conscious choice of whether to be incremental or radical. They just innovate as dictated to by the environment within which they find themselves. Innovation is an emergent property of an organizational system that operates at the 'edge of chaos' zone. The significance of this finding is that organizations can contribute to the management of the state of order and or chaos so as to function at the 'edge of chaos' zone and thus allow for the emergence of self-organization through exploration and experimenting for effectiveness.

Secondly, the study has provided a lens through which to view how DCS innovations came about, the significance of which is to help amplify innovation properties and enhance creative thinking in much more meaningful areas within the organization so as to allow other organizational sectors to experiment with solution-driven, service-delivery methods. Furtherance of skills in areas of rehabilitation could help augment innovativeness, a necessary ingredient for creative thinking.

Thirdly, the application of the five bedrock principles of innovation, although not a common or familiar tool for unpacking innovation in the public sector, has highlighted organizational understanding that can further innovation and unlock creativity. Although not all of the five bedrock principles are applicable in detail within the DCS, highlights have shown that all have characterized the DCS as a complex adaptive system. Self-organization and 'edge of chaos' principles have shown prominence as key drivers of innovation in the DCS. The significance of this finding is in the creation of a fertile environment for the enhancement of other principles for a holistic exploration of innovation.

Fourthly, the exploration of innovation definitions has, to a large extent, proved that innovation is subjective to the innovator and his or her purpose for the innovation. The CPSI definition of innovation as "applied creativity that is contextually relevant" qualifies all DCS creativity as innovation. If a different definition that enshrines newness were to be adopted, the conclusion would be that DCS is neither creative nor innovative. This is further problematic in finding an appropriate definition of innovation as 'newness' which has been problematized further by the questions that Johannessen et al. (2001) raise as to what is new, how new, and new to whom?. The significance of this finding serves to challenge DCS to look at more challenging definitions that sets the innovation bar high and that innovations should not only be about submitting to awards ceremonies, but enhancing organizational improvement.

Fourthly, the prevalence of impediments to innovation emanating from negative idiosyncrasies by supervisors whose role in enhancing innovations is of paramount importance plunges the organization to either extreme, viz. rigid order resulting in organizational ossification or chaos culminating in disintegration. A conducive learning environment is an ideal setting for innovation. The significance of this finding is to highlight where much of the innovation drive should be geared. The transformation of mental models of organizational agents is a less predictable and less certain venture; however, an understanding of this nature would help the research and development wing of DCS to pay particular attention to supervisors whose negative idiosyncrasies impede innovation.

This study has ventured into a unique field that has not been researched in depth in the public sector. Innovation as an organizational enhancement tool that elevates organizations to new market niches can help revolutionize the public service delivery initiative broadly. These findings cannot be confined to the use in the DCS, but they can be used by any public sector organization that desires to innovate not for awards purposes, but for the enhancement of service delivery.

5.3 Recommendations

The Department of Correctional Services adoption of the CPSI definition of innovation as “applied creativity that is contextually relevant” is limiting. Creativity is one aspect of innovation that drives innovation at its elementary stage. An adoption of a more challenging definition that could also be applicable even in the private sector, may serve this purpose. One definition that could heighten the drive to innovate could be an adoption of a complex adaptive definition by Cherkasky and Slobin (2007) who defined innovation as a disciplined process by which an idea is generated, realized, and evolved resulting in significant business value and an improved customer experience. Although this definition is limited in that it does not provide newness as a central theme and measurability thereof, its significance lies in the disciplined process which can be used to provide a research and development dimension to the DCS knowledge base so that what is construed as innovation is not just mere improvement or change.

The creation of a learning, experimentation and exploration environment is of pivotal importance in enhancing innovation. It is recommended that a concerted effort be geared towards establishing an environment where experimentation and exploration is encouraged. This could culminate in the diversification of innovation, covering all seven innovation categories as suggested by Hartley (2005) and beyond.

Although this study was focused on DCS innovations from the side of correctional officers, there seemed to be a deliberate exclusion of innovative rehabilitation ideas from those at the receiving end of such rehabilitation endeavours, i.e. offenders. The involvement of these agents in their rehabilitation should not be construed as different from the involvement of customers in the betterment of their service. It is assumed that correctional officers know what offenders need for the enhancement of their rehabilitation; however, offenders' innovative ideas may as well contribute to their own transformation of their mental models.

5.4 Recommendation for further research

As much as this study was focused on innovation as propelled by the DCS, more research is needed to probe innovations, especially from offenders as they seek to cope within their environment. It may be beneficial to enquire into their mental models and the direction to which the rehabilitation process should take. As free, but incarcerated agents, offenders do play a role in their own transformation process. The innovative manner in which they acclimatize and adapt to correctional settings could enhance innovative ways in which they could be rehabilitated using complex adaptive systems approach.

5.5 Conclusion

The application of complex adaptive systems approach to innovation within a public sector organization has been a ground-breaking venture. The findings of this study using a conceptual framework from complexity, charged with unpredictability and uncertainty, has served as a lens through which organizational innovations can be interpreted. This study has shown that the complex adaptive nature of DCS and its reliance on incrementalism and exploitation are means through which its innovations are appropriated. It has further established that many DCS innovations emanate much more from self-organization as agents experiment at the 'edge of chaos' zone. DCS innovations, like most complex adaptive systems, are not the result of carefully planned innovation strategies or research and development, but rather they emerge as properties of a complex adaptive system.

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Appendix A: INTERVIEW GUIDE

Exploring Innovation in the Department of Correctional Services: A Complex Adaptive Systems approach.

What innovations have there been in the department?

How have they come about?

How have such innovations changed the way the department has been doing things in the past?

To what extent are they towards the achievement of departmental goals?

Are there any barriers to innovation that you have experienced?

What has the departmental leadership done to enhance innovation?

Are such innovations replicable within the department?

Are such innovations replicable within the broader public sector?

What control flexes have there been to encourage innovation?

A highly controlled environment limits innovation. Do you agree or disagree with this statement?

Organizations are said to be most innovative when they operate at the zone called “edge of chaos”. What has been your experience in the DCS?

What in your view are DCS factors that impinge on innovation performance?

What has been done in the department to stimulate innovation?

Are you happy with the way the department enhances innovation?

Innovation is essentially about converting ideas into something profitable. What idea generating mechanisms there are in the DCS geared towards channelling creative abilities?

Appendix B: LIST OF DOCUMENTARY DATA RECEIVED FROM THE DIRECTORATE SERVICE DELIVERY IMPROVEMENT

Five Pictures depicting sleeping bags manufactured at Goodwood Correctional Centre

AAPSIA Awards 2010 Submissions FSNC

Allandale Entry Form – Impumelelo Awards

Amajuba Project

Birds Project

Building Public Service Leadership

CAPAM

CAPAM Awards – Imbeleko Project

CAPAM Youth Leadership Forum

Commonwealth Innovations

CPSI Awards Submission Form – Free State Province

CPSI Awards submission form (School Crime Prevention – Gauteng)

DCS – Various Awards Entries

DCS Innovation Management Project AAPSIA 2010

DCS Innovation Manifesto

Eastern Cape Submission Form

Enhancing Leadership in Citizen Service Delivery

Entry Form – Imbeleko Project CAPAM Oct 2009

Entry Form – Sleeping Bag Project CAPAM Awards 2010

Gauteng Region

Goodwood CPSI leaflet

Imbeleko Project AAPSIA Awards

Impumelelo Awards

Impumelelo Awards Application Form

Innovation Issues 1-8

Innovation list – Eastern Cape Province

International Innovation Awards Brochure

Letter of Appreciation from the Premier – Free State Province MPL E.S Magashule

LMN PowerPoint Presentation October 2008

Mangaung Desk Refurbishment Project

Mbombela Goodwood Project

Photographs of Handing over ceremony

PowerPoint Presentation - Eastern Cape Province

PowerPoint Presentation – Free State Province

PowerPoint Presentation 1 –Gauteng - CPSI Awards

PowerPoint Presentation 2 –Gauteng - CPSI Awards

Proposed Submissions – Innovation Awards 2010

Submissions CAPAM Awards 2010 Sleeping Bags Projects

Western Cape Presentation 1 Awards

Western Cape Presentation 2 Awards October 2008