

**UNIVERSITY OF KWAZULU-NATAL**

**CAREER PLANNING AND MANAGEMENT IN A  
COMPLEX ADAPTIVE SYSTEM**

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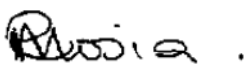
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**2013**

## DECLARATION

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- ii. This dissertation has not been submitted for any degree or examination at any other university.
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To God be the glory, great things He has done.

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- My family, you always push me to be the best I can be
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## **ABSTRACT**

The world of work is constantly changing. This variation is brought about by the changes happening both inside and outside an organization. In addition, the individuals in an organization also change as a result of internal and external factors. For this reason, careers of individuals in an organization evolve in response to the change in their environment. Sometimes, people can plan their careers paths, while at other times the changes are unexpected. The aim of the study is thus to understand how people plan and manage their careers while taking into account the unpredictable nature of their environment. This study was undertaken at the Council for Scientific and Industrial Research (CSIR), where two thirds of the employees are science, engineering and technology professionals, while the other one third is support staff. The data was collected through open-ended interview questions on a select number of employees of different professions and ranks.

This study applied chaos theory in an attempt to understand the career planning and management strategies that employees of the CSIR employ. The decisions that employees make at any given time are informed by what is happening in their surroundings. In this case, employees were studied as agents in a complex adaptive system. As agents, employees are influenced by what is happening amongst themselves, within an organization, as well as outside the organization. Therefore, looking at employees in the context of their surrounding gives a more accurate picture of the factors that influence their careers. In addition to consultation with employees, career management policies and strategies of the CSIR were studied to determine if there is a fit between employee expectation and the organization. The information gained will assist the Human Capital Development unit to introduce development interventions that will be relevant to the employees.

From this study, it is evident that people are responsible for planning their career trajectories. However, it was also apparent that management was responsible for ensuring that the organization's policies and strategies are supportive of people's careers. In addition, it was clear that career growth of the individual was also dependent on one's manager, leading to a dual responsibility. The manager was responsible for providing

relevant exposure that compliments an individual's aspirations. Of course, this can only be so if those aspirations are in line with the organization's strategies. In addition, it is clear that the careers of individuals are affected by what is happening externally. This results in complexity in career planning and management. For that reason, long-term career planning has proven to be a futile exercise as there are too many influences on careers, which are unpredictable. For that reason, only those individuals who are flexible and willing to change with changes in the environment have had success in their careers. The said success was not at all times planned.

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# CHAPTER 1

## Introduction

### 1.1. Background

The Webster Comprehensive Dictionary (1995) defines a career as a course of professional life or employment. According to Jackson Fr *et al.* (2006) career planning is a process of aligning an individual's career aspirations with the organization's needs. Therefore, career planning is an on-going process undertaken by an individual to determine his or her interests, skills, values, competencies and career aspirations, and devising a plan on how to fulfil those goal. On the other hand, career management is an on-going process or activities undertaken by an organization to determine its personnel needs for the future, as well as deciding on the interventions to be offered that will result in the organization reaching its objectives. From these definitions, it is clear that both the employee and the organization play specific roles in the career development of individuals in an organization.

The definitions cited above give the impression that career planning and management takes into consideration the needs of an individual and the organization only. This is far from the truth. Both individuals and organisations are affected by events in their environments. For instance, a lot of people have lost their jobs due to the recent financial crisis. None of these people or their former employers planned on these lay-offs. This is but an extreme case where events in the environment affect the careers of people in an organization. This is because organizations are open systems. As a result, they interact with the environment, sharing information, energy, challenges and the likes.

A system is an entity made up of interrelated parts, whose sum total make up the whole (Buckland, 2000). An organization is therefore a system made up of different parts that give the organization its character. These parts or subsystems can be different systems in an organization. Departments, people, functions, *etcetera* are examples of subsystems in an organization. Systems can be classified as simple or complex depending on the interactions of the subsystems within that system. A system is said to be simple if it is predictable, ordered, closed, stagnant and with a known number of elements. On the other hands, a

complex system is one which is unpredictable, dynamic, and open, with a large number of elements (Alder *et al.*, 2003).

From the definition of a system, it is clear that the characteristics of a system are dependent on its subsystems. However, looking at the subsystems in isolation will not give a true picture of the whole system. Since employees are subsystems in a system, they should be looked at in the context of an organization. A person cannot have a career in isolation. In fact, an individual's career is to some extent defined by the organization that person works for. For instance, a scientist at the Council for Scientific and Industrial Research (CSIR) may have different roles compared to one in another organization, even though the general definition of a scientist might be universal. Therefore, career planning and management should be looked at in the context of an organization.

As mentioned earlier, an organization is made up of different entities. People are an important aspect of an organization. In fact, it is impossible to have an organization without people. Organizations are often divided into departments and functions. There are also policies that often regulate the functioning of the organization and its employees. Different theories have been applied to understand organizations and their people. For this study, complexity theory and the theory of complex adaptive systems will be used to understand the influences of careers of people in an organization.

Complexity theory is an overarching theory that includes a number of theories such as dissipative structure theory, chaos theory and the theory of complex adaptive systems that originated in the natural sciences (Burnes, 2005; Stacey, 2007). In general, complexity theory is the study of dynamic and complex systems whose interactions are non-linear (Pepper, 2003). Chaos theory is the study that looks at systems that are non-linear, dynamic and complex, and owes its origin to Lorenz who was studying mathematical models of weather systems (Levy, 1994; Levy, 2000). He discovered that small and insignificant changes to initial conditions can have unpredictable and non-proportional results in a system – a phenomenon known as the “butterfly effect” (Anderson, 1999; Burnes, 2005). The theory of complex adaptive systems looks at individual subsystems within a system. Complex adaptive systems are systems consisting of a large number of entities called agents, whose behaviour is controlled by a set of individual rules referred to as schema (Stacey, 2007; Shaw, 1997; Grobman, 2005). Agents can move in and out of a

complex adaptive system, resulting in a dynamic system that changes in line with the agents in it.

While complexity theory has been used extensively in understanding organizations, it has also been used, albeit in a limited context, to understand individuals in an organization. People in general are dynamic. No person can claim that they are the same as yesterday. People's careers are also ever-changing. They change depending on the changes in the person, organization and the world in general. According to Pryor and Bright (2003, 2007), an individual's career is an emergent property which comes about as a result of the interactions of an individual with other people from other organization, countries, fields, and so forth. This means that a person does not choose a career in isolation. The choice is influenced by his or her needs as well as available opportunities. It therefore makes sense to study career planning and development through the theory of complex adaptive systems as this allows us to look at an individual, the organization as well as the environment in which they both operate and exist. Because of the inherent complexity of people, they can also be looked at as complex adaptive systems (Pryor & Bright, 2007). However, for the purpose of this study, people will be studied as agents in a complex adaptive system. Careers are emergent properties that emerge as a result of interactions of employees with the environment (Bloch, 2005)

Career planning and development should be looked at as a life-long occurrence which will be informed by changes in the individual as well as the environment (Zimmerman & Kontosh, 2007). Therefore, looking at people in the context of their environment is more effective in career planning and development as opposed to traditional methods that only looks at traits in isolation (Bright and Pryor, 2005).

Patton and McMahon (1999) introduced the Systems Theory Framework (STF) of career development. This is a qualitative assessment tool for career counselling that is informed by the constructivism worldview, and views a person in the context of their environment (McMahon *et al.*, 2003, McMahon & Watson, 2008). They believe that much can be drawn from understanding an individual's view of an event or experience. This informs people's mental models. The framework is developed around an individual as an open system that is embedded on a larger system. Needless to say, many individuals make up the large system. Therefore, people are considered here as subsystems within a system, within a system. An

individual is affected by a number of influences such as gender, race, religion, geographic location and so forth. From these differences, it is clear that the characteristic and background of an individual might assist or prevent one from pursuing a certain career route. For example, someone may enjoy running, but his body structure might only allow him to take part in long distance running as opposed to sprinting that requires speed and not endurance. Similarly, there are jobs that are suitable for males and not females due to their physical make-up. One's religious beliefs may direct one to certain jobs and not the others. For instance, a nurse who does not believe in abortions may have difficulty participating in the procedure which will then limit, to some extent the clinics and hospitals she can work in. Each individual in a system will have different influences, which means that individuals will have different worldviews (McMahon, 2005).

In addition to individual differences, the environment can also influence the careers of people in that system. For instance, South Africa has mining industries as a result of the rich mineral resources, while some countries in the Middle East are rich in oil, making their economy dependent on that resource. For that reason, while there may be similar careers available for people in the two countries, there will also be unique careers that are informed by the available natural resources in that country. The politics of a country and continent also has an influence in people's careers. For instance, in South Africa in the past black people were only allowed to do certain jobs and not others. As a result, one finds very few old black engineers today mainly because engineering was not an option for them back then. It is only now that people can choose careers without political interference.

Figure 1.1 shows the Systems Theory Framework (STF) that depicts the factors that influences people's careers. While McMahon dwells on systems theory, their work appears to be relevant in the theory of complex adaptive systems as well. The theory of complex adaptive systems looks at the non-linear interactions of agents within a system, while STF looks at the non-linear interaction of subsystems within a system. Interactions in both complex adaptive systems and in STF result in the emergence of rules and patterns that are informed by the worldviews of either the subsystems or the agents. This means that both agents and subsystems self-organize in response to influences from the environment. There is talk of unpredictable consequences in both theories.

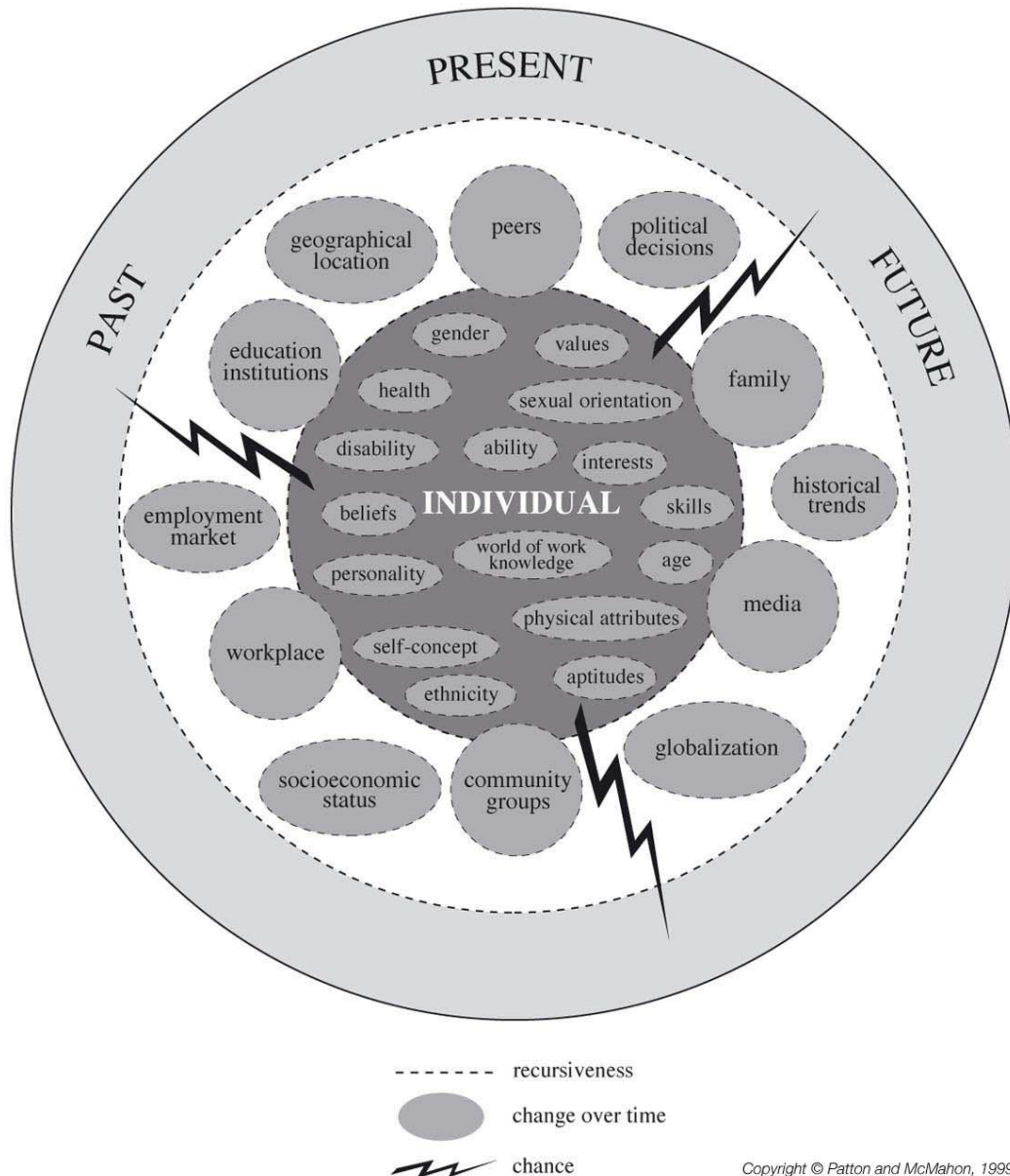


Figure 1.1: The Systems Theory Framework of Career Development (Patton and McMahon, 1999)

This study aims to apply chaos theory in an attempt to understand the career planning and management strategies that employees at the CSIR employ. Also, the expectations of employees on career development opportunities versus those offered by the organization will be assessed. The aim here will be to determine alignment between employee expectations and the organization requirements and offerings regarding career development. Finally, an attempt will be made to determine if employees believe that they have influence over their career trajectories. The information gained will assist the Human

Capital Development unit to introduce development interventions that will be relevant to the employees while serving the needs of the organization.

The CSIR is a research and technology development institution that has in its employ almost 1700 out of 2400 people who have a minimum of a National diploma in different science, engineering and technology (SET) fields. Almost 30% of the employees at the CSIR have either a Masters or a Doctorate as their highest degree. Besides the differences in qualifications levels, the organization also has broad areas of research ranging from biosciences, natural environment to the built environment. This implies that people with a variety of educational backgrounds and skills are employed at the CSIR.

The study aims to answer the following questions:

1. What are the factors that influence the career planning strategies of individuals?
2. How can employees effectively plan their careers taking into consideration the dynamic nature of careers and the organization?
3. To what extent does the environment affect individuals' careers?

Based on what has been reported on so far, an assumption is made that long-term planning of a career is a futile exercise if one is operating in a complex adaptive system.

## **1.2. Dissertation Structure**

In the second chapter, a literature review will be presented. An analysis of the literature dealing with complexity theory, the theory of complex adaptive systems and career planning, development and management will be undertaken. This is done with the aim of understanding what has been studied previously on the different topics. The literature review will not deal with all that has been dealt with on the subjects, but will be comprehensive and relevant to the current study.

Chapter three will give details of the research design undertaken in this work. This will describe the research approach, method of data collection, analysis and interpretation.

In chapter four, the results of the study will be presented and discussed in detail. Therefore, results and discussion will be presented together.

Chapter five will provide conclusions and recommendations from the research.

## **CHAPTER 2**

### **Literature Review**

#### **2.1. Introduction**

The definition of a career has changed over the years. In the past, careers were characterized by upward mobility of an individual in one or two organizations (Ackah & Heaton, 2004). The trajectory of an individual's career was almost set based on the company's offerings. For instance, someone who is a teacher can be promoted to head of department, then deputy principal and finally principal of a school. These are the only available opportunities for growth. Most people will remain at teacher level for the rest of their working lives. Nowadays, there is talk of "boundaryless" and protean careers. Because of the changes in the employment environment, people now move either horizontally (at the same level) or vertically (up the ladder) within organizations (Ackah & Heaton, 2004). Growth is no longer defined by upward mobility but by the different skills that people gain, hence the importance of horizontal mobility which exposes an individual to different skills, albeit at the same level. While in the past there was no need for career planning, as people knew how their careers were going to pan out, people in organizations today have to plan their careers in order for them to succeed. In addition, an individual is no longer confined to one organization, but can move within different organizations in search of different skills and experiences.

Complexity theory has been used extensively in organizational literature. It is also finding use in the career development. Therefore, a brief review of complexity theory will be undertaken. This will be followed by describing how and where complexity theory is used in career development. Finally, a brief review of the relevant methods of studying or analysing career development will be undertaken.

The aim of the review is to gain an understanding of complexity theory and how it is applied in career development.

## 2.2. Understanding Organizations

An organization is a social construct made up people. Often, organizations are formed to serve a specific need of society. However, management is required to ensure that an organization achieves its intended role. The main role of management in an organization is therefore to plan, organize, lead, and control (Olum, 2004). In essence, management is responsible for determining different essential activities within an organization, and ensuring that they happen as and when they are supposed to. Because of the different roles required to complete specific tasks, and to run an organization, different people play different roles within organizations. The organization's leadership and management is responsible for providing the strategic direction of the organization. This includes policies, strategies and associated rules and regulations. In turn, people behave according to organizational rules to execute their duties. While this may be so, employees bring with them unique traits and behaviours that may influence a lot of what happens within the organization (Okediji, *et al.*, 2009). These differences shape how people interpret rules and regulations, thereby informing the behaviour of employees. Needless to say, these interpretations will be different as people are themselves different.

Although the leadership of the organization is responsible for providing the strategic direction of the organization, this is often informed by what is happening in the environment.

From figure 2.1, it is clear that there are a number of factors that influence organizational activities. These include the environment, people, and the organization itself (Cooksey, 2003). The environment in which an organization operates influences the activities of the said organization. This is because an organization does not exist in isolation. The environment is made up of other organizations, government, society, market forces, global forces, *etcetera*. On the other hand, the organization itself determines its activities. This influence is derived from the organizational purpose, policies, management structures, roles and responsibilities, individuals in the organization, and so forth. Of course, individuals are members of larger groups of people in the organization. These groups are influenced by family, the society, colleagues at work, *etc*. Within the group there is an individual who is also unique due to his or her past experiences, needs, goals, and all that. All these factorss influence the activities in an organization. For instance, organizational



policies are made by people, who are influenced by their own environment. Organizational strategies are also influenced by what is happening externally. The government can also play a crucial role in influencing organizational activities. For example, organizations in South Africa are bound by law to follow certain practices that were introduced by the government. For instance, the Broad Based Black Economic Empowerment (BBBEE) policy requires an organization to have a minimum number of black and female employees at different levels or to do business with black owned businesses. Failure to adhere to these requirements might have a negative influence on possibilities of doing business with government thus resulting in a negative financial impact on the said organization. Interestingly, at times it is almost impossible to reach the set targets due to shortage of skills as a consequence of our history as a nation. Taking all this into consideration, it is clear that organizations are dynamic and in constant evolution (Tilebein, 2006).

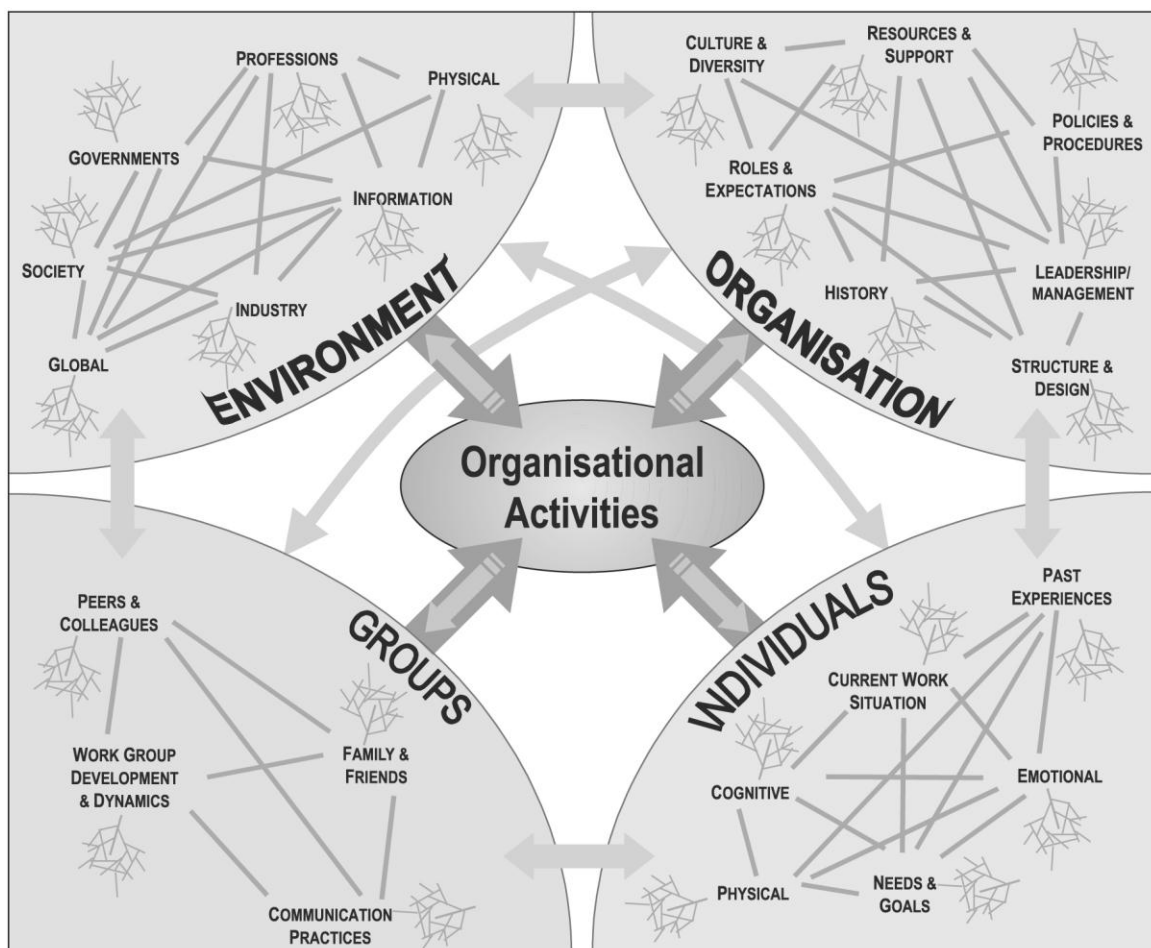


Figure 2.1: Contextual complexity of organizational activities (Cooksey, 2003)

Figure 2.1 highlights the complexities inherent in organizations. Organizations are not immune to what is happening in their environment. Factors such as globalization, recession, and technology force organizations to change the way they do things in order for them to survive (Hosseini, 2011; Bhatt, 2011). For instance, the recent economic meltdown has resulted in some organizations closing shop. For others, there is a need to restructure or downsize in order to remain in business. For organizations to survive, they need to be flexible and agile so that they can adapt in line with the changes in the environment. According to Sullivan (1999), organizations are constantly evolving and little changes in the system are often irreversible.

Complexity theory enables the study of organizations taking into account the multiple causes that influence their operation and day-to-day running (Styhre, 2002). Below is a detailed discussion on complexity theory.

### **2.3. Complexity theory and the theory of complex adaptive systems**

Complexity theory is an overarching theoretical framework that includes a number of theories that originated in the natural sciences. These include chaos theory, dissipative structure theory and the theory of complex adaptive systems (Burnes, 2005, Stacey, 2007, Zexian, 2007). In general, complexity theory is the study of complex, dynamic systems whose interactions are non-linear (Pepper, 2003). According to Cilliers (2000), the understanding of complexity theory has resulted in a new way of defining complex organizations, as well as redefining the role of leadership in organizations. The importance of interactions among elements in a system as well as with their environment is a key message of complexity theory (Keene, 2000).

Below is a brief description of the general characteristics of complex systems (Cilliers, 2000).

- A complex system is made up of a large number of interconnected subsystems that communicate through direct and indirect feedback loops. The elements of the system are themselves also complex adaptive systems.
- The interactions between subsystems are dynamic, rich and non-linear. These interactions influence the behaviour of the system. These systems are dynamic in

that they change with time. They are non-linear because the input into the system is not always proportional to the output from the system.

- Since the behaviour of the system is unpredictable, the system is characterized by emergence properties which are a result of the interactions of the subsystems.
- These interactions also influence the history of a system, thus the system's nature.
- While the behaviour of complex systems may appear random, they have an ability to self-organize and adapt to the changes brought about by the interactions of the subsystems. The concept of self-organization was first reported by von Bertalanffy who observed it in biological systems (Kieffer, 2007).
- Complex systems are open systems as they swap energy or information with their environment.

Below is a detailed description of various complex systems as defined with different scientific disciplines.

Chaos theory examines systems that are non-linear, dynamic, complex and highly sensitive to initial conditions (Levy, 1994; Levy, 2000; Holden, 2005). The term 'chaos' was used as some scientists considered that some systems are so complex that they appear as if they are in chaos (Walker, 2007). According to Anderson (1999), chaos theory seeks to explain the nature of non-linear, random and dynamic systems. Systems are said to be non-linear when the behaviour of a system is not proportional to the cause of the behaviour. Chaos theory owes its origin to Edward Lorenz who was studying mathematical models of weather systems and discovered that small and insignificant changes to initial conditions can have unpredictable and non-proportional results in a system – a phenomenon known as the "butterfly effect" (Anderson, 1999; Burnes, 2005). For instance, the Severe Acute Respiratory Syndrome (SARS) that started in China in 2003 had a negative influence on the tourism industry as people were reluctant to travel, while it resulted in positive growth for the individual air-purifier masks industry. Taken in isolation, the syndrome itself was insignificant and wouldn't have had a big impact had it not been for the world being an open system that it is. However, due to ease of travel, the disease was spread beyond China resulting in economic losses (Pryor & Bright, 2003).

While patterns of the weather system are erratic in the long term, they are believed to always follow the same global shape (Stacey, 2007).

The presence of fractals is another feature of chaotic systems. In nature, there is a repetition of patterns that gives the illusion of sameness in systems such as clouds, ferns, trees or weather patterns (Levy, 2000).

Four attractors have been identified. An attractor is a state or condition that regulates or informs the behavioural pattern a system should follow (van Eijnatten, 2004). The point attractor represents a pattern in which a system moves into a single point or outcome. Periodic or pendulum attractors represent patterns where systems move or swing between two points or outcomes. Torus attractors describe a pattern of a system that exists in a complex and conventional manner. Finally, the strange attractor represents behaviour of a system functioning in a complex and random manner. The behaviour of this system results in emergent properties that are unpredictable (Pryor & Bright, 2007).

Other contributors to complexity theory are physicists Henri Benard and Ilya Prigogine (Holden, 2005). Benard observed the emergence of new hexagonal structures during the heating of a thin layer of liquid. The system was moved far from equilibrium into a point of instability through heating (Holden, 2005). Prigogine built up on the work of Benard by studying atoms and molecules. He believed that some aspects of the second law of thermodynamics such as the unstoppable decay of atoms were not giving the true reflection of how things were occurring in nature (Holden, 2005). According to the second law of thermodynamics, dissipation occurs when energy is removed from an ordered system (Lichtenstein, 2000). This is a fact that Prigogine disputed through the theory of dissipative structures. He reported on the emergence of new patterns of complex structures that emerged when external energy came into contact with atoms and molecules (Holden, 2005). The emergence of these new structures happens without any external intervention. Both Benard and Prigogine introduced the concept of the unpredictable behaviour of systems that are operating far from equilibrium (Stacey, 2007). When systems operate far from equilibrium, they can inflate small changes in an environment resulting in instability that disintegrates the old patterns in favour of new evolved ones. The new pattern forms as a result of self-organization within the system. The emergent complex structure is called a dissipative structure and requires energy to be maintained (Stacey, 2007; MacIntosh & MacLean, 1999). Systems that operate far from equilibrium have a critical point whereby self-organization occurs spontaneously, resulting in a new pattern. According to Stacey (2007), dissipative structures get input from the environment, which they then dispense

within a system, thus causing the system to disintegrate. The collapse occurs as a result of pressure generated on the systems due to the input from the environment (Lichtenstein, 2000). This disintegration is not necessarily bad, as it can lead to new and sometimes improved patterns through self-organization. Basically, non-equilibrium conditions are a necessary provision for transformation to take place (MacIntosh & MacLean, 1999).

Self-organization and adaptation in complex systems was reported by Kaufmann during his study of living systems. Unlike dissipative structures where order emerges out of chaos, complex systems can adapt and self-organize when on the “edge of chaos” (MacIntosh & MacLean, 1999). According to Shaw (1997), this is a condition in which stability and instability coexist far from equilibrium. Too much stability in systems prevents them from growing, which invariably result in them collapsing. On the other hand, systems that change too often also disintegrate.

Both chaos theory and dissipative structure theory look at the properties of a system as a whole. In contrast, the theory of complex adaptive systems looks at individual subsystems within a system. Following is a description of the most cited characteristics of complex adaptive systems:

- Complex adaptive systems are systems that have the ability to adapt in response to the interactions of their elements or changes to their environment (Meso & Jain, 2006; Kim & Kaplan, 2006; Sherif, 2006).
- They are systems that are made up of a large number of diverse entities called agents, whose behaviour is controlled by a set of simple individual rules called schema (Stacey, 2007; Shaw, 1997; Grobman, 2005). These systems are thus deterministic as they follow rules. Principles, beliefs, models, rules and values are examples of schema that influence individual behaviour (Harkema, 2003). Although the schema controlling the agents’ behaviour maybe simple, they often result in complex patterns (Anderson, 1999). Each agent has its own schema that continuously changes based on behaviour of neighbouring agents, as well as perceived changes in the environment (Shaw, 1997; Anderson, 1999). The schema not only controls the agent’s actions but also direct the changes that should take place in response to the interaction with neighbouring agents (Tilebein, 2006).
- They communicate via feedback loops which feed information to neighbouring agents, which then change their behaviour to accommodate the changes in their

environment (Anderson, 1999). These feedback loops can either be positive, negative or non-linear. Positive feedback loops propel the system into an unstable state, while negative feedback loops push the system into a stable state. On the other hand, non-linear feedback loops result in an unpredictable state that is informed by what is happening in the system at a given time (Walker, 2007). Therefore, when both negative and positive feedback loops are present at the same time, the system will operate on the edge of chaos. This is a region where stability and instability exist at the same time.

- The spontaneous interactions between agents result in emergent patterns that are a product of self-organization. These emergent patterns are a result of the collective behaviour of the agents. Self-organization can only occur in an open system. This is because energy is needed in order for self-organization to take place (Nilsson & Darley, 2006).
- The behaviour of systems is somewhat regulated by attractors. The point attractor, pendulum attractor, torus attractor and strange attractor are the four main attractors recognised in chaos theory (Bright & Pryor, 2005; Pryor & Bright, 2007).
- In addition, agents adapt to their environment through continuously increasing their fitness landscape (Anderson, 1999). Fitness landscape models are used to define the adaptive behaviour of agents (Tilebein, 2006). As with systems, the fitness landscapes also change in response to changes within and among agents.
- Agents can move in and out of a complex adaptive system, resulting in a dynamic system that changes along with the agents in it.
- Complex adaptive systems are also sensitive to initial conditions. The initial conditions continuously change as the system evolves (Mendehall *et al.*, 2000).

Although these are not the only properties of complex adaptive systems, different authors emphasize different characteristics, depending on what they are looking at (Anderson, 1999; Plowman *et al.*, 2007; Pepper, 2003; Burnes, 2005; Grobman, 2005). Wallis (2008) presented an overview of the different characteristics of complex adaptive systems as identified by different authors, as shown in figure 2.2.

[illegible]

Figure 2.2: Components of complex adaptive systems (Wallis, 2008)

## 2.4. Individuals as agents in a system

Individuals in an organization can be considered as agents in a complex adaptive system. Relationships among employees represent a form of interaction that makes up a complex adaptive system (Regine & Lewin, 2003). In fact, relationships are important in complex adaptive systems (Keene, 2000). Of course, different relationships have different rules. For instance, a person relates differently to a manager compared to a colleague. Similarly, people behave differently at work compared to at home. Therefore, relationships inform the rules of engagement. People may – or may not – be cognisant of what the next individual is doing or feeling, and often that affects how they interact with that individual (Stacey, 2003).

According to Mendenhall *et al.* (2000), careers of people in organizations epitomize non-linearity of organizational life. The efforts that people put in career development do not always yield the results envisaged. In addition, one person's career moves can have an impact on another's career. An example is the opportunity for growth for one employee due to the resignation of another. In this case, the employee who occupies the vacant post did not necessarily plan on that happening, but the benefits are due to the actions of the person (Mendehall *et al.*, 2000).

People are parts of a number of different subsystems. For example, a person can be a black female engineer. From this description, the person falls under the black people subsystem, female subsystem and engineer subsystem. In addition, the same person is also part of a larger group within a department. It is therefore important for people to understand how they fit into the different subsystems. It is also important for an individual to understand how he or she is perceived by members of his or her subsystem (Alder *et al.*, 2003). This understanding is necessary as it affects the rules of engagement between agents.

Each subsystem has a different language or method of communication (Alder *et al.*, 2003). This is another reason why individuals should know to which subsystems they belong. For instance, the message of management to employees is different to that of communication between employees. In addition, group dynamics also affect the attitudes and behaviour of individuals in organizations (Okediji, 2009).

An individual who is part of an organization also has prior influences in the form of family, friends and society at large. Zimmerman & Kontosh (2007) highlighted the effect of family (both siblings and parents) in career choices and trajectory. Often, people make decisions that are informed by their family situations at any given time. Therefore, the context of an individual outside of the place of work should always be considered when one is making career related decisions.

If individuals are agents in a complex adaptive system, it is clear that long-term planning of a career may be futile (Greenhouse *et al.*, 1995). Rather than long-term planning, individuals should engage in continuous assessment of themselves and the environment and change plans accordingly.



Although the concept of complexity theory originated from the natural sciences, it has found applications in a number of social sciences. Below is a brief review of the application of complexity theory in career development and planning.

## **2.5. Career planning, development and management in an open adaptive system**

During the industrial era, people had less control over their careers. Of course, back then, people went to work for simpler reasons than is the case today. People tended to depend on management to define career paths.

A career is defined as a path of employment which provides opportunities for progression in the professional world (Simpson & Weiner, 1989). A career represents an individual's life experiences that involve both paid and unpaid work (Drier, 2000). From these definitions, it is clear that one cannot have a career in isolation. An individual needs to interact with an organization or range of organizations over a period of time in order to develop his or her career (Collin, 1998). In addition to the influence of organizations, careers are also influenced by societal factors such as culture, politics, economics, technology, etcetera (Dries *et al.*, 2008; Drier, 2000). Igarria *et al.* (1999) differentiate between internal and external careers. They defined an external career as a progression through a range of organizationally defined jobs and positions that professionals go through. In contrast, internal careers are those personal aspects such as values, aspirations and beliefs that influences an individual's view of a career and career success (Igarria *et al.* 1999). Edgar Schein (1996) introduced the concept of career anchors, which are an individual's sense of understanding which includes the individual's needs and motives, perceived strengths and values.

In an organization, people's careers can be influenced by a complex interaction of a number of issues such as payment and grading systems, performance appraisals, strategy, culture, promotion processes, etcetera (Bolton & Gold, 1994). Although these influences are present in most companies, they differ as companies are different.

Career planning is defined as an attempt by an individual to control the trajectory of one's career so as to achieve long term goals through planning and management (Hall *et al.*,

2004). Career planning is also defined as a process during which an individual analyses his or her skills, interests, and ambitions, while at the same time assessing the environment for opportunities and threats (Aryee & Debrah, 1992). While it is good to plan one's career, it is also important for individuals to understand how the complex interactions of different career influences might lead to unexpected results completely different to those initially planned (Patton & McMahon, 1999).

The analysis of self and the environment during career planning is often followed by a detailed plan which specifies what actions an individual can follow to reach his or her career dreams (Aryee & Debrah, 1992). This process is referred to as career self-management (Sturges, 2008). Key activities involved in career self-management include networking, increasing personal visibility, improving one's skills and competencies as well as pursuing available job opportunities in line with career goals. Basically, individuals are supposed to manage their careers through different jobs and organizations (Clarke, 2008). Following through with a development plan improves a person's employability (Clarke, 2008). According to Converse *et al.* (2012), the aptitude of an individual to affect the environment and adapt to the changes is the key requirement for career success, especially in a dynamic work environment.

Career development is a process where individual interests and competencies are matched with opportunities available in an organization (Aryee & Debrah, 1992). The availability of opportunities in an organization is dependent on the strategic direction of the organization at any given time. This direction is often influenced by what is happening in the environment. Therefore, environmental factors such as globalization, corporate downsizing, government regulations, technology, *etcetera* will have a profound effect on the strategy of an organization. According to Bujold (2004), career development is a process that involves decision making and actions from more than one stakeholder who are interested in an individual's career. This development can either be negative, positive or neutral. It is clear therefore that career development is dependent on what is happening in an organization at any given time. Chaos theory can thus be applied in the study of career development (Gibb, 1998). According to Gibb, career development is both complex and unpredictable. Although this is so, Gibb believe that career development follows a set of rules that influence the process.

Career management is an overall process of planning, implementing and evaluating career plans (Bolton & Gold, 1994). This definition therefore incorporates both career planning and development as defined above. This implies therefore that career management is the responsibility of both the individual employee and the organization. Baruch (2006) talks of a pendulum shift between individual and management responsibilities in career management. Management is responsible for providing development opportunities that are informed by the needs of an organisation. These opportunities are thus regulated and depend on resource availability as well as benefit to the organization. In contrast, an individual is responsible for taking advantage of the available opportunities. Individuals should therefore actively scan the landscape to determine the opportunities available for them that are in line with their career aspirations. It is clear therefore that career management cannot be undertaken in isolation by either an individual or the organization, but should be done in consultation (Baruch, 2006).

The aims of career development differ depending on whether one is looking through a lens of an employee or management. The motive for development for an individual has to do with opportunities for advancement. The employer is interested in ensuring that an individual embarks on development that is relevant to the organization while making sure that there is a fit between an individual and his career (Garavan, 1990).

Organizations as we see them today have changed compared to how they were in the industrial age for instance. Needless to say, careers have also changed in line with changes in the workplace. Careers have changed from organizational careers to what are now known as protean and boundaryless careers (Smith-Ruig, 2008). Previously, people used to enter organizations at a young age, and leave the same organization on retirement. Growth during that era was characterized by upward mobility in an organization that resulted in better position, pay and status. These days, people generally move from one company to another looking for growth. In addition to moving between organizations, people also change their professions in search of growth. These days, people are not necessarily looking for growth in terms of salary and position, but are looking for opportunities for growth that will allow them to reach their career goals that will make them both employable and marketable (Smith-Ruig, 2008). In fact, younger people are looking for opportunities for career and personal development when choosing an organization to work for. Organizations in turn use career development opportunities as a means to attract and

retain employees (Gaffney, 2005). While in the past growth was characterised by upward mobility, organizations today encourage employees to move horizontally as well so as to gain broad experiences that will make them more effective in management roles (Garavan & Coolhan, 1996)

It is clear that career planning, development and management are activities that involve both employees and the organization. However, according to Baruch (2003), these aspects of career management are often undertaken in an individualist and isolated manner. Individuals perform career planning in isolation, while organizations provide development interventions that are meant to benefit the organization without necessarily looking at the needs and aspirations of their employees. Needless to say, this poses a problem as career planning without an organization is useless, while career development that does not satisfied an employee's aspirations is counter-productive as it might lead to resignations (Baruch, 2003). The importance of career planning, development and management viewed through the systems lens is indisputable.

While most organizations still offer structured career paths for employees, most employees' careers evolve in a non-linear and unpredictable nature which cannot be explained by existing models of career development and management (Sullivan *et al.*, 1998). The unpredictability of careers can be attributed to a number of influences that are not deterministic. Bright *et al.* (2009) reported on the multitude of chance events that can influence a career either positively or negatively. Needless to say, these events have unimaginable consequences to people's careers.

In the past, people used to have organization specific skills, which were not transferable to other organizations. Nowadays, people have a range of competencies that can be useful in different functions and organizations. Inkson (2006) defines a "boundaryless career" as a career that is not confined to specific boundaries and limits. For one's career to be able to transcend boundaries, one needs to have skills and competencies that are transferable. These skills are often acquired through job experiences, training and other opportunities which may or may not be linked to career development which happens in an organization. The fact that people desire transferable skills is a challenge to organizations as the more people are developed, the more attractive they are to other organizations. The challenge

therefore lies with both the individual and the organization to plan, develop and manage careers in such a way that both role players benefit from the interventions.

Organizations are large systems that are characterized by non-linear interactions, which are often articulated through rules (Stacey, 1995). Organizations exhibit the characteristics of complex adaptive systems as described above. While there are different systems of agents in an organization, such as people, departments, disciplines etcetera, this study will only look at employees as agents. According to Stacey (1995), these agents follow regulations and behavioural scripts with some degree of freedom. This means that they can follow a rule, change it or ignore it completely. However, they do not have choice on the consequences of their decisions. The behaviour of an individual agent is informed by his experiences, those of neighbouring agents as well as the changes in the environment. The combined effects of the different agents' decisions determine whether a system will be stable or not. Since the organization is an open system, there is a constant exchange of employees with the environment. This means that new employees enter the system, while some old employees leave. The entrance of new employees will invariably result in changes in the interactions of the agents, thus emergent properties. Because of the inherent complexity of people, they can also be looked at as complex adaptive systems (Pryor & Bright, 2007). For the purpose of this study, people will be studied as agents in a complex adaptive system.

Stacey laid the foundation of applying complexity theory to individuals in organizations (Stacey, 1995). Some scholars have taken the theory further studying different theories such as systems theory and chaos theory in career development (Mendehall *et al.*, 2000; Zimmerman & Kontosh, 2007; Patton & McMahon, 1999; Pryor & Bright, 2003). According to Pryor and Bright (2007), a career is an emergent property which comes about as a result of the interactions of people with other people in prospective companies, universities, *etcetera*. This means that a career cannot be studied independent of a person and the environment under which the career develop, as a career cannot exist outside of those key requirements (Pryor & Bright, 2007).

Like organizations, people are also constantly changing. Needless to say, careers of people also change to adapt to changes in an environment. Therefore, career development should be looked at as a life-long occurrence which will be informed by changes in the

environment (Zimmerman & Kontosh, 2007). For that reason, looking at people in the context of their environment is more effective in career planning and development as opposed to traditional methods that only looks at traits in isolation (Bright & Pryor, 2005).

The application of chaos theory in career counselling and development has been found to be effective (Bright & Pryor, 2005) because chaos and complexity theory looks at a person within an environment rather than at isolated aspects of a person. According to these authors, the fact that career development interventions are informed by past behaviour, skills or experiences highlight the challenge that is currently faced by career development professionals. Therefore, any proposed intervention should take into consideration the possibly unpredictable results that can emerge due to the interaction of people with each other and their environment. Small interactions among elements of a system can result in disproportionate effects. This is because complex systems are sensitive to initial conditions. People have unique experiences causing the, as subsystems in a system to have unique properties that are informed by their past, skills, experiences and personality (Pryor & Bright, 2003). The non-linear interactions of unique subsystems results in emergent properties of a system.

The complexity in people is also brought about by their different beliefs systems (Gibb, 1998). Gibb (1998) used chaos theory to study the effects of people's beliefs in career development.

In their application of chaos theory to careers, Pryor and Bright (2007) considered individuals as complex adaptive systems operating within other complex adaptive systems such as organizations and families. They define attractors as boundaries that define systems. They are said to be limits which defines a system's operation and identity. These limits will have an influence on the types of work related activities that a person will engage in. For instance, a doctor who opposes abortion will have a problem working in an environment that will require him to perform that procedure. Values can be seen as career attractors. In order to achieve career success, it is important to learn to manage the boundaries between work and non-work aspects of an individual's life (Sturges, 2008, Ahmed & Kaushik, 2011). Failure to manage these boundaries may result in problems in one's life. For instance, spending too much time at work may result in divorce for some

people, which may have negative emotional implications, which will further impact on one's career.

The behaviour of an individual in a system is controlled by what is referred to as attractors. Four attractors are identified in career theory, the point, pendulum, torus and strange attractors. A detailed description of the different attractors was provided earlier. Examples of the different attractors in career theory of careers will be undertaken (Pryor & Bright, 2007). A point attractor can be the determination of an individual to work for a specific organization. This individual will do anything in his or her power to be employed in that organization. During this whole time, the person will lose sight of other opportunities that would have been better than the one envisaged in a specific company. But because the individual already has set his sight for a specific company, he will disregard other opportunities, regardless of how good they are. A pendulum attractor can be seen in people who find it difficult to make career related decisions. A person will move between two extremes whenever one has to make a decision with the result that no decision ends up being taken. A habit or routine is a predictable behaviour of individuals. This is an example of a torus attractor. Individuals who plan while accepting that they do not have total control over their future epitomise the strange attractor.

Pryor and Bright (2007) differentiate between open and closed systems in their application of chaos theory in careers. Open systems are represented by the point, pendulum and torus attractors, where individuals have a false sense of control over their career and life trajectories. This is in contrast to the strange attractor thinking where individuals are aware of their limited control over their career trajectories. In this case, people are cognisant of the influence of the environment in their careers. They propose that the strange attractor is the most relevant in career development of individuals. A strange attractor represents an open system that operates at the edge of chaos.

Individuals interact with their environment, and thus change their behaviour in response to this interaction. For instance, the use of electronic mail was not prominent twenty years ago. However, it is the way of life in today's work place. For that reason, employees who were already working when e-mails were introduced had to learn the new communication tool so as to remain relevant. Therefore, external factors can influence the behaviour of individuals.

Patton and McMahon (1999) developed the Systems Theory Framework (STF) of career development. This is a qualitative assessment tool for career counselling that is informed by the constructivism worldview. According to these authors, constructivism incorporates making meaning out of an individual's past, present and future. They emphasize the importance of assessing an individual in relation to their environment. This is done by paying attention to the connections between an individual's experiences and various external influences. They believe that much can be drawn from understanding an individual's view of an event or experience. This informs people's mental models. The framework is developed around an individual as an open system embedded in a larger system. Needless to say, many individuals make up the large system. Therefore, people are subsystems within a system, within a system. For instance, a person is a member of a family, which is in turn a part of a society, which is a part of the country that belongs to a continent, *etcetera*. An individual is affected by a number of influences such as gender, race, religion, geographic location and so forth. Each individual in a system will have different influences, which means that individuals will have different worldviews (McMahon, 2005). Although individuals are capable of making their own decisions, these are often influenced by their environments and other subsystems. The whole system and its interactions are assessed when using STF.

Figure 2.3 depicts the different factors that influences employees' careers as described in the STF (Patton & McMahon, 1999). The main emphasis of the STF is an individual, who is central to the analysis. An individual is a whole made up of a number of subsystems ranging from values to beliefs, skills, gender and so forth. An individual interacts with outside subsystems including family, friends, politics, workplace and the like. All these systems are affected by their past, present and future (Patton & McMahon, 1999). The dynamic interactions between systems are accounted for through what McMahon (2005) calls recursiveness. These interactions are said to be dynamic, non-linear, multidirectional and mutual. Because of the nature of interactions between systems, the planning and predictions of a future is almost impossible. This is also true for career planning. The interactions among subsystems generate patterns and rules necessary for the functioning of the system (McMahon, 2005). These rules and patterns are informed by internal and external variables that have an impact on a person. These rules and patterns change with time, resulting in on-going change of the system.



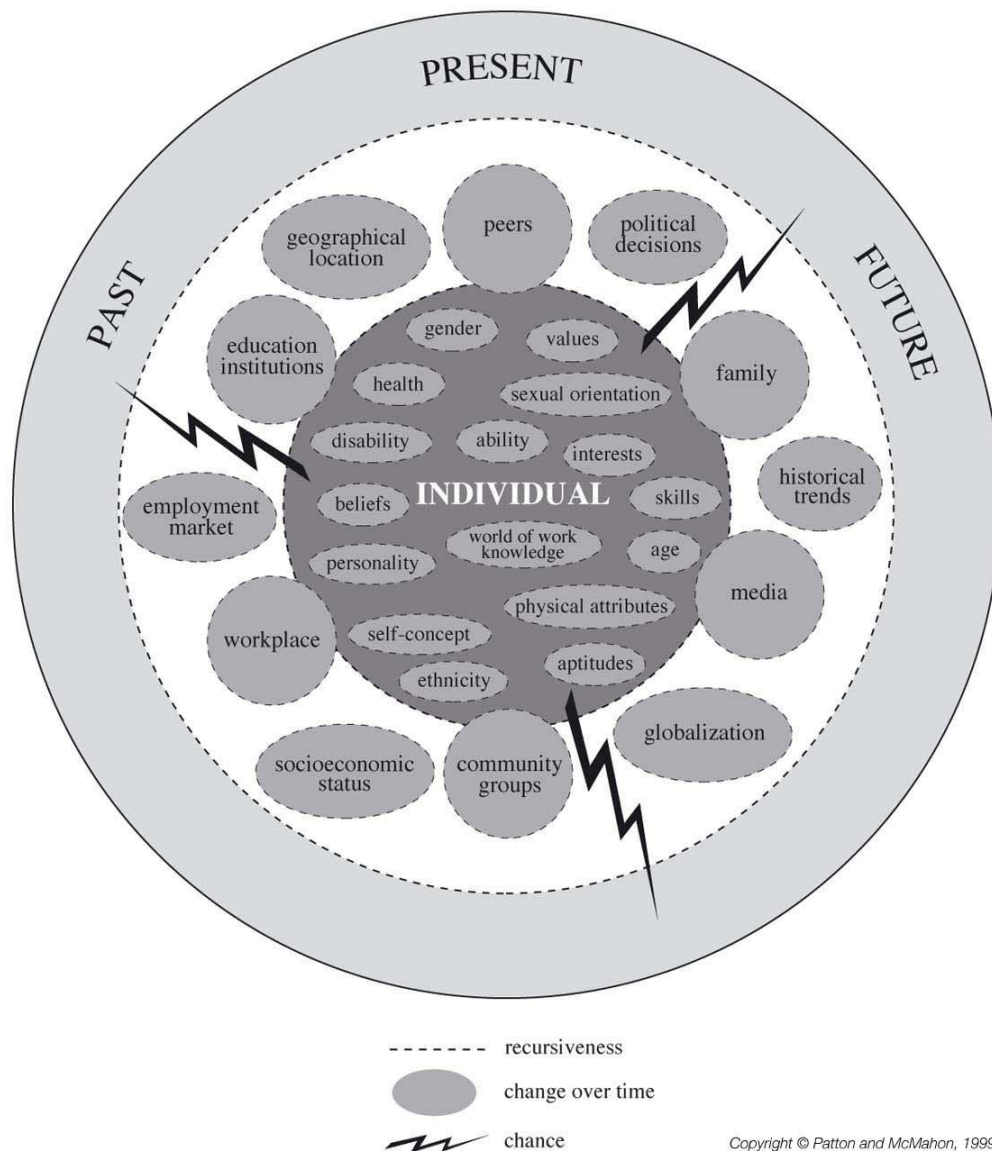


Figure 2.3: The Systems Theory Framework of Career Development (Patton & McMahon, 1999)

## 2.6. Researching career development and management

Career planning, development and management are traditionally studied through the objectivist or positivist approach, which rely on scientific measurements as a way of quantifying variables such as behaviour and traits. These traditional methods look more on the influences of an individual's traits and personality on career success. They are used extensively in career counselling where individuals are advised on what career to follow based on their traits and personality (Bujold, 2004). In addition, people are employed in

organizations, or groomed for management positions based on the results from psychometric tests, which are reductionistic in nature as they only look at individuals' traits (McMahon *et al.*, 2003). Needless to say, this approach does not take into account an individual's past and the influence that past will have on career preferences, neither does it take into account the influences of the environment on career choice. According to Bright and Pryor (2005), traditional approaches of researching careers seek to understand individual behaviour in terms of specific factors, such as traits, and how these influence the behaviour of individuals. The flaw with this approach is that it does not take into account the interactions of various aspects that influence careers as well as the emergent properties that come out as a result of the interactions.

In contrast, the realistic or constructivism approach attempts to derive meaning from individuals' experiences through self-assessment. This approach is subjective as it takes into account an individual's perception of self and the environment (McMahon *et al.*, 2003). The constructivism approach looks at an individual in the context of the aspects that make up an individual. These can include a person's experiences, beliefs, capabilities, and so forth, which are often influenced by the environment. Interestingly, this approach does not put too much emphasis on a person's abilities and capabilities, but on the meaning that the person derives from these based on their interactions with their environment and the people in it (McMahon *et al.*, 2003). The self-knowledge gained through this approach can bring about changes to a person's behaviour. This is in contrast to the positivist approach that is not meant to influence behaviour, but only to understand it.

Systems theory was employed by Arthur and McMahon (2005) to study individual career development. Through this approach, they were able to incorporate all aspects that influence an individual's career starting from the individual, to outside factors such as family and the environment in general. Systems theory is a theoretical framework employed to analyse both the internal and external factors that influence the career development of people (Patton & McMahon, 1999).

Pryor and Bright (2003, 2007) introduced the chaos theory of careers. They spoke of careers as emergent properties that come about as a result of the interaction of an individual with his environment. In addition, this theory acknowledges the ineffectiveness of long-term planning that is so prevalent in traditional career counselling practices. They

identified point, torus and pendulum attractors associated with careers and linked them to closed systems. In contrast, strange attractors are associated with open systems and take into consideration the unpredictable nature of life.

Lately, the narrative approach has been applied in the study of career development (McIlveen & Patton, 2007). Through this process, individuals give meaning to their experiences through self-awareness (Bujold, 2004). Through this process, it is possible to understand a person's beliefs, attitudes, expectations, *etcetera* and how these affect a person's choice of career as well as motivation to succeed in a chosen career. In addition to these, narratives also give an appreciation of the influence on the environment on a person's career. Narratives are used in career research as they enable the researcher to understand the subject through the life story of the subject. From this story, the researcher can extract patterns, beliefs, influences and so forth, that have a bearing on an individual's career (Bujold, 2004). Chaos theory seeks to understand processes and patterns. Therefore, the narrative approach is consistent with chaos theory as it also seeks to uncover patterns in careers as opposed to predicting the outcomes of career development interventions (Bright & Pryor, 2005).

According to Gibb (1998), the process of career development is influenced by a set of rules. In this case, the rules were said to be an individual's belief systems. For that reason, understanding an individual's beliefs can uncover and somewhat predict an individual's behaviour (Gibb, 1998). Gibbs employed the phenomenological approach to study career development. This approach enables the researcher to understand the subject's frame of reference, which in this case would be belief systems. Gibbs (1998) believes that the phenomenological approach can help uncover the belief attractor states and rules that influence career development.

Unlike in quantitative assessments where there are known guidelines on how to interpret results of different assessments, there are no such guidelines for the qualitative approach (McMahon *et al.*, 2003). McMahon *et al.* (2003) give guidelines on the development of qualitative career assessment processes. According to the authors, it is important to ground the assessment process in theory, as is the case with quantitative assessments. Also, the process should be thoroughly tested to ensure relevance and usefulness to individuals to whom the assessment is carried out. The assessment should also be carried out in a

reasonable time frame. The instructions for the clients should be clear and easily understood.

## **2.7. Conclusion**

The world of work is undergoing constant change as it is a part of a larger environment that is also continuously changing. Needless to say, these changes also have an influence on people's careers. Since the workplace is ever changing, one wonders if it is necessary for one to plan one's career.

From the literature review, it appears as if planning is rather futile when one takes into account the different influences on employees' careers. However, undertaking career planning in the context of both internal and external influences helps in planning for some unforeseen events in one's career.

## **CHAPTER 3**

### **Research Methodology**

#### **3.1. Introduction**

The aim of this research is to understand the strategies employed by CSIR employees in planning their careers. For this reason, a qualitative research approach is employed. The use of qualitative data collection methods allows for detailed examination of information (Black & Ubbes, 2009). While qualitative research allows for in-depth data collection, there are limited guidelines on the methods of data analysis to be used. This is in contrast to quantitative research where the method of data collection and analysis are well prescribed.

#### **3.2. Research Design**

Both qualitative and quantitative approach is used to collect data. The aim of the quantitative analysis is to determine the demographic information of participants. This includes age, gender, years of employment, highest qualification level, and so forth. The data will be correlated with the views expressed by individuals regarding their career development and management.

The careers of people differ even within the same organization. In addition, the perception of individuals on their career progress and success are different. For that reason, the qualitative approach is used to understand how different people view their careers as a function of individual plans and development opportunities presented by the organization. There are a number of ways of collecting qualitative data. These include interviews, focus groups, questionnaires, to name but a few. For this work, interviews were used to collect data. The advantage of questionnaires is that they present an opportunity to reach a large number of participants at a time. However, it is not possible to ask follow-up questions to get clarity on the answers provided. In contrast, interviews are time consuming as the interviewer is needed to be present during the interview. For that reason, not as many people can be reached, especially when time is of essence. On the other hand, it is possible to get detailed information from participants by asking follow-up questions where answers

are not particularly clear. For the purpose of this study, interviews were conducted in order to get as much information from the participants as possible. Face-to-face interviews were conducted with participants. Open-ended questions were asked. Unlike questionnaires where participants fill in the questions on their own, interviews are a bit more personal as the interviewer is personally involved with the participant. In addition, interviews allow the interviewer the opportunity to ask probing questions where necessary. Therefore, answers from interviews tend to be clearer.

### 3.3. Population and Sample

The study is undertaken at the Council for Scientific and Industrial Research (CSIR). Permission was granted to conduct research within the organization. The target of the study was science, engineering and technology (SET) professionals working at the CSIR. There are about 2 400 employees at the CSIR with 65% of them being SET professionals. These people are spread between nine operating units and centres as well as in shared services. The sample of participants includes individuals from all the departments who were randomly selected.

Table 3.1: Career levels at the CSIR (Van Wilgen, 2006)

	Description	Participants at each level
Chief Researcher	This is a world expert who leads international teams of researchers and is often called upon to provide strategic direction at an international level.	NC, MK, NMo, HP
Principal Researcher	This is an individual who is a specialist who leads multi-disciplinary research teams. Typically, this individual is recognised nationally with a limited international recognition.	IG, SB, QW, LoK
Senior Researcher	This is an individual who has years of experience and preferably a Doctoral degree. However, a Masters coupled with extensive experience is adequate. An individual in this position provides strategic direction and often leads a small	MPB, SNo, BW, LeK

	team of researchers.	
Researcher	Ideally, this is an individual with at least a Masters degree who works independently within a narrow field. Often, these individuals have a number of years of work experience and they are able to formulate research questions due to their knowledge of the needs of the system.	NMa, SNa, LM, TQ

As can be seen from Table 3.1, 16 participants whose ranks ranged from researcher to chief researcher were interviewed. The sample was chosen using the staff data available from the human resources department. While the choice of individuals was random, efforts were made to choose participants from different levels of their careers. Also, attempts were made to balance age, gender and race. The participants were initially contacted over the phone to request them to take part in the study. The interviews were set-up once consent was received from the intended participants.

### **3.4. Data Collection**

All interviewees were requested to sign a consent form, and were promised anonymity. This is important to allay participants' fears of their information being passed on to other parties such as management. In addition, career discussions are very sensitive due to the fact that there is more than one person involved, and people did not want to offend their managers. It was therefore very important to ascertain their anonymity. For that reason, names of the participants will not be divulged.

Standardized open-ended questions were used to facilitate the discussion with the participants. This ensured that the same questions were asked to all participants. Follow-up questions were noted where applicable. These follow-up questions were only asked for clarity where necessary. The carefully-worded questions were prepared in advance and were asked in the manner in which they were written. The interviewer refrained from providing examples to limit influencing the participants. The participants were given the questions in advance so as to adequately prepare for the interview.

Face-to-face interviews were done, and were recorded using a recorder. In addition to recording, notes were also taken during the interview. The recorded interview was transcribed soon after the interview to ensure accuracy. The recorded interviews were transcribed as soon as the interviews were concluded.

Secondly, career development policies and strategies were analysed to determine whether there is a congruency between employee expectation and what the organization offers.

### **3.5. Data Analysis**

At first, the data was analysed through the determination of percentages in each category. For instance, the percentage of women versus men or the percentage of respondents in the different age groups, and so forth. This information was used to determine the effect of the chosen variable on the perceptions and beliefs different people have regarding their careers.

Thematic content analysis is the method used to analyse the qualitative data collected. While thematic analysis is extensively used for data analysis, there is no uniformity on actions and procedures that should be followed in analysing the data (Black & Ubbes, 2009). For this study, themes that align to the theory of complex adaptive systems were applied.

The first step in data analysis involved familiarising the researcher with the data. This was followed by organizing the data into themes. The themes were then grouped into categories. The categories were then reviewed to assess the emergence of more themes from the grouped data. Then the categories were labelled and compared to literature data (Black & Ubbes, 2009). Pryor and Bright (2003) used chaos theory in the study of careers. This is a systems theory approach that recognises complexity as leading to unpredictable changes in a system. The categories identified were therefore aligned to chaos theory. These include change, complexity, non-linearity, unplanned events, sensitivity to initial conditions, open system, self-organising and so forth.

This is a single researcher study. For that reason, there was no opportunity to have another person to discuss with to determine the objectivity of the results of the study. The results



are based on the impressions of the researcher and may be different if looked at by another person. This is due to the fact that people make sense of information based on their past experiences, beliefs and so forth. While attempts were made to ensure that the views of the participants were captured as is, it should be noted that the researcher might have influenced the conclusions to some extent.

### **3.6. Conclusion**

A qualitative research approach was used to understand the strategies employed by CSIR employees in planning their careers. This data was gathered through open-ended interview questions. Thematic data analysis method was used to consolidate the data received.

## **CHAPTER 4**

### **Results and Discussion**

#### **4.1. Introduction**

Sixteen science, engineering and technology (SET) professionals at the CSIR were interviewed. These individuals were chosen randomly depending on their levels. The levels of professionals interviewed ranged from Researcher to Chief Researcher or Senior Research Manager. Eight female and eight males were interviewed and each level had two males and two female interviewees. The study only looked at SET professionals as they are the core of the CSIR. As mentioned in the introduction, the CSIR does research and technology development. For that reason, researchers with different areas of expertise are core to the organization.

The CSIR is a complex adaptive system that is made up of professionals with different areas of expertise and societal backgrounds. All these individuals bring into the organization their own experiences, thoughts, ambitions and so forth. Some of the individuals have been with the CSIR since they finished university while others come from other organizations. The behaviour of these individuals is influenced by their past and present experiences. In addition, their behaviour is controlled by external factors such as their families, government policies, other company policies, society, etc. These variations in experiences and responses to these experiences require that the organization is agile and able to change to accommodate these complexes. According to Converse *et al.* (2012), the work environment is dynamic as it continuously changes. For this reason, individuals are expected to adapt to the changes so as to grow in their careers.

For this study, professionals are regarded as adaptive agents whose interactions with other agents and the system as a whole results in unpredictable, complex and dynamic emergent systems (Brownlee, 2007). In this case the careers of these professionals are emergent properties (Pryor and Bright, 2007).

## 4.2. Career Development Strategies and Policies

In 2006 the CSIR board approved the SET professional Human Capital Development (HCD) Strategy. Through this strategy, the organization aimed to address issues of quality, quantity and agility for research staff. Various measures were introduced to fulfil the objectives of the strategy. These will be discussed below.

In addition to the strategy, the board approved the Research Professional Development, Career Development, Performance Management Policies as well as various pipeline development strategies to support the Human Resource Strategy as well as the SET HCD strategy. The discussions below are derived from the analysis of the above mentioned policies, strategies and interviews of the participants.

## 4.3. Growth Opportunities

Five different types of growth opportunities were mentioned by the participants. They were generalised as follows:

### 4.3.1. Upwards mobility through organogram vacancies

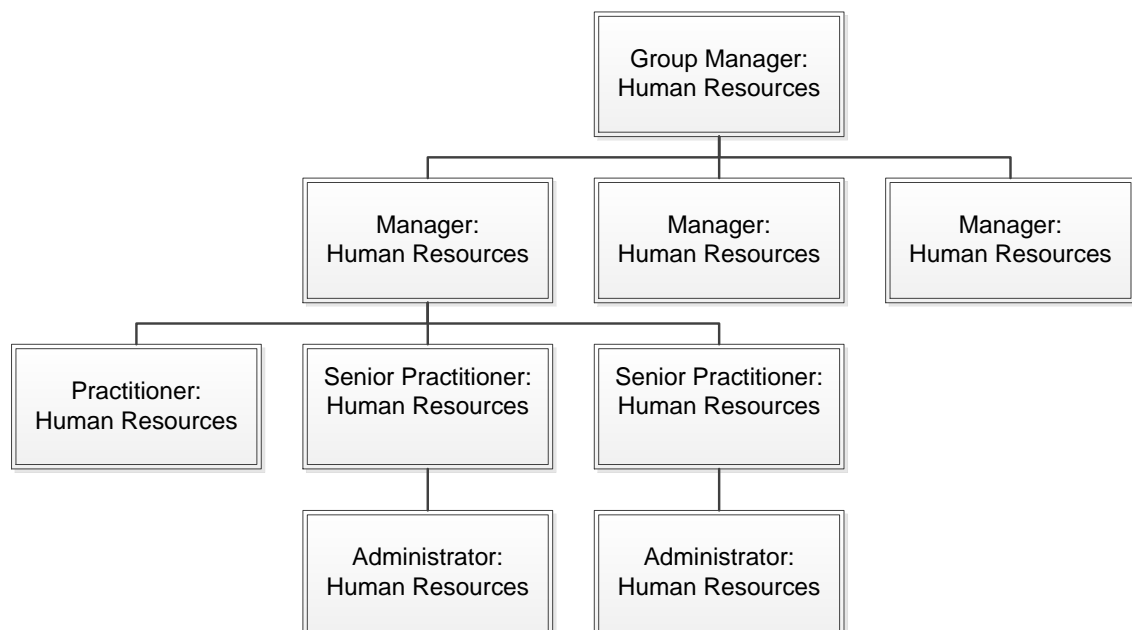


Figure 4.1: Representative organogram for a Human Resources Department

The most common system in organizations is that of job types and grades that are influenced by the needs of the organization. At the CSIR, some job types are what are commonly known as organogram (fixed) jobs. Typically, an organization will decide on its operational structure with the different skills levels required. Thereafter, the organization will decide how many positions per level will be required for the effective running of the organization, as shown in Figure 4.1. This is an example of what is referred to as traditional or hierarchical jobs (Baruch, 2006). As can be seen in a Human Resources department depiction in Figure 1, the positions range from HR administrator right up to Group Manager. All the positions have a job description that details the qualifications, skills and competencies required for an individual to perform at that level. Movement to the next level often only happens when there is a vacancy. However, it is not necessarily automatic that a person in a lower position within the organization will occupy the vacant higher post. At times, the organization will advertise a vacancy due to the fact that people at the lower level are not ready in terms of skills and competency to fill in a higher position. In that case, someone from outside might come in to occupy that vacant position. This often results in internal people having negative views about the organization and its commitment to retention and growth of staff, more so for people who applied for the vacant post. These are the people who will often leave the organization when an outside opportunity presents itself. Often they do not even try and understand why they did not get the job, and the organization does not give them feedback to make them understand. However, it often happens that there is an internal candidate who is fit and ready to occupy the vacant position. At times, the position is not even advertised and the internal candidate is promoted to the vacant position as per the company policy. Some of the candidates interviewed were appointed into vacant positions without the organization advertising. For some, they applied for a vacant position internally and were successful after going through interviews and following the required recruitment process.

To counter the problem of people not being ready for higher positions, some organizations would have a succession plan with which they identify their talent, and work towards equipping people at lower levels with relevant skills in order to fill in higher position when an opportunity presents itself. Typically, these individual will have customised training programmes that seek to provide them with the relevant skills for the earmarked position. Often, the organization makes the decision of who should

be part of this program, and not necessarily the other way round where an employee volunteers to be part of that program. In fact, those who volunteer are almost often not the right candidates for the program. Again, being side-lined for training programmes might result in people leaving the organization without understanding why they did not make it into the program. It is clear that communication in the workplace is key to ensuring that employees are happy and understand the thinking of management.

While an organization can play an active role in getting some people at lower rungs ready for a higher position, it is often an individual who actively works towards getting the right skills that will position him favourably when a position is available. This is often done by improving qualifications, volunteering to do extra work and learning as much as possible about the work that is done by colleagues at higher levels.

One of the individuals interviewed mentioned the fact that his boss was instrumental in growing his career. The boss was always on the lookout for positions that were suitable for the candidate and assisted the employee to position himself properly for bigger challenges. Because of this, the individual was ready to occupy a higher position when there was a vacancy. Another individual was asked if she was interested in occupying a higher position that was vacant. This happened after she showed interest in the job way before it was vacant. The manager knew of her interests and capabilities and thus gave her the opportunity to prove herself at the right time. There was another participant who felt that he had reached a glass-ceiling in his career. There was only one possible position to occupy above his current position. He would have to wait for his boss to leave the organization before he can occupy that higher position. This individual did not have a very good support from his manager, and was already looking for other opportunities outside.

#### **4.3.2. Upwards mobility through career ladder growth**

Following the approval of the HCD strategy in 2006, the organization implemented various career ladders or paths to assist in the growth and development of SET professionals. Through these, employees are given guidelines of what is needed for them to grow in their careers. While the titles given to researchers might be used in other organizations, the requirements for each grade are specific to the organization.

Therefore, the role of a senior researcher at the CSIR might not be the same as that of a senior researcher in another R&D organization. On the same note, someone might have been a principal researcher in one organization, only to become a senior researcher at the CSIR, which is a lower rung of the ladder. Figure 4.2 shows the career progression of someone in a research career ladder at the CSIR.

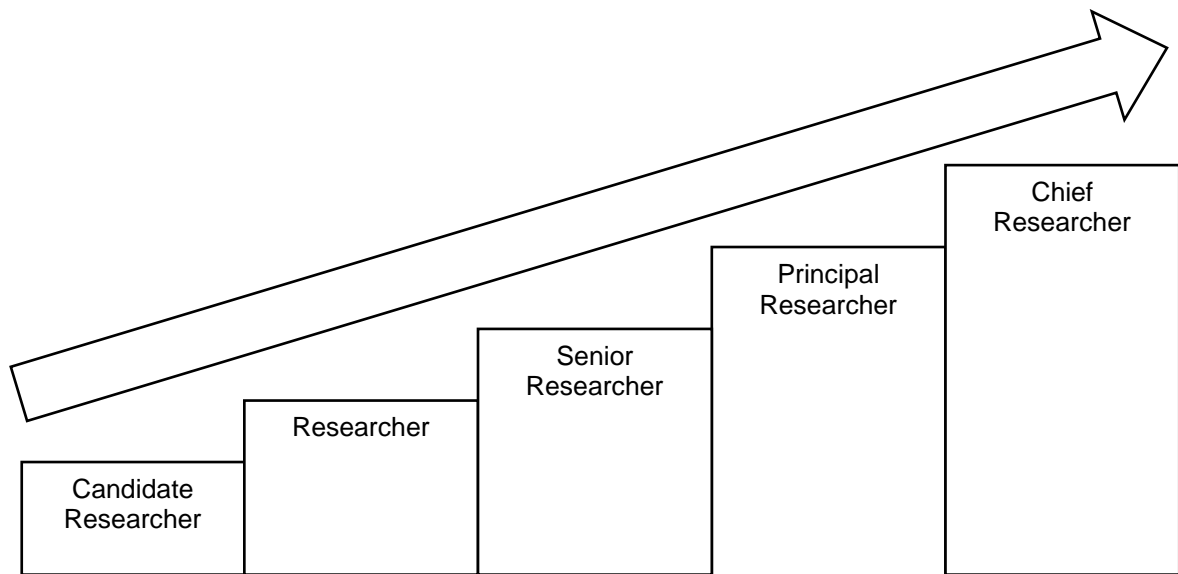


Figure 4.2: Schematic representation of the mobility up the CSIR career ladder

Currently, there are four career ladders which are:

- Research career ladder – this caters for people who are involved in the generation of new knowledge through applied research. The levels range from candidate researcher to chief researcher. An individual grows from learning from others to leading a small team and then leading international multi-disciplinary teams, from not being expected to raise R&D funding to contributing to proposals and then attracting enough money to support a large team of researchers. A PhD is almost a requirement for one to be a chief researcher. Of the fourteen chief researchers at the CSIR, only one has a Masters degree as his highest qualification. The rest have doctoral degrees.
- Research applications and development ladder – this caters for people involved in the application of already existing knowledge for the creation of new technologies and products. Most of the people on this ladder have an engineering background. The expectations in this ladder are almost the same as the research ladder with the emphasis here being more on product development rather than knowledge

generation. However, it is not necessary for one to have a PhD to be a chief developer. Incidentally, all eight chief engineers or knowledge applicators have doctoral degrees.

- Project management ladder – this ladder serves the people who are responsible for managing research projects ranging from a few thousand Rand to millions of Rand. Growth on this ladder depends on the amount of money one manages, the number of clients involved in the project, the complexity of the project and so forth. Ordinarily, people on this ladder will have some experience of research and technology development and will be in possession of a technical degree.
- Technical ladder – this ladder is meant for individuals who assist researchers and technology developers by providing technical assistance. The people on this ladder are mainly technicians or technologist. Some of them grow to be researchers and technology developer. The growth of an individual is depended on the complexity of the work an individual is involved in, the complexity and number of clients (whether internal or external) the individual serves and how the individual contributes to solving research and technology development questions.

The introduction of the ladders has not only served the organization with regards to growth and development of the researchers, but it has also been utilised by researchers to plan and navigate their career trajectory. The ladders all provide clear expectations for each level, to an extent that people know what is expected of them to grow to the next level. People typically start at the bottom of the ladder and work towards growing their career as detailed in the career ladder. Unlike organogram jobs, career ladder jobs have no predetermined number of positions per grade. Therefore, people grow up the ladder as and when they are ready. Growth is informed by the outputs that are realised as a result of individual daily activities. These outputs range from peer-review articles, patents, R&D funding attracted, and so forth. Individuals are expected to have certain qualities and quantities of outputs realised over specific period of time for them to grow to the next level. In addition to the outputs, there are certain inputs that are required such as qualifications where the higher your qualifications the better your level. The influence that one has in the scientific and engineering community is also looked at. Most of the outputs one improves with experience and over time. Someone coming fresh from university might not be able to independently write a peer reviewed

article, or even present at a conference, but that skill gets developed over time, to a point that after a number of years the same individual is in a position to write numerous publications as a lead author and present in conferences, at times as a keynote speaker. Similarly, the leadership in the scientific community develops with time, and as a result of the outputs that one has due to the research one has done. For leadership, the outputs such as publications enhances ones visibility so that the said individual is invited to review scientific papers, be part of conference organizing committees and so forth. There is therefore a direct correlation between the number of quality of outputs that one produces to the influence of an individual in the scientific community. It is clear from the above description that the growth of researchers at the CSIR is influenced by what happens within the CSIR and outside of the CSIR. Internally, the type of project one is involved in will determine the outputs the individual generates. On the other hand, the individual is expected to raise R&D funding which is often sourced from external funders. In addition, the outputs of an individual enable the said researcher to participate in external structures that reinforces his leadership and influence. This in turn contributes to the growth of the researcher. Clearly, the growth of a researcher is affected by both internal and external forces. Needless to say, the CSIR is an open system, which lends itself to influences from numerous system, which in turn influence careers of the professionals within the organization. From the above description, it is clear that careers are an emergent property (Pryor & Bright, 2007).

Career ladders can be regarded as strange attractors (Pryor, 2007). While they give a view of the possible growth paths for researchers, they do not necessarily inform when and how a said individual will reach a particular level of the ladder. Two people can enter the organization coming straight from university with the same qualification, and start at different operating units. In some cases, they may start in the same operating unit, but work on different projects. The outputs from the different projects may result in the people having completely different rates of growth. While they may retire having reached the highest level possible as per the career ladder, their rate of progress will be the different. This is similar to the weather. It is known that July is winter in South Africa, yet it is not known for sure what temperature will be realised on a particular day.



Most of the participants interviewed appreciate having career ladders as a career development tool as it makes it easier for them to plan and navigate their careers. It gives them guidelines that when followed may lead to growth. The only thing that is not so easy to control is the rate of growth as one is not always in control of the rate at which one gets their results. Most participants have actually highlighted the fact that their growth is not where they had to hope to be mainly due to the fact that at times the quality and quantity of work done does not necessarily yield the results expected. For instance, an individual might invest time in writing funding proposal yet not get any funding as the decision to fund projects does not lie with him. At times, it is not because of poor quality of the proposal, but lack of funds from the funder or even misalignment of the proposed work to that which can be funded. This is yet another example of external influences determining the rate of growth of an individual, which has nothing to do with how hard the said individual is working.

In addition to individuals, the career ladder framework can also be used by managers to assist in the development of employees. One of the managers interviewed sang praises to the framework and insisted that he used it to guide young researchers who start in his group. By using the framework as a guide, it is easy to decide on what to expose the individual to in order to ensure growth of the employee while fulfilling the organization's imperatives. The flip side of it is also true. Some manager may use the framework to block the growth of some employee. The said manager may decide not to allocate relevant work with the sole aim of slowing the progress of an individual. Individuals need to be involved in meaningful research in order for them to publish, attract funds and gain external recognition.

While the career ladders are used for growth of an employee, the said growth may at times be unaffordable for the organization. For instance, instead of moving one level up, it is possible for an individual to jump a level or two during assessment. This has financial implications for the organization, especially if too many people get promoted at the same time. As a result, there have been times when people have changed titles as a result of growth in career ladders but without significant financial rewards. This often happens when the organization is struggling financially. The question can be asked of whether it is more important to move people on the career ladder without rewarding them financially or if it is more important to give them financial rewards. Of course,

the answer to that depends on the circumstances of each individual. There are people who do not care much about titles but are concerned about their quality of life as brought about by their financial standing, while other people care more about the title and what that title mean to the outside community. Being known as a chief researcher may be more important to one person, even though the financial rewards are not that substantial, while for another it can be more important to earn a certain salary regardless of their job title. This highlights the fact that individuals have different motivators and drivers. This difference poses a challenge for organizations where they need to balance between individual aspirations, organizational imperatives as well as the economic forces that impact on the quality of life of employees.

The main drawback with the career ladder system is both the duration and the timing of the actual assessments. As per the CSIR Human Resource calendar, the career ladder assessment process only happens once a year. This means that people have to wait the whole year before they can be promoted. This is even worse for people who needed one or two outputs in order to go into the next level. Waiting for a year for a promotion when the requirements were achieved in the early months of the year can be demotivating. In addition to the frequency of assessment, the assessment process itself is rather long. The process starts in March and is concluded in July, when the individuals are promoted. It starts with individual assessments. While this initial step can in principle take a few days, most people take longer to fill in the assessment form and to gather the required information. Once the individual has filled in the information, the assessment framework is then sent to the manager who then makes inputs based on the submission of the individual. The manager then calibrates the submissions within his group, and then sends to the Unit level committee to do the Unit level assessments and calibration. Thereafter, the submissions are escalated to the CSIR level committee to finalise the assessments. The CSIR committee finalises the promotions for Principal and Chief Researcher levels, as well as does quality control for the lower levels. Once the people have received their results, there is time allocated for appeals. The results are then submitted to the CSIR Executive which signs off the promotions. This often happens in July.

The outcomes of the career ladder review are often out of the control of an individual once she has submitted for the assessment. Three possible outcomes can be realised as follows:

- Demotion – this happens when the final points as per the panel review are less than the points a researcher had prior to the assessment. This often happens when some outputs fall out of the assessment timeframe. For instance, there is a limit to the years under which publications can be counted. Therefore, an individual may have had a certain number of publications during the last assessment, which may have fallen out of count for the current assessment. This assumes that the said individual did not have as many or more outputs since his last assessment. Needless to say, the said individual may have assessed himself to be promoted, only to find that the results are negative. While the requirements for each level are clear as per the career ladder framework, they are at times subject to individual interpretation, which leads to individuals providing information that may not be sufficient for promotion. Most often than not, individuals in this category will appeal the results. There is often a problem associated with this aspect of the assessment as it may infringe on the employee's rights as determined by the Basic Conditions of Employment Act, 2002. This is yet another aspect of policy which is influenced by external forces.
- No change in level – this happens when the final points are not enough to allow the person to move to the next level. In this case, the individual will have submitted with the view that she is due for promotion, only to find that the panel does not agree with her ratings. At times, individuals in this category may appeal the results.
- Promotion – this happens when the final points are higher than the original points, and are out of the range for a particular level. At times, the points may be more than the range for the next level, resulting in the individual being promoted over 2 levels.

From the above description, it is clear that how an individual assesses himself can differ to how his manager assesses him, and also how the panel assesses the individual. At times, the differences can be due to insufficient level of motivation. This is often rectified during the submission process. However, at times, the interpretation of the

requirements as per the framework may differ per person, which leads to unhappiness in most cases. At times, the manager might rate the individual higher or even lower and the panel might disagree with the manager's rating. The rating of the panel is the one that is recognised.

#### 4.3.3. Upwards mobility through increase in capabilities

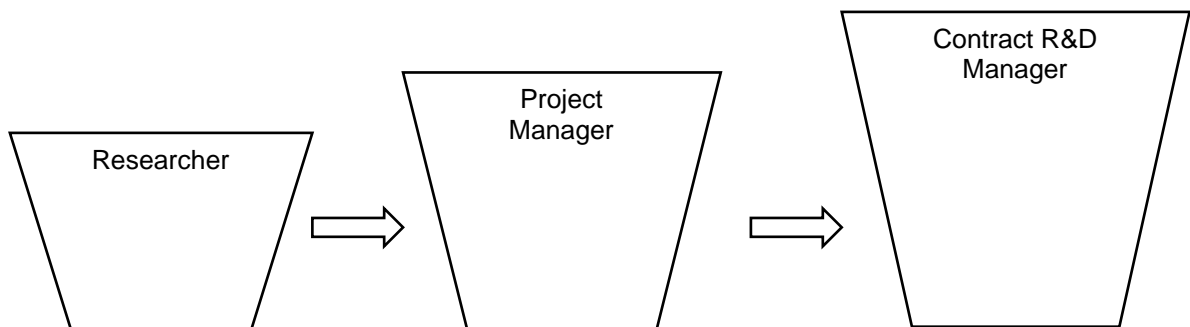


Figure 4.3: Example of growth through increasing responsibilities at the CSIR

Some employees have spoken about growth as a result of increased responsibilities, as shown in Figure 4.3. It often happens that an individual starts in a particular role, but with time acquires more responsibilities that were not originally part of his job description. The job of the said employee can be re-assessed to take into consideration the new responsibilities. Depending on the complexity and challenge brought about by the new responsibilities, the job may be graded on a higher level which will lead to growth. For example, someone might come into the organization as a Laboratory Technician responsible for running one analytical machine. Running two machines of the same kind might increase his work load, but might not increase the complexity of the work, nor his responsibilities. For that reason, that may not necessarily lead to a change in job grade. On the other hand, the same individual might run a different machine which is a bit more complex, that requires more of him in terms of running the machine as well ensuring the quality of the results. This might lead to a grade increase and thus a promotion. While it is common that some people end up doing far more than what they originally signed up to do, it is not so common to re-grade the job to accommodate the new responsibilities. The decision to grade a job lies more with the manager than the individual. Unfortunately, the financial sustainability of the

organization is often taken into consideration when making decisions regarding grading jobs.

The CSIR uses the HAY Job Grading System which measures know-how, problem solving and accountability. It is through this methodology that different job grades are determined. Management is responsible for providing the job description and all relevant details to enable the internal Job Grading committee to do the necessary evaluation. In this case, management has to guard against writing a job to suit an incumbent versus a job as per the requirements of the organization. People shape their jobs, thus designing a job description to suit an individual may pose a problem as the next person may not necessarily do the same functions, which may not be necessary for a particular position. Most of the Human Resources professionals are trained to perform the grading and often form part of the internal grading committee. Unlike the frequency of career ladder assessments, the HAY job evaluations happen on a monthly basis.

#### **4.3.4. Lateral mobility which eventually lead to upwards mobility**

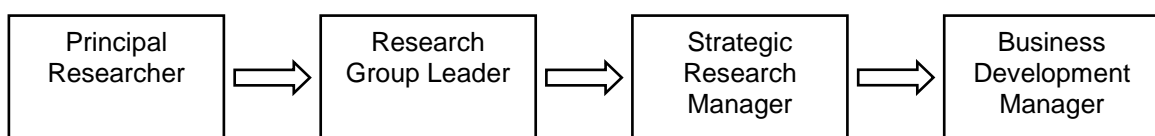


Figure 4.4: Example of lateral career mobility within the CSIR

Another very common growth mechanism mentioned is what is commonly known as lateral movement. In this case, an individual changes responsibilities without changing a grade as depicted in Figure 4.4. For instance, an individual might start off as a researcher at a particular level, then move to an area of management that is still at the same level, yet change responsibilities. The same individual might later move to another job within the organization which is still at the same level but with completely different responsibilities. This path is an example of what is now known as boundaryless careers. In this instance, the individual's career transcends boundaries that define specific career paths within the same organization or even different organizations (Burach, 2006). Ahmed and Kaushik (2011) refer to this as transitory career. This is perhaps a better description of the careers that transcend boundaries.

One cannot necessarily talk of boundaryless careers as careers do not exist in isolation, they require an individual and an associated organization in order to exist.

While the individual would not have moved grades over a period of years, that individual will have grown the basket of skills such that when a management position requiring general knowledge of the organization becomes available, that individual will be in a better position to occupy that vacancy than an individual who spent a similar number of years in the same positions doing the same thing. So, at times spending too many years in the same position might not be so good for an individual in a long run. Depending on the goals of an individual, there may be value in changing jobs even if the change does not lead to upwards mobility, but increase in skill and competence which might be valuable in the long run. Of course, there is a negative to this as some employers may think that the said individual does not know what she wants and rather opt for someone who did one thing for a long time.

There are a number of participants who have experienced this movement which had added to their eventual growth as they had more skills as a result of different jobs than a person who did one job over the same number of years.

#### **4.3.5. Formal and informal training**

In 2006 the CSIR board approved the SET professional Human Capital Development (HCD) Strategy. Through this strategy, the organization aimed to address issues of quality, quantity and agility for research staff. The first objective was to increase the number of appropriately qualified SET professionals who will have the right skills and expertise to perform the unique research that is carried out by the organization. This entailed providing bursaries and scholarships to deserving university students to enable them to acquire the right qualifications. These students are often employed by the organization on completion of their studies. The organization also introduced studentships, which are Masters and PhD study opportunities for students to do their research at the CSIR but register with the university. These students not only acquire a degree at the end of their contract but they also have relevant work experience as they get involved in CSIR research and other activities during their studies.

In addition to increasing the number of appropriately qualified students, the organization also enables its permanent employees to further their studies and financially support them if the studies are relevant to the work the individual is involved in. Most of these individuals perform research that is aligned to their studies. Therefore, while they may not be registered full-time with the university, their research is part of their work, which makes their studies shorter than for an individual who has to study after hours. In addition to allowing them time to do research, the organization also pays for the said studies. At the moment, there are more than two hundred full-time employees who are registered for Masters and PhD degrees, and this is one of the Key Performance Indicators for the organization. Needless to say, a lot more are registered for undergraduate degrees and diplomas. There is an individual who started at the organization without a matric certificate. This individual was given an opportunity to conclude her high school studies. She recently graduated with a Honours degree. Needless to say, this success has led to a new job within the organization. Some participants highlighted the fact that they joined the CSIR purely for the opportunities to study further. One third of the participants are either currently registered for Masters or Doctoral degrees, or have upgraded their qualifications after joining the organization. While most of the employees are registered at South African universities, the organization also sends a select number of people to study abroad. This often happens when there is a need for specialized competencies that are not available in South Africa. In that case, willing employees are sent abroad to study for a Masters or doctoral degree. In some cases, people go abroad for post-doctoral opportunities supported by the organization. In some instances, the organization allows individuals who have sourced funding elsewhere to gain international experience or qualifications without terminating their service with the organization. This is often done when the skill the individual hopes to acquire is relevant to the organization, and the organization can afford to be without that employee for the duration of his studies.

The drive to increase the number of people with post-graduate degrees is in line with the national drive, hence the support. In addition, the CSIR is a research institution, and wants to align itself with its international counterparts where a PhD is a requirement for one to be recognised and employed as a researcher. Also, some international funding bodies only recognise researchers with doctoral degrees as principal investigators. For that reason, the lack of a PhD might be a major stumbling block for researchers,

especially those who want to make a mark in the international arena. There are close to five hundred and three hundred researchers with Masters and doctoral degrees, respectively at the CSIR. The fact that policies at the CSIR are influenced by national and international requirement is indicative of the fact that the CSIR is itself part of a system. It is part of the National System of Innovation, the general research community, and so forth. All these systems influence the CSIR in different ways.

In addition to addressing quantity, the organization has also introduced initiatives to address the issue of quality. This is over and above the qualifications upgrades, which to some extent address the quality issue as well. This is done through sending staff members to different courses and workshops so as to improve their performance or to expose them to new or improved technologies that are required for them to perform research. Since some of our research is not common in South Africa, the organization invests a lot of money in sending researchers abroad to learn new methods and technologies which are then brought back to the country and the organization. Needless to say, when they come back they return with new experiences which then influence how they do things. And their colleagues may copy the new behaviour which will then result in new ways of doing things within the organization. There are also a number of custom designed courses and workshops whose aim is to ensure that the researchers have the right skills that will enable them to do the work at the CSIR. For instance, the Research and Innovation Core Skills programme that is aimed at providing young and emerging researchers with the necessary skills to progress in their careers was designed to benefit CSIR employees.

Over and above custom designed courses, there are also short courses that are just as important and give the researchers the required skills to grow in their careers. For instance, researchers are given an opportunity to present their work at international conferences. This is regarded as training. A young researcher can start off by presenting her technical work for her small research team, and end up presenting at the Emerging Researcher Symposium, which is an annual conference during which young researchers are provided an opportunity to present their work for the whole organization. The same individual can then present at a regional conference before going to an international conference. Of course, the sequence of events need not follow the above trend, but this highlights the opportunities available. Presenting at



conferences is one of the outputs required for an individual to grow in their careers and the organization offers opportunities for individuals to take part in this activity and also ensures adequate training, even if it means attending a course that will equip one with presentation skills.

Furthermore, there are short courses offered that equip the employees with the skills required to perform their duties. These include project management, writing technical reports, to name but a few. While these may not lead to a recognised certificate, they are valuable in as far as equipping the employees for their job requirements. Attendance to such training requires an individual to take an initiative and identify such gaps for himself. Unfortunately at times management might not approve such training, be it due to financial consideration or other reasons. In addition to the individual, the manager might recommend attendance for training whether as a result of succession planning or in order to deal with an identified competency issue. While this training may not directly lead to a promotion, it enhances an individual's performance which in the long run will lead to growth.

A performance agreement is entered into on an annual basis between an employee and an employer. While the agreement may dwell on the performance requirements, it also identifies training opportunities that an individual should be exposed to during the said year. This is recorded and evaluated at the end of the year. The training may be to close a skill gap for current job or to equip one for a future job as per the agreement between an employer and employee. It is clear that the training is not taken in isolation. It is suggested to address a current gap or in preparation for a future job. The closing of a gap is as a result of reacting to a feedback loop that informed the individual that a certain skill is required in order to succeed in a particular job (Pryor & Bright, 2007).

#### **4.4. Career Planning Strategies**

One participant compared career planning and management to running a marathon. A novice runner first researches the dos and don'ts of marathon running, which includes how to run, what food to eat and when, the best times to run, what clothes and shoes to wear and so forth. Then the runner plans his training program which may include running a certain number of kilometres a week, as well as participating in short marathons to build up

to the actual event. Then the runner will participate in relevant events in order to qualify for the marathon. A few days before the actual event, the individual will ensure that he eats the required food to sustain him during the race and get the rest needed. When the day of the marathon comes, the individual will wear the required gear and run as planned. On completion of the marathon, the individual will assess his performance and analyse what he did wrong or right. Thereafter, he will start the process of planning for the next event, taking the learning from the previous event into consideration. For instance, while a runner may have planned to finish the race at a certain time, he may be slower than anticipated due to a number of reasons. Post-race analysis will enable him to understand his running style, behaviour after running a certain number of kilometre and how he handles steep hills for instance. This is even more important for first time runners.

Baruch (2006) talks of intelligent careers where an individual knows why, how, whom, what, where and when about a said career path. In this case, the individual knows enough about self to make informed career decisions. In addition, the individual is aware of what his chosen career requires and where his skills can be applied. He also knows people and has the relevant connections. This is an individual who is in charge of his own career and is not necessarily relying on others to define his progression. Career self-management is a process that involves positioning, influencing and boundary management in which an individual actively manages his career (King, 2004). Converse *et al.* (2012) allude to proactive personalities as individuals who do things in order to influence their environment, and their actions are not limited by situations they find themselves in. They proactively look for opportunities and take actions until they reach their objectives.

Often, career planning and development follows a continuous process that includes self-assessment, market intelligence, planning, execution and review as detailed below.

#### **4.4.1. Self-assessment**

Self-assessment involves taking stork of the individual's skills and capabilities, likes and dislikes, strengths and weaknesses, preferred work environment, limitations, and so forth. Some of these aspects have something to do with a job itself, but may also include aspects that do not have anything to do with a job. As part of this exercise, an individual will determine those things that are important to her, and those that she is not willing to

compromise on. The factors identified in this exercise can be seen as boundaries that direct where an individual can operate and where it is not favourable for that individual. Boundaries are required to define a system (Pryor, 2007). Boundaries are an example of an attractor (Pryor & Bright, 2007). Examples of boundaries are nature of the work, available growth opportunities, distance from home, travel requirements, and so forth. These boundaries are specific for each individual and vary depending on the life circumstances of each individual. For some people, working close to home might be a requirement as they want to be able to transport their children to and from school. Similarly, a single parent may not want a job that will require her to travel if she does not have assistance with the children after hours.

For instance, while someone might be interested in a career in research, the environment under which the research is done is important. Research is generally done at universities, research councils and some private sector organizations. Expectations from researchers in each of those sectors are different. For example, while a researcher at a university might be expected to lecture and deal with students, the same is not expected for someone in private sector. Therefore, if a said individual does not enjoy interacting with students then the person will not opt for a university environment. The working hours at a private sector company might be more than at a university. For that reason, someone who likes some flexibility in their working hours might opt for university rather than a private company. An individual might want to help people to a point of studying medicine, but not enjoy working with people directly. You may find that person doing research to develop cures for diseases in a research council or institution rather than working in a hospital as would be expectations for someone with a medical degree. The preferred work environment is one of the important considerations when deciding on a job. Most of the participants highlighted the fact that they consider the environment in which they will work when looking for a job.

In addition to the work environment, most people choose a job that will give them personal satisfaction. In fact, the word impact and an opportunity to improve the quality of life of another person were reasons cited by most as a reason they were working at the CSIR. It is interesting to find association with doing work for a greater cause in research environment. These terms are often associated with people working in jobs that serve people directly such as in the medical fields, police force, social work and so forth. The nature of projects

that people embark on at the CSIR is meant to have a social benefit of some sort, and people identify with that. This is evident when looking at the qualification profile of the people. Most people who do work for a greater cause do not put too much emphasis on their salaries. They are content when they receive enough money to have a decent lifestyle, and derive satisfaction in the work more than the financial rewards. For instance, engineers working in the private sector earn far more than your average engineer at the CSIR. However, the work done in private sector is not often associated with a greater cause. For that reason, most of the engineers at the CSIR are willing to sacrifice financial rewards for a greater cause.

Edgar Schein (1996) introduced the concept of career anchors. These are an individual's sense of understanding which includes the individual's needs and motives, perceived strengths and values. These aspects are dynamic, especially at the beginning of an individual's career. However, they stabilise after a number of years once the said individual has discovered himself in the world of work. Once this understanding has been reached, career anchors channels an individual towards specific career choices. Clearly, this is an example of a point attractor as it almost always leads an individual to a predictable choice.

The following career anchors have been identified:

- Security/stability – people with this anchor want to be stable and secure and that motivates their job choices.
- Autonomy/independence – individuals with this anchor prefer to be their own bosses. They want an environment that will allow them to define their job, deliverables, working hours and so forth. They tend to rebel against fixed rules and regulations in the workplace.
- Technical/functional competence – people with this anchor are most content when they utilise their technical skills and competencies to advance their careers.
- General management competence – people with this anchor aspire to reach the highest level at work and believe that they have the capability to influence the success of the organization through their management and leadership skills.
- Entrepreneurial creativity – people with this anchor typically start their own businesses and believe that they are masters of their own success. In some cases,

people will develop new products and processes which they base their businesses on.

- Service or dedication to cause – individuals in this category are looking for jobs that will enable them to do something for a noble cause. Often, people in this category want to save or improve lives, the planet and so forth. Their motivation goes beyond their needs and is satisfied when they have done good for a greater cause.
- Pure challenge – people in this category are looking for jobs that will provide them with opportunities to solve complex problems, invent new processes and products and possibly deal with difficult people that you can influence.
- Lifestyle – individuals with this anchor believe that their work lives must align with all other aspects of their lives. This means that there must be a balance between job requirements, social requirements as well as individual requirements.

While Schein alludes to a single dominant career anchor per individual, Wils *et al.* (2010) described complementary and conflicting career anchors. For instance, creativity and challenging work are complementary anchors, while challenge and security are seen as conflicting anchors. According to Igbaria *et al.* (1999) professionals working in a research and development environment look for service, lifestyle and security in their jobs. When asked what it is that they were looking for in a job most of the participants mentioned working on a challenging project where no two days are the same as well as an opportunity to improve the quality of life of the people of South Africa. This is not surprising as the people interviewed are scientists and engineers working in a research and technology development environment. By its nature, research and technology development is challenging and requires people who are curious and want to solve problems. The CSIR mandate is to do research and technology development in order to improve the quality of the life of the people of South Africa. So most people in the organization often identify with doing research which aims to improve security, protect the environment, improve processes and so forth.

In addition to individual's preferences, family and societal demands are often taken into consideration. For instance, most of the participants took their family circumstances into consideration when making job related decisions. As an example, a mother with small children might not take a job that requires travelling if she does not have additional help to

take care of children after hours during her travels. This is one of the limitations that a few participants referred to, especially those with young children. One participant had to sacrifice her job for a while in order to prepare her child for matric exams. Another participant passed on an opportunity to go abroad for training when his parent was sick. Financial demands as a result of family requirements were cited as a reason for changing jobs by one individual even though she enjoyed the job she was occupying that was paying less than what she needed to support her family. Another participant is doing all he can to convince his family that their life is fine even though the family is pressuring him to look for a better paying job. This is because he enjoys his job and feels that he can make a difference in society. Things that can be considered as trivial by others such as distance to travel to work, preferred working hours and so forth, are some of the things that participants mentioned as factors they consider when they decide on a job change. Some of these factors have nothing to do with a particular job, but everything to do with the person's circumstances outside of work. According to Ahmed and Kaushik (2011), the world of work of modern employees should take into consideration the needs of the individual outside of the work place, while also allowing him to make impact to society through the work. The fact that workplace policies need to take into consideration the desires of employees outside of the workplace requires a dynamic and agile human resources department that is able to respond to the employee demands as prescribed by changing external imperatives.

While some of the factors mentioned above may not change throughout the career of an individual, most of them will change with time. For instance, a person's beliefs and values may remain fairly constant during his whole life. For that reason, the individual is likely to continue to choose jobs that do not clash with values and beliefs. For example, someone who believes that drinking alcohol is a sin might not want to work for a brewery, no matter how good the job is. On the other hand, there are some factors that change with time such as the age of children, marital status and so forth. These changing circumstances may have an impact on the individual's job choices. A mother with young children will make a different career decision compared to the same person with adult children. Alternatively, an adult with dependent parents who are sickly may make a different job choice compared to someone whose parents are late and thus do not require him to take care of them. Therefore, career related decisions are often affected by circumstances outside the workplace, which are dynamic. For example, a participant had to change her work

schedule for a few years in order to help prepare her child who was studying towards grade 12. Needless to say, this sacrifice for her child had an impact on her productivity, albeit in the short term. This in turn had an impact on her potential for promotion during that time, which will invariably have impact in the future. A lady who was expectant had to stop doing work in a laboratory to protect her unborn child. This resulted in her not having publishable results for the whole year. Again, this had both short-term and long-term implications. Another participant had to change jobs in order to accommodate changes in her marital status, even though she liked her job and wouldn't have resigned otherwise.

In addition to immediate family, some people consider friends and society in general when making career related decision. This can be direct and indirect influences. Participants mentioned instances where friends and family assisted in making a career related decision. In other cases, indirect pressure from friends forced some to change careers in order to be on par financially with friends. In a similar light, some people were influenced by society to make certain career related decisions. One individual cited a time when he read about a certain influential person from a rural area who indirectly motivated him to continue studying. Had he not read that article, he would not have studied further, thus may not have reached the level of success he has reached.

#### **4.4.2. Environmental or Market assessment**

Once an individual has a good understanding of self and has decided on the nature of work that she wants to be involved in, the individual will then look for jobs that fit the criteria as per her preferences. A certain job is linked to an organization. People often research organization to gain an understanding on the policies and work environment. Different companies have different policies and practices that may sway an individual towards or away from the said organization. Some organizations participate in surveys that compare them with similar organization with the resulting ranking giving an indication of the environment in that organization. For instance, CSIR has been certified as one of the Best Employers by the CRF Institute. This certification is bestowed on companies that achieve a certain scoring in relation to policies that deal with primary benefits, secondary benefits & working conditions, training & development, career development, and culture management. In addition, the organization has been ranked in the Top 3 Companies to work for by students in science as per the Magnet Communication survey. These

certifications are important for companies to highlight in this environment with a limited pool of skilled personnel. Therefore, organizations should put themselves out there and give potential employees information that is important to help them make relevant decisions.

In fact, more and more job seekers consult these surveys to see which companies are ranked as the top and/or best employers. For early career employees, they are looking for opportunities to learn and career advancement. Organizations that score high on career development are chosen by early career employees. This was found to be true for the CSIR. Most of the early career participants confirmed that they joined the CSIR due to its career development opportunities. Most of the participants were either studying, or had upgraded their qualifications while they were at the CSIR.

When people look at policies, they often look for things such as conditions of service, career development, performance management, rewards and recognition and so forth. These are policies that influence their work/life balance, career growth as well as affordability. When considering conditions of service, people look for issues such as annual and maternity leave, family responsibility leave, study leave and so forth. Maternity leave is of importance to women of child bearing age who may want to have children. The CSIR recently introduced new conditions of service with one of the major changes being the increase in paid maternity leave from 3 to 4 months, as well as increasing the number of family responsibility days from three to seven. This decision came about after a comparative study that showed that most organizations, including government, provided 4 months paid maternity leave. Since the organization wanted to attract more women, it had to change its conditions of services to be more attractive to the desired market, as well as to be comparative with other similar organizations. Performance review practices are also considered important, so are career development opportunities. People at different stages of their careers will put different emphasis on the career development policy in particular. The rewards and recognition policy talks to the lifestyle that one can afford, as well as appropriate recognition for the work the individual is doing. Some organizations, including the CSIR, provide wellness programmes which are important to some people. This often shows that an organization cares more about its employees beyond just doing a job. Some people go to an extend of looking for day-care facilities as well as gym and so forth in



organizations. Of course, these aspects are important depending on stages people are at in life.

In South Africa, people are almost forced to move provinces and cities in search of jobs. Gauteng is the economic hub of the country. In addition, some cities like Cape Town and Durban also offer healthy job prospects. As a result, most of the participants came from other provinces and cities outside of Pretoria and Johannesburg. For that reason, most people are aware that in order for them to progress in their careers, they need to move away from their families. In doing market research, people take location into consideration. Some people mentioned that they are not willing to relocate outside of Gauteng. In fact, some participants even went to an extent of not wanting a job outside of Pretoria due to logistic reasons and family requirements. Therefore, the availability of jobs is sometimes dictated by the region one wants to work in. One participant had to move provinces in order to be closer to her spouse due to marriage. In so doing, she had to change career focus and settle for a lesser paying job as a result of that move.

In addition to the region, the stability associated with a company counts for some people. Government as an employer was in the past considered a safe employer. This is one aspect that people look at, especially older people. This is not so important for young people as they are known to move companies and jobs depending on their needs at any given moment.

#### **4.4.3. Planning and execution**

Once an individual has identified the type of job and environment that one want to work in, the individual embarks on a job search. This includes looking at internally available jobs as well as reading the career classified in newspapers, subscribing to relevant job-seekers sites as well as engaging with agents. The individual will apply for jobs that satisfy her qualification profile as well as personal preferences. Some senior participants mentioned reliance on networks for job search. In this case, someone in a different organization will inform an acquaintance of a job that is available in his company that fits the profile of the approached individual.

Once the individual is successful in getting the job, the person will then perform in the new job. Depending on the goals of the person, the individual might be content with the current job and do little to improve his skills. Typically, these are the people who occupy the same position for a long time without looking to move to the next level. However, in most cases, one job is used as a stepping stone to another job. In that case, the individual will learn as much as possible in the new job, then start planning for the next move. This is easier for people who know where they want to go next. One of the participants mentioned that he never saw different jobs as training for the next job. It was only after talking to a former school mate whom he never saw as working in academia that he appreciated the value of skills development through on-the job-training. This was after the school mate explained to him that he worked in academia in order to gain certain skills that he will need for his future job.

Three types of individuals were identified in this study. There are those who do long-term planning, short-term planning and those who do not plan at all.

#### ***4.4.3.1. Long-term planning***

Typically, these individuals have a long-term end goal regarding their careers. One person said she wanted to be a CEO of a company. These individuals then plan their jobs in such a way that they get the right experience while they work towards their end goal. Another individual said he wanted to start his own business, but realised that he didn't have the right skills after completing his studies, thus decided to spend a few years formally employed so that he increases his skill base and as well as his network. Another individual hopes to be a chief engineer and is doing things that will enable him to reach that goal in the future. Career ladders are seen as a perfect way to navigate a career for people who are long-term planners. The requirements of the career ladder enable an individual to plan activities that will not only support the organization, but will also add into the basket of skills and outputs required for growth.

Perhaps the greatest danger with planning is the resulting rigidity. By its nature, a plan directs a person to do certain things at a certain time. Because of this rigidity, the owner of the plan may miss out on opportunities that emerge which are not related to the plan, even if those opportunities were going to result in better outcomes than the planned outcomes.

This is an example of close-system thinking. For instance, an individual may want to work for the CSIR and that person will do everything in their power to end up working for the CSIR. In the process, the individual may have declined a lot of offers that may result in that person achieving greater success than success at the CSIR. As a result, long-term planning may become ineffective due to the unpredictable nature of open-systems.

When asked if they were where they planned to be in their careers, almost all the participants said they were not where they planned to be. Most of the people interviewed are researchers. Research work by its nature is unpredictable. While an individual may hope to get certain results out of the research, things do not always go according to plans. At times, the results may not be what the individual hoped for, which may have an impact in their ability to publish. At times, the organization may change its strategy, which may imply that an individual will have to change research direction, thereby lose all the work and experience gained in the past. For others, lack of funding was cited as a reason for slowed growth. In addition to outside influences, for some people the delay was more personal, such as having children. While the said individuals wanted to have children at some point in their lives, often that decision was taken in isolation of the career. Some jobs require that a person stops doing their day-to-day activities when they get pregnant for the safety of the unborn child. Needless to say, that disruption has an impact in the progress of the affected party. Other participants cited sickness as contributed to their delays. In some cases, sicknesses of family members had an impact in their progress as they had to take care of the ailing family member, thus sacrifice time from work. Needless to say, all these aspects, except planned pregnancy were out of the control of the individuals.

While these people may have a time-frame during which they want to achieve their long-term goal, they have realised that things do not always go according to their time-table. These individuals are able to adjust to disappointments without losing sight of the end-goal. Careers occur in an open system which is affected by events within the system and outside of the system. This is the reason why long-term plans do not often materialise as intended. People who understand that they operate in an open system are able to adapt in order to accommodate the unplanned changes.

When using the analogy of running races, long-term planners can be compared with people running marathons. To run a marathon an individual needs to plan way in advance. For

instance, for one to run the Comrades marathon the individual needs to qualify. In order to qualify, the individual needs to enter and finish a certain number of half-marathons within a specified period of time. In addition to that, the individual needs to train in a certain way in order to build the endurance needed to run the Comrades Marathon. Lastly, the individual needs to prepare mentally so as to finish the race. For that reason, one does not wake up in May of a certain year and decide that they want to participate in the Comrades in June of that year. The same applies to long-term career planning and management. One prepares for a certain position over a long period of time.

#### ***4.4.3.2. Short-term planning***

Some of the people interviewed were short-term planners. These individuals often plan for their next move. The current job informs their next move. In this case, the participants do not necessarily have an end-goal in mind. However, they use current jobs as stepping stones to the next, yet to be defined job. One participant alluded to the fact that she did not plan for the long-term, but only planned for the next job. She decides on the next move based on what she is currently doing. The current job dictates the next job due to the nature of experiences that she gains, as well as better understanding of self and/or the environment. For instance, her current job is in science management, when she thought that she will no longer be involved in science. People in this category have a broad view of where they want to go, albeit not specific. For instance, one might say that she wants to be an executive director, without saying in which field. The said individual will then navigate to a point of reaching the goal without necessarily sticking to a direction prescribed by their original qualifications for instance. This is different to someone who wants to be a chief researcher. It is clear that that individual wants to progress in a research environment.

Using the analogy of running races, these individuals are compared with short-distance runners. Most of these people start by running a few kilometres over a certain time. They then repeat this for a while to build the stamina so that they can run long distances over a short period of time. For instance, one can start off running 5 km, then graduate to 10km before running half-marathons. More often than not, these individuals do not necessarily start with the ambition to run a half marathon, but to run a short distance and perfect their time before they have the confidence to run longer distances. Sometimes, some people are comfortable just running short distances without graduating to longer distances. The same

is true for short-term planners. These individuals only plan for the next move, and do not necessarily have plans for a higher position. This does not mean that they do not want to reach the highest level, it is just that they plan as per their abilities at any given time.

#### ***4.4.3.3. No planning***

The last category is of individuals who do not plan at all. In this case, the individual decides on the available opportunities as and when they appear without a picture of the desired future. In most cases, these individuals are unable to answer when asked where they see themselves in x number of years. At times, these individuals only change jobs when things are not good. Interestingly, this category does not necessarily involve disengaged and underperforming employees. It does include high performing employees as well. These are individuals who are content in their jobs and are often not looking for a move. Because they are high performing individuals, they are at times identified by their bosses for promotions without them taking the initiative to apply for a promotion. In their study of career transitions for mid-career employees, Peake and McDowell (2012) discovered that most employees did not plan their careers. However, they adapted to changes as brought about by different circumstances, some due to their own doing while others were from environmental influences.

When comparing to runners, these individual are those who run for fun and at times for health reasons. They do not necessarily care about the kilometres run at any given moment, nor do they care about a time it takes to run a certain number of kilometres. All they care about is getting fit, for instance. They will take part in races as and when an opportunity presents itself, but it is not their ultimate aim.

#### ***4.4.3.4. Unplanned Events***

Most of the participants planned their career trajectory. However, there have been instances of unplanned events that have changed either the time of achieving a goal or have moved the goal post completely to a point of changing careers. These events can either be minute resulting in huge results, or they can be big resulting in equally big changes. One participant changed career focus as a result of a chance encounter with students who were attending a workshop during lunch time. Had she not gone to buy food she would not have

known of the new facility that a few months later she ended up managing. If it was not for that day's event, she would not have shown interest in the facility. In return, her manager would not have thought of her when the previous manager resigned. A similar example is that of a participant who applied for a vacancy after one of her colleagues resigned. While she was not planning to move at the time, the resignation of the other colleague prompted her to apply for a job which she got that resulted in a promotion for her. Another participant decided to study up to a post-graduate degree as a result of an article he read in a magazine while waiting for someone. Had it not been for that article, the individual would have only studied for a basic degree and then looked for a job. Needless to say, the individual would not have reached the level of success he has obtained if he did not have a doctoral degree. Another participant had to move back to South Africa from the USA as a result of the terrorist attacks that happened in the USA in September 2001. While she planned on building her career in the USA, the terrorist attacks resulted in a lot of companies laying off people, and she was one of the casualties. She couldn't get a job as she was a foreigner, forcing her to come back to South Africa. Interestingly, her career has flourished since she came back to South Africa. She has achieved more than she would have had she remained in the USA. For some individuals, health challenges resulted in delays in them either finishing their studies or performing at a certain level at a particular time, which resulted in unfavourable performance reviews, which resulted in delays in promotions. Needless to say, this had long-term effects when looking at one's career. A number of participants have been positively and negatively affected by restructurings in their departments. For others, the restructuring resulted in promotions and new opportunities, while for others it resulted in forced change of career focus which had negative implications for their careers in the long term.

While it is good to plan, planning can only go to a certain extent. In fact, planning is associated with closed system thinking. This is because one has certain control over closed systems. Unfortunately things do not always go according to plan, as in open systems. In most cases, events happen that derail the plans thus forcing people to re-organize. Individuals are complex adaptive systems. For that reason, they are able to self-organize so as to adapt to changes in the environment, or even to changes in plans as seen above. As a result of their self-organising, their careers as emergent properties adapt accordingly. This was also observed by Pryor *et al.* (2007).

Bright *et al.* (2009) differentiate between high and low influence chance events in career development. In their study, they found that people were able to remember chance events that had high influence on their careers, where the participants had low control of the outcomes. The one thing that is evident from the chance or unplanned events is the non-linearity of the outcomes. At times, a small event might have a huge impact, while sometimes a big event might have negligent results. According to Converse *et al.* (2011), individuals should learn how to influence their environment and also adjust their response to the changing environment if they are to succeed in the work environment. They differentiate between internal and external factors related to career success. Internal factors have to do with how an individual interprets events and reacts to them (attitudes, feelings, etc.), while external factors refer to the environment in general. Clearly, the individual has more control over internal factors, and limited control over external factors. According to Sturges (2008), it is those individuals who have career goals who are able to balance between work and non-work requirements in order to achieve their career goals.

#### **4.4.4. Review**

Some people actively review where they are in their careers and plan for the next move. Others do not necessarily actively do so. In fact, reviewing of one's career is not necessarily a planned activity. For instance, career ladders at the CSIR can be used as a mechanism for reviewing where one is at in terms of their careers, as well as finding information of what still needs to be done in order to grow in their career. Reviews happen on a day-to-day basis for most people. People make development plans regularly without sitting down at set times of a year. Of course, there are organizational processes that force people to review their progress on an annual basis, at the least. At the CSIR there are performance reviews that happen twice a year. While this process reviews the performance of an individual at any given time, it also reviews development initiatives that an individual should undertake in order to either improve their performance or work towards more responsibilities. Any development initiative results in improved performance, which in most cases will result in career growth. These reviews can be taken to be some sort of feedback mechanism which people have to act on to correct or improve performance. In addition to formal review processes, informal processes continuously happen that employees respond to, such as seeing someone being promoted as a result of recent

qualification upgrade. This information may prompt someone to want to upgrade their qualification in order to also be promoted, as was the case with one of the participants.

#### **4.5. Planning and managing a career in a research environment**

As an individual, a researcher is affected by the world she lives in. How she conducts herself at any given moment is influenced by her feelings, surroundings, abilities, beliefs, values, circumstances and so forth. All these issues change with time. For that reason, a researcher will have different expectations at different times in their careers. A researcher is complex adaptive system that is affected by its environment. A career of an individual emerges as a result of the above interactions and how the said researcher reacts to the interactions with the environment. Interestingly, this reaction is influenced by feelings, beliefs and how the researcher views the world. This explains why two people in the same environment with similar resources and support systems can have completely different experiences of the said environment as well as different outcomes. For instance, researchers may be given a chance to apply for funding. One researcher may take up the opportunity because of a belief that she can do anything, and thus will not limit herself prematurely. On the other hand, the other researcher may decide not to apply as he believes that the funders have already decided who they will fund and he will not waste his time in applying. Needless to say, the attitudes of the two researchers will determine how far they go in their careers.

A researcher does their work to support the organisation's imperatives. The organisation decides on the nature of people it needs in its employ, as well as the nature of work they will embark on. The nature of work is often informed by the organisation's strategy. The strategy will direct the focus area for research for instance. Therefore, even though an individual might have an interest in a particular field of research, that individual will not be able to follow that area unless it is aligned with the organisation's strategy. The organisation's strategy is informed by the market. The market includes society, business, government and so forth. For instance, the CSIR is meant to do research that will result in improvement of the quality of life of the people of South Africa. For that reason, the research done at the CSIR is informed by the SA government's strategies, societal and private sector needs. It is clear that these needs are not constant but change over time. For instance, finding a cure or even a vaccine for HIV is one of the government's imperatives.



For that reason, researchers in South Africa are encouraged to be active in that field. South Africa recently won the rights to host the Square Kilometre Array (SKA). As a result, funds will be channelled to activities that will ensure a success of that project. The hosting of the 2010 FIFA Soccer World Cup required the country to redirect some funds to ensure success of the tournament. Once that was achieved, the funds were reallocated to on-going projects which received limited funding as a result of investments in the tournament. Some imperatives are short-term while others are long-term. Therefore, the organisation's strategy will change over time in order to remain relevant. Needless to say, these changes will have an impact on the researchers who have to change their focus to align with the organization's strategy.

In 2010, the CSIR introduced six Research Impact Areas (RIAs). These include health, natural environment, built environment, defence and security, energy and industry. The focus of the RIAs was informed by the Millennium Development Goals 2015, the 12 Government Outcomes, the New Growth Path as well as the National Development Plan – Vision 2030. The RIAs inform the organisation of the key research areas that the organization should embark on. Once these were in place, researchers were expected to align their research areas with the RIAs. It is clear that the research conducted at the CSIR is influenced by both national and international strategies.

To succeed in a research career, as a world-class researcher, one needs to have a certain level of qualifications. In most cases, a PhD is a requirement. For that reason, qualifications are the first requirements. Therefore, not having the necessary qualifications might be a limiting factor to one's growth in a research career. At times, an individual might aspire to obtain a particular qualification, but fail to do so due to either time constraints, or finances, as is often the case with some people in our country. Needless to say, this limitation will have long-term implications in the individual's career. Some people conquer those limitations by studying part-time. While this route might result in a longer time to realise their dream, success is almost guaranteed if they achieve those qualifications. Most of the individuals interviewed had either a PhD or a Masters degree. A number of those with a Masters degree were busy with their PhDs.

A PhD is required if one wants to apply for funding from most institutions that support research. In fact, one requires a PhD in order to be a principal investigator for most

international research grants. Even with the local National Research Foundation, most funding opportunities are granted to PhD holders and a limited amount is available for those who are working towards upgrading their qualifications. In addition, South Africa is on a drive to increase the number of people with doctoral qualifications. For that reason, support is given to those who want to upgrade their qualifications to doctoral levels. Achieving a qualification can be seen as a point attractor as it is an activity that channels the system to move to a single, well defined point (Pryor, 2007).

In addition to attraction of funding, researchers are also required to supervise and/or co-supervise post-graduate students who are registered for Masters or doctoral degrees. In most cases, a PhD is a requirement for one to do so. It is only in exceptional cases where a Masters degree will be recognised for co-supervision. Again, a doctoral degree appears to be a key requirement for one to succeed in a research career at the CSIR. Another key requirement is skills transfer to emerging researchers. Experienced researchers are expected to work with up and coming researchers and not only help grow their careers but also transfer the relevant skills to those researchers. An indicator of working with other researchers is co-publishing. Therefore, an experienced researcher is expected to have journal articles, conference presentations, patents, technology packages and so forth that were developed with emerging researchers. Skills transfer is one of the important activities that ensures organizational sustainability.

While some people complete a doctoral degree for personal reasons, it turns out that it is one of the key requirements to succeed in a career in research. For that reason, it is clear that some things that we do for personal gratification may have positive effects on one's careers.

Depending on the research organisation that one is part of, availability of research funding can be a limiting factor in one's career. At the CSIR, only one third of the funding comes from parliamentary grants. The rest of the funding is derived from contract R&D. In this case, researchers are expected to source funding to do research. This funding can be derived from government, national or international private sectors as well as funding agencies. Researchers spend a portion of their time writing research proposals. It is clear that successful attraction of research funding is beyond the researcher's control once they have submitted their proposals. Success in sourcing research funding is depended on the

strategy of the funding agency, alignment of one's research with their strategy and availability of funding in general. For that reason, even when there is alignment between one's proposal and the strategy of the funding body, the availability of funding might be an issue. On the other hand, one might think that their proposal is aligned to a funding body's strategy, which could have been the case a month or so earlier, only to find that the strategy has changed. Needless to say, the researcher would have spent time preparing a proposal which will not result in funding. Government is the biggest funder of research done at the CSIR. Needless to say, the availability of funding is affected by government's priorities at any given moment. A number of researchers alluded to the frustration associated with limited research funding, in particular the reduction of funding as a result of changing government priorities. For instance, a number of people alluded to the focus on the 2010 Soccer World Cup and the fact that most government spending was allocated to ensuring the successful hosting of the soccer tournament. For that reason, research funding was a bit compromised, especially for research that was not of high importance to government at the time. Currently, the Department of Science and Technology is focusing on building the Square Kilometre Array (SKA). For that reason, most of the research funding has been channelled towards that project. Needless to say, some projects' funding has been reduced. In some cases, funding has been cut completely. Needless to say, a lot of people's careers will be affected by this redirection of funds. It does not help that researchers are measured by the amount of funding they have attracted over the years in the career ladders. Therefore, successful attraction of funding is one of the requirements for growth in a research career, especially at the CSIR.

The other thing about research funding is that the amount of money one is able to attract is depended on the relevance of one's research. In addition, it is dependent on one's standing in the research community. At times, one might be doing relevant research, but struggle to attract funding because the principal investigator is not known in the research world. This is a vicious cycle. One needs funding to grow their research, while on the other hand one needs to have proven herself in the research world in order to attract funding.

Proving yourself in the research world requires one to disseminate their research result. This included giving presentations at scientific conferences and meetings, and publishing in scientific journals. However, in order for one to do that, one needs to perform new research and add into the research knowledge. But, for one to do meaningful research, one

needs to have research funding. This is another chicken and egg situation that is often beyond the researcher's control. In most cases, researchers are expected to protect their discoveries through patenting. Obtaining an international patent is a lengthy process that takes years. Researchers at the CSIR are only recognised once the patent is granted. Unlike someone who publishes their results in a journal, patenting takes a long time, thus delaying the progression of one's career, albeit for a short period. In rare cases, people are not allowed to divulge their research and keep it as trade secret. Needless to say, those individuals will have challenges when compared to those who can freely publish their results, thus get recognition as per the career ladder requirements. At times, the researcher does not have a say on whether to publish or not to. This is dictated by the strategy of the organization. For instance, if the organization wants to grow its intellectual property portfolio, then that organization will put a lot of emphasis on patenting and less so on publications. For that reason, even if an individual may want to publish in a journal, the organization's imperatives might override the individual's wishes.

Unfortunately the speed of growth of an individual's career differs depending on the field one is in. For instance, someone in a chemistry research area might be able to grow quicker than someone in the engineering field depending on what is measured as output and inputs. This has been cited as a criticism to the career ladders as applied in the CSIR. While the playing field is level as per the expectation by the organization, the same cannot be said about the field outside. For instance, some journals have high impact factors while others have relatively low impact factors. Journal impact factors are used as a measure of quality of work that the individual has published. However, this cannot be a true measure of quality as different fields use different yard sticks to measure quality. In addition, just because one's paper is not cited as much does not mean that it is not of good quality as some field do not necessarily publish in journal articles but may rely on conferences to disseminate information. In addition, while in other fields it may take less than a year to publish an article, in others it may take almost 2 years. This does not mean that the researchers working in the respective fields have not done the same amount of work, but because of the nature of their environment and what is measured through career ladders, the one whose field enable him to publish quicker might move relatively faster than the other one. These are some of the factors that already highlight the fact that at times people may not necessarily be in control of their careers. Yes, an individual may work hard and generate high quality work, but the nature of the field he operates in may slow down his

progress relative to another individual in the same organization who is doing research in different field. In other cases, an individual might generate work which was novel at the start of the research and thus patentable, only to find that another lab patents similar work just when she was able to file her patent. This will reduce the impact of the work significantly and thus have a negative effect on the career growth of the said individual.

While the outputs are often dependent on how hard an individual works, they are also dependent on the nature of work allocated to an individual. At times, some researchers are given an opportunity to do new cutting-edge work which will lead to patents, peer-reviewed publications in high impact journals, and so forth. Needless to say, those individuals involved in such work will grow relatively quicker compared to individuals working in routine, repetitive work.

Being known in the scientific arena opens doors for one to be invited to be part of different committees such as conference organising, funding review, strategy development and so forth. As mentioned above, one needs to publish his research results in order to be known by counterparts outside of one's team. Being part of these committees is an indicator of one's leadership in the scientific world. This is one aspect that is evaluated through the career ladder framework.

#### **4.6. The role of a manager in career development**

All the participants agree that a manager has an important role to play in developing the career of employees. This role differs depending on the career stages of the employees. When young employees enter the research environment, they often do not know what is expected of them in order for them to grow in their careers. Therefore, the role of the manager is to involve them in relevant projects that will use their skills while also enhancing their knowledge. Involvement in relevant projects will also enable the researchers to co-publish and/or co-develop technologies. Also, doing cutting edge work will allow the emerging research opportunities to present at international conferences. While an inexperienced researcher might have aspirations to grow in his career, it is the manager who determines the rate of such growth by ensuring that the researcher works on important projects that will lead to required outputs as per the career ladder requirements.

One of the participants alluded to the fact that he lost a number of years of acquiring relevant experience due to the fact that his manager did not give him work that was required for him to grow in his career as an engineer. For that reason, he could not get professional registration due to the lack of involvement in prescribed projects with the right level of complexity. On the other hand, one participant mentioned the fact that she is where she is because of her previous manager who gave her the right exposure and allowed her to flourish in her job. Because the managers decide who works on which project, they are to some extent very important in determining the rate of growth of an individual.

There are a number of things that are expected of SET professionals from each ladder. Most of these are in the professional's control, but some depend on the support one gets from the manager. For instance, professionals are expected to publish work in peer-reviewed journals. In order for one to publish one needs to do meaningful and new research. It is therefore the responsibility of a manager to assign meaningful work that will lead to publishable results to an individual. In some cases, the manager might assign meaningful work, but as is sometimes the case in research, one might not get the results they initially expected from the research. This might be bad in a sense that the individual will not have much to show for the time spent in that research. In addition, researchers are expected to attend conferences and present their work to the science and engineering community. Whether the individual is able to attend a conference or not is depended on the availability of funds as well as manager's discretion. Therefore, managers have a hand in ensuring that people are exposed appropriately. On the other hand, individuals are expected to apply for R&D funding. In this case, the individual needs to take the initiative to identify funding bodies and understand their requirements followed by applying for the funds. Off course, whether the said individual gets the funding s/he applied for or not is largely beyond the individual's control. The above indicates that while there is a lot that an individual researcher can do to advance his career; some things are beyond the individual's control. In some cases, the manager has an influence while in other cases external factors have an influence.

Growth is not only depended on working on projects, it is also depended on getting the right training. Again, the manager is key in this regard as he controls the budget. In addition, the manager should know what skills an employee should acquire in order to succeed in his environment. Some managers are reluctant to train their employees as they

have lost a number of employees in the past as a result of enhanced skills acquired through training. This is a risk as failure to train employees might result in disgruntled employees who may leave the organization as a result of lack of training, especially those who were attracted by available training opportunities. On the other hand, properly trained employees have enhanced employability. Therefore, a manager has to invest in an employee despite the risk of losing that employee because of enhanced skills. The same manager should also have a plan of what he will do with the employee once he has finished his studies for instance. Some people upgrade qualifications with the aim of growing in their career. They expect to be promoted on completion of the training. Failure to recognise the new or improved skills might result in the individual leaving the organization as a result of feeling under-utilised. Lastly, an employer should guide an emerging researcher by making sure that he understands the requirements of the career ladder, for instance.

The role of a manager is different for experienced employees. For these individuals, the manager is supposed to provide an enabling environment that allows experienced researchers to perform work that will result in impact. Most of the experienced participants felt that their managers were more of a hindrance rather than an enabler.

It is often said that people do not leave a company but leave a manager. That is because line management is the face of the employer. Therefore, people have impressions of the company as influenced by their direct manager.

#### **4.7. The CSIR as a Complex Adaptive System**

The CSIR is a complex adaptive system that is part of both the international and national systems of innovation. As per its mandate, the organization is supposed to do research and technology development with partners from industry and academia with a purpose of improving the quality of life of the people of South Africa. The research strategy of the CSIR should align to national strategies and imperatives. In addition, the CSIR should perform research that will improve the competitiveness of South African industry in particular. In addition to South African influences, the organization also aligns itself with what is happening internationally. It is clear from this discussion that the organization is a system which is part of a larger system. Because of it, it is affected by what is happening outside of it. The organization receives part of its funding from government. Therefore,

change in government priorities that leads to reduced funding has a huge impact on the organization and its people. In addition, the organization must constantly evolve so as to remain relevant.

The organization is made up of different operating unit. Each unit has a specific research focus, which in turn requires a specific skills set. These different units interact with different industry sectors and different government organization depending on the research done at that unit. Some units find it easier to attract R&D funding compared to others. For that reason, the financial performs of units differ, which had an impact on the remuneration of the employees, even though the remuneration levels are governed at a CSIR level. For instance, one unit can afford to pay employees at the upper compo ratio while another can only afford to pay at the lower compo ratio. Needless to say, employees from the different units will have different views of the organization even though they are part of the same organization.

As mentioned above, the organization is made up of professionals with different areas of expertise and societal backgrounds. All these individuals bring into the organization their own experiences, thoughts, ambitions and so forth. Some of the individuals have been with the CSIR since they finished university while others come from other organizations. The behaviour of these individuals is influenced by their past and present experiences. In addition, their behaviour is controlled by external factors such as their families, government policies, other company policies, society, etc. These variations in experiences and responses to these experiences require that the organization is agile and able to change to accommodate these complexes. According to Converse *et al.* (2012), the work environment is dynamic as it continuously changes. For this reason, individuals are expected to adapt to the changes so as to grow in their careers.

#### **4.8. Career planning and development in a changing world**

Figure 4.5 shows some of the factors that influence individuals at any given moment, as discussed in this study. It is evident from the picture that individuals are very complex. They have feelings which changes depending on their experiences at any given time. In addition, their feelings are influenced by their past, beliefs, perceptions and so forth. Their educational level influences their performance in the workplace. While some people may



aspire to acquire the highest qualification possible, which is key to success in a career in research, some may have been limited by their family background, thus they were not able to study further. Some people may have chosen a certain career due to the information that was available to them at the time, which would have been different given availability of more information. At times, their history affects how they behave, and how they treat other people around them. All these factors bring about complexity at an individual level.

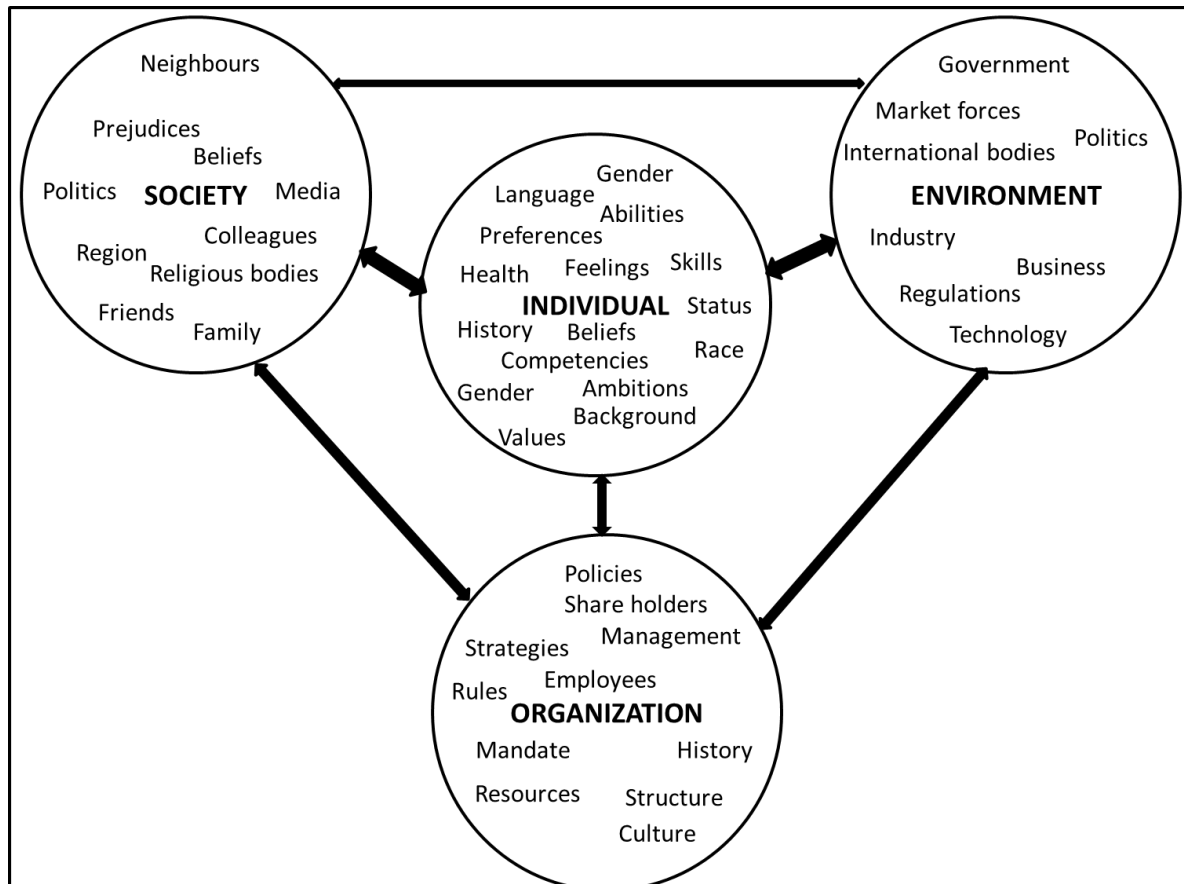


Figure 4.5: Different factors influencing individuals

Figure 4.5 show that individuals are also highly influenced by society. Their family and friends play a big role in shaping an individual, who then help shape other individuals around her. Society in general has rules and regulations that people adhere to. These shape the behavior of people, which can change depending on the people the individual is with at that moment.

In addition to society, organizations where people work also contribute to shaping employees. Organizations have policies which people have to adhere to. The mandate of

the organization informs the nature of work that the organization embarks on. This invariably affects people as they have to do the work as required by the organization. Organizations do not decide on their mandate in isolation. They are there to serve the society. For that reason, organizations themselves are influenced by the environment in which they operate. All of these factors are dynamic and change regularly.

According to Bright and Pryor (2011), people's careers are influenced by different things which are interconnected. The effect of this influence may not be predetermined as it is sensitive to initial conditions. All the people interviewed work within an organization that is dynamic, they live in a society that ever changes, they themselves are changing on a daily basis as a result of their experiences. This is a clear example of complexity, which has an effect on careers. A change in one aspect of an individual's life, which may not necessarily have a direct association with a job, may lead the said individual to make a career related decision. For example, a person getting married may decide to change jobs in order to be closer to a spouse. Most people plan their careers and take steps to ensure that their plans are realised. However, in most cases, unplanned events occur that derail the plans and force people to adapt. For instance, an individual may be offered a promotion as a result of a colleague's resignation. At times, this happens when one is least expecting, and the promoted individual will have to accommodate the changes and act as required by the new position. While in some cases the results of events may be expected and predicted, often they are unpredictable. There is sometimes a nonlinear relation between a change event and its results. For instance, one individual met with children who were talking about an exhibition, which made her to go and see what they were talking about. Later on she got a job managing that entity that she became interested in as a result of seeing school kids during lunch.

It is evident from the results of the study that career as emergent properties of individuals in an organization are unpredictable. For that reason, while the organization can provide systems that enable career growth and management, and while individuals can have plans for their career trajectories, it is those individuals who are willing to adapt as a result of unplanned events that have shown growth in their careers.

#### **4.9. Conclusions**

SET professionals are seen as agents at the CSIR, and the CSIR as a system that is part of a larger system. The CSIR is influenced by both its employees and the external environment. The effects of the external environment have had an effect on the employees of the organization. Examples were given where government policies led to policy changes at the CSIR, which then had an influence on employees' careers. In another example, changes in government spending priorities had an impact on the available funding for a project which invariably had an effect on an individual's career. The recent economic meltdown has invariably resulted in a lot of people throughout the world losing their jobs. Clearly, South African employees were not immune to this worldwide phenomenon. As luck would have it, the career of one of the employees interviewed was influenced by the terrorist attacks that happened in North America in 2001. This is a good example of the fact the world is an open system and that professionals move in and out of organization and even countries. In fact, most of the people interviewed have worked for another employer before joining the CSIR. In addition, two of the people interviewed were serving their notice periods at the time of the interview. On the other hand, there were individuals who have only worked for the CSIR after they completed their studies.

The SET professionals as agents come from different backgrounds and have different experiences that influence their career choices and how they react to the environment. These differences make for an interesting environment where SET professionals as agents influence each other directly and indirectly. The interactions lead to career growth and at times had led to people leaving the organization. Examples were given where individuals' careers were influenced by management and other colleagues.

From this study, it is clear that people are responsible for planning their career trajectories. However, it was evident that management was responsible for ensuring that the organization's policies are supportive of people's careers. In addition, it was clear that career growth of individual was also dependent on one's manager, leading to a dual responsibility. The manager was responsible for providing relevant exposure that compliments and individual's aspirations. Of course, this can only be so if those aspirations are in line with the organization's strategies. This is a shared responsibility. In addition, it is clear that the careers of individuals are affected by what is happening

externally. The said individual must thus be flexible enough to change as and when the environment prompts him to do so.

Finally, it is clear that while at times employees seemed helpless as a result of other people's actions and the environment in general, it is those who knew what they wanted in their careers who were able to adapt and change accordingly. It is therefore important to plan and management ones career despite the unpredictable nature of the world.

## **CHAPTER 5**

### **Conclusions & Recommendations**

#### **5.1. Conclusions**

SET professionals are seen as agents at the CSIR, and the CSIR as a system that is part of a larger system. The CSIR is influenced by both its employees and the external environment. The effects of the external environment have had an effect on the employees of the organization. Examples were given where government policies led to policy changes at the CSIR, which then had an influence on employees' careers. In another example, changes in government spending priorities had an impact on the available funding for a project which had an effect on an individual's career. The recent economic meltdown has resulted in a lot of people throughout the world losing their jobs. Clearly, South African employees were not immune to this worldwide phenomenon. As luck would have it, the career of one the employees interviewed was influenced by the terrorist attacks that happened in North America in 2011. This is a good example of the fact the world is an open system and that professionals move in and out of organization and even countries. In fact, most of the people interviewed have worked for another employer before joining the CSIR. In addition, two of the people interviewed were serving their notice periods at the time of the interview. On the other hand, there were individuals who have only worked for the CSIR and have not worked for any other organization. These people will have different expectations and views of the organizations compared to people coming from other organizations.

The SET professionals as agents come from different backgrounds and have different experiences that influence their career choices and how they react to the environment. These differences make for an interesting environment where SET professionals as agents influence each other directly and indirectly. The interactions lead to career growth and at times had led to people leaving the organization. Examples were given where individuals' careers were influenced by management and other colleagues. It was clear from this study that family, friends and even strangers have had an impact in either the career direction or progression of the participants. These aspects are often not linked to career success.

From this study, it is evident that people are responsible for planning their career trajectories. However, it was also apparent that management was responsible for ensuring that the organization's policies are supportive of people's careers. In addition, it was clear that career growth of individual was also dependent on one's manager, leading to a dual responsibility. The manager was responsible for providing relevant exposure that compliments an individual's aspirations. Of course, this can only be so if those aspirations are in line with the organization's strategies. This is a shared responsibility. In addition, it is clear that the careers of individuals are affected by what is happening externally. The said individual must thus be flexible enough to change as and when the environment prompts him to do so.

All of the participants admitted that their careers where not where they planned for them to be at the time of interviews. Most of them alluded to things that were beyond their control that led to the delays. The most mentioned delay was as a result of research being unpredictable, where one invested time with minimum results compared to what it was hoped for. This lack of result had an influence on the rate of growth of the individual. In other cases, changes in unit, organizational or government strategies led to changes in the research direction, which resulted in slowed progress at times as a result of having to learn new techniques and so forth. In other cases, health issues either in the case of the participant or family member slowed the progress to some extent. For some people, they were not where they planned to be, but they were in a better place. Some were promoted even though at the time they were not planning on moving. Careers of researchers are affected both negatively and positively by unplanned events. In some cases, the results of those unplanned events where not proportional to the initial events.

Finally, it is clear that while at times employees seemed helpless as a result of other people's actions and the environment in general, it is those who knew what they wanted in their careers who were able to adapt and change accordingly. It is therefore important to plan and management one's career despite the unpredictable nature of the world.

The following key issues were highlighted by the study:

- Careers of researchers are unpredictable. The unpredictability is brought about by the nature of work done. While one can anticipate certain results, at times they do not come as originally planned. At times, the anticipated result may not come at all.

Depending on the audience one is addressing, failed results may be seen as a waste of time.

- Effects of some chance events were seen to result in disproportionate results relative to the inputs. For instance, a walk to the cafeteria resulted in one individual identifying a future job, which she occupied a few months later. This would not have happened had she not gone out for lunch.
- Research happens in an open system. For that reason, the careers of researchers are not immune to what is happening outside of the organization.
- The research environment is dynamic. Therefore, changes happen on a daily basis. Some changes may be planned, but most often then not, those changes are not planned. This requires the researchers to re-organize in order to adapt to the changes.
- Since researchers are themselves complex adaptive systems, they have personal boundaries which define the system. These boundaries influence their career choices. These boundaries include family, beliefs, abilities, preferred work environment, and so forth. Needless to say, different people have different boundaries.
- Strange, torus and point attractors were identified as part of various processes individuals embark on to maintain order in their careers.
- As agents, researchers respond to both direct and indirect feedback mechanisms.
- As agents, researchers interact with other agents within the system, and thus are affected by the behaviour of other agents. Therefore, their careers at times evolve as a result of actions by other agents within a system. For instance, one person being promoted as a result of a colleague leaving a certain position.

## **5.2. Limitations of the study**

The research looked at careers of science, engineering and technology (SET) professionals at the CSIR. Most of these individuals' career growth is governed by career ladders that were introduced in 2006. For that reason, their career growth prospects are clear, even though they are influenced by numerous factors as seen in the study. Careers of individuals who are not on career ladders were not studied. Most of these individuals are in support

roles such as finance, human resources, procurement and so forth. It is expected that their experiences will be different to those of SET professionals.

While an equal number of males and females were interviewed with the purpose of determining gender differences in career growth experiences, race was not taken into consideration. A random number of blacks and whites were interviewed.

The study only looked at the perceptions and experiences of individuals as employees and did not look study the views of management with regards to career growth and development.

### **5.3. Recommendations**

It is clear from the study that individuals believe that management plays an integral part in their career growth. For that reason, line management should be equipped with the right skills to help guide the employees with career management. In addition, management should play an active role in guiding employees, especially the younger ones on how to navigate their research careers.

New employees must be given a detailed explanation of the different career ladders and how these are important for their career growth. Knowledge of this information earlier in their careers will help them plan their actions appropriately and thus facilitate career growth and satisfaction.

Career aspirations of employees should be discussed in detailed. These should then be compared with the expectations of the organization where the employee's role is concerned. Where there is alignment, attempts should be made to nurture an individual's career. This will not only result in job satisfaction, but it will result in a productive employee who is loyal to the organization, thus minimising resignations. Where there is no alignment, this should be explained to an individual so that the said employee shouldn't feel like others are being developed and s/he is not.



#### **5.4. Future studies**

The people interviewed were all in agreement that they are responsible for their career growth. It would be interesting to study the careers of those individuals who believe that someone else is responsible for their career growth. The study should look at the growth of those individuals and to some extent their level of satisfaction with their growth. These can be compared with those of the individuals who believe that they are responsible for their career growth.

Some people highlighted that they considered family when making career related decisions. However, this research did not dig deeper into understanding how family influenced both males and females and whether there was an appreciable difference. It will be interesting to see to what extent people are willing to sacrifice for the sake of their family and if there is a difference between men and women.

Careers of people in “fixed-jobs” should also be studied. These are individuals who are not SET professionals whose jobs are defined by the needs of the organization and are organogram based. It will be interesting to find out how different their experiences are to those of SET professionals.

Because of the history of the country and its impact on different people, it will be interesting to find out the experiences of different races, especially the older generation. To what extent did the history of the country have an impact on their career growth. How different is the organization today compared to twenty years ago, and how that difference has made it easier for the younger generation to grow in their careers.

The perceived role of management in career growth in a complex adaptive system should also be studied. This can be done by interviewing managers and understanding what they think their role is in career development at the CSIR. This can then be compared with that of employees so as to ensure alignment. Also, the views of the different role players will influence policies.

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## **APPENDIX A**

### **A. Demographic Information**

Please select (x) the appropriate category

#### **1. Gender**

Male ( )                      Female ( )

#### **2. Age group**

20 – 30 ( )    30 – 40 ( )    40 – 50 ( )    50 – 60 ( )    61 and above ( )

#### **3. Marital Status**

Never Married ( )    Married ( )    Separated ( )    Divorced ( )    Widow(er) ( )

#### **4. Number of Children**

0 ( )    1 ( )    2 ( )    3 ( )    4 ( )    5 ( )    More than 5 ( )

#### **5. Highest Qualification**

Certificate ( )    Diploma ( )    Bachelors ( )    Honours ( )    Masters ( )    Doctorate ( )

#### **6. Number of years since you left University**

1-4 ( )    5-9 ( )    10-14 ( )    15-19 ( )    More than 20 years ( )

#### **7. Number of jobs since you left university**

1-2 ( )    3-4 ( )    5-6 ( )    7-8 ( )    More than 9 jobs ( )

#### **8. Number of years at the CSIR**

0-5 ( )    6-10 ( )    11-15 ( )    16-20 ( )    21 and above years ( )

## B. Interview Questions

1. Tell me about your current job (what it entails, entry requirements, and opportunities for growth)
2. What are the top five factors (influences) that you consider when making a career related decision, and why?
  - 
  - 
  - 
  - 
  -
3. What strategies do you use for career planning and management? That is, how do you plan your career growth and trajectory?
4. Looking back, has your career trajectory followed your planned path? That is, are you where you planned to be today? Please elaborate.
5. In your opinion, what career growth opportunities are available at the CSIR and have you taken advantage of them?
6. In your opinion, what is the role and/or influence of management in your career growth?
7. Can you think of a time when a family member directly/indirectly influenced your career decision?

Event:

Results:

Influence on your career:

8. Can you think of a time when a seemingly insignificant event/situation resulted in unexpected consequences (negative/positive) in your career?

Event:

Results:

Influence on your career:

9. Can you think of an event/situation (outside the organization) that has had an impact (big/small) on your career?

Event:

Results:

Influence on your career:

10. Can you think of a time when one of your colleagues or management made a decision or announcement that influenced your career?

Event:

Results:

Influence on your career:

11. Can you think of an event/time when you (or someone in the organization) did something that ended up being done by most people in the OU without anyone suggesting that the behaviour be copied?

Event:

Results:

Influence on your career:

UNIVERSITY OF  
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23 JUNE 2009

DR. MR MOSIA (932323983)  
LEADERSHIP CENTRE

Dear Dr. Mosia

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0279/09M

I wish to confirm that ethical clearance has been granted for the following project:

"Career Planning and Management in a Complex Adaptive System"

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

Yours faithfully

*Ximba*

MS. PHUMELELE XIMBA

ADMINISTRATOR

HUMANITIES & SOCIAL SCIENCES ETHICS COMMITTEE

cc. Supervisor (Mr. S Bodhanya)

cc. Mrs. C Haddon

Founding Campuses:

■ Edgewood

■ Howard College

Medical School

■ Pietermaritzburg

■ Westville