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ATTRACTION AND RETENTION OF PREVIOUSLY DISADVANTAGED SCIENCE RESEARCH PROFESSIONALS: A CASE STUDY OF THE CSIR

THASHNI MAISTRY

2011

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ATTRACTION AND RETENTION OF PREVIOUSLY DISADVANTAGED SCIENCE RESEARCH PROFESSIONALS: A CASE STUDY OF THE CSIR

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ABSTRACT

This research study is concerned to investigate the problem of the attraction and retention of previously disadvantaged science research professionals in South Africa by conducting a case study of the CSIR. In the South African science sector there is the problem of attraction, development and retention of the required number of previously disadvantaged research professionals needed to transform and develop the intellectual human capital base of the country. The concern around the skills shortage in South Africa means that the previously disadvantaged science research professionals are in high demand. Therefore, it is essential to find out what their career perceptions, needs, and challenges are if science workplaces are to facilitate their career needs. The objective of this study is to establish the career perceptions, challenges and, attraction and retention factors, that would keep previously disadvantaged science research professionals in science careers.

Giddens's theoretical assumptions around structuration are used to explain how people derive meaning for themselves. The research methodology used is a multi-methodological approach using both qualitative and quantitative data analysis methods. Data was collected through a focus group discussion and a cross- sectional online survey.

Key findings are that previously disadvantaged research professionals are: not socialized through their career choices and decisions, that gender difference does not influence career choices and that there is a generation gap at the CSIR. The perceptions of the older and younger respondents differ. In the light of the findings, the following recommendations have been made: government needs to do more in supporting previously disadvantage individuals engaged in science careers through better access to funding and career opportunities, the CSIR should have stronger mentoring programmes so as to address the age and cultural cleavages that exist at the CSIR, the organisation needs to redress their career ladders and remuneration packages as previously disadvantaged researchers are being lured by better packages outside the CSIR, respondents feel that they get career support, advice and opportunity at the CSIR however they do not believe that this is a transparent process across the organisation and equality issues need to be addressed through stronger policies and strategies at the CSIR.

DECLARATION OF ORIGINAL WORK

I, Thashni Maistry, declare that this dissertation is my own unaided work. Any assistance received has been duly acknowledged in the dissertation. It is being submitted in partial fulfillment of the requirements for the degree of Masters in Industrial Sociology and Labour Studies at the University of Pretoria. It has not been submitted before for any degree or examination at this or at any other University.

Thashni Maistry	25, Friday, February, 2011
……	…….
(NAME)	(DATE: Day, Month, Year)

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DEDICATED TO MY PARENTS & BROTHER ASOTHIE, MANOGRAN AND THEESEN MAISTRY & GRANDMOTHER, MRS GOVENDER

ACRONYMS

SET- Science, Engineering and Technology

CSIR- Centre for Scientific and Industrial Research

HEI's- Higher Education Institutions

HSRC- Human Science Research Council

NRF- National Research Foundation

SANSA- South African Network OF Skills Abroad

BEE- Black Economic Empowerment

HRDC- Human Resources Development Cooperation

NACI- National Advisory Council on Innovation

NSI- National System of Innovation

NRDS- National Research and Development Strategy

NSF- National Skills Fund

SETA- Sector, Education and Training Authority

NSB- National Skills Board

SAQA- South African Qualifications Authority

ETQA- Education and Training Quality Authority

EEA- Employment Equity Act

AA- Affirmative Action

PDI's- Previously Disadvantaged Individuals

HRDS- Human Resources Development Strategy

HCD- Human Capital Development

DoE- Department of Education

DST- Department of Science and Technology

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*** N.B:** ***In some cases were the research articles were downloaded from the internet or speeches were used the documents were numbered manually with the first page reflecting as page 1, until the end of the document as no visible page numbers existed on the document.***

CHAPTER ONE

Introduction

1.1 Background

Over the past few years, organisations have experienced many challenges in the face of globalization (Rioux, Bernthal & Wellins: 2009, 4). Human capital forms part of the fundamental core of organisations, and therefore any challenges impacting on the organisation will affect the organisational human capital. One of the major challenges for South African workplaces over the past few decades has been the need to attract, develop and retain previously disadvantaged individuals with appropriate skills for workplaces. This sociological inquiry into the nature of pure science workplaces takes on relevance in the light of the above. This study of the attraction and retention of previously disadvantaged South African science research professionals is concerned to contribute towards the debates around the existing and ongoing skills shortages in South Africa, and the need for highly skilled and educated competent human resources. This is, if South African society is to not only sustain itself, but also to develop further.

The global science sector is focused on the research and development of scientific innovation and knowledge. This is also true for South Africa. The latter has been and is currently embarking on a drive to attract and retain previously disadvantaged South African science research professionals so as to address the needs of societal and workplace transformation. In the achievement of workplace transformation, government and other stakeholders hope that there will be a shift in the patterns of employee and employer relations as South African workplaces try to attract and hold onto these previously disadvantaged research professionals. It is suggested, for example, that opportunity changes in the workplace could result in professionals remaining committed to both South African organisations and South Africa, and be less tempted to succumb to prospects abroad.

The deputy minister of the Department of Science and Technology (DST), Derrick Hanekom indicated in his speech at the National Research Foundation Internship Programme Research Presentation Day in February of 2009 that the problem of attraction and retention was not just a concern for South Africa, but was a global problem (Hanekom, 2009:1). Hanekom (2009:1) also provided some global statistical data on scientific talent management to indicate the severity of the problem. According to him Australia, for example, has a 20 000 human capital shortfall that will be required by 2011. In Britain, science organisations are not filling key posts as there are no suitable science professionals to take up these positions, particularly at higher levels in the workplace (Hanekom, 2009: 2).

In South Africa these problems are amplified by decades of segregation in our education systems which restricted access to universities for the black population which makes up 85% of the population of South Africa. Furthermore Hanekom (2009:2) makes reference to studies by *Productivity SA*, as well as the *2007 International Institute for Management Development World Competitiveness Yearbook* which indicates that South Africa has the highest brain drain and the most severe skills shortage of the fifty five countries studied in 2007.

Minister Hanekom (2009:3) also acknowledges that the South African government was well aware of the fact that the country has a skills shortage in Science, Engineering and Technology (SET), and that this is not just a concern but a critical issue and challenge for the Department of Science and Technology (DST). In an attempt to alleviate the problem the DST and the Department of Education (DoE) have joined forces in developing a SET Human Capital Development Strategy. The latter is still in draft stage, but focuses on the critical issue of nurturing a productive and representative scientific workforce for the National System of Innovation (NSI).

Notwithstanding, more previously disadvantaged people are beginning to involve themselves in different areas of science research, even though they have had limited

access to careers and education in science fields. At the onset it is helpful to delineate the boundaries of this research study. It is specifically focused on South African science research professionals (consisting of African, Asian and Coloured racial groups) as identified by the Apartheid Populations Registration Act No. 30 of 1950 which required people to be registered at birth into one of the aforementioned racially defined groups. These South Africans were disadvantaged by Apartheid policy and systems. They were further restricted by limited access to higher education based on their racial grouping. Race in the context of this research study is regarded as phenotypic but also and more importantly, as a social construction. Although race ordering is a distinctive and core characteristic in South Africa the critical role that it plays in shaping ideology and existing conceptions of racial identity will not be discussed but taken for granted.

In addition, the research study does not investigate, but notes that the white population in the science sector may also experience challenges around the question of the attraction and retention of South Africa white science research professionals. This aspect will not be included as part of the study, given its specific focus of this research study.

1.2 Research Site

The study is a case study of the Council for Scientific and Industrial Research (CSIR) in South Africa. The idea of working on a study related to the CSIR emerged when the researcher was in the employment of the CSIR, working in their human resources division. The CSIR was constituted by an Act of Parliament in 1945, and is arguably one of the most recognised science, technology, research and development organisations in Africa (www.csir.co.za, 2009). The location of the main site is in Pretoria, although the CSIR consists of other regional offices around the country that interact with both private and public partners around the world. The primary task of the CSIR is to undertake multi-disciplinary research and technological innovation with the aim of contributing towards industrial development, and in so doing, to improve the quality of the lives of people, both in South Africa and on the African continent. The organisation consists of 5 business units, 3 science centres and 3 emerging DST research areas engaged in multi-disciplinary research and development (www.csir.co.za, 2009).

The CSIR human resources department engage themselves with the recruitment, selection and placement of human capital who work in science, innovation, technology, research and development. Two of the three aforementioned CSIR's commitments towards the National and New Partnership for Africa's Development programme (NEPAD) below focus on human capital:

1) Building and transforming human capital,
2) strengthening the Science and Technology base, and
3) performing relevant knowledge- generating research and transferring technology and skilled human capital (www.csir.co.za, 2009).

Historically, the CSIR workforce consisted of a highly skilled and educated white researcher. During the late 1990's, the CSIR embarked on the *"Beyond 60 Process"*, which involved an organisation-wide restructuring and transformation process. The Beyond 60 process was reflective of the transformational changes that were taking place in the broader South African context at the time. For example, many of the highly educated South African white researchers emigrated in search of better opportunities due, arguably to the introduction of more previously historically disadvantaged individuals into the science labour force via the implementation of affirmative action (AA) policies and the (South Africa) Employment Equity Act No. 55 of 1998. These policies were introduced to redress past inequalities entrenched by the Apartheid system. This particular phenomenon of emigration was regarded by the South African government as a "*Brain Drain*". That is, white professionals moving out of organisations, and being replaced by often less experienced previously disadvantaged individuals (Bailey, 2003: 235-238).

1.3 Statement of the Problem

According to Bailey (2003: 235), "the problem in South Africa is that, we cannot attract and retain the required number of black research professionals that are needed to transform and develop its intellectual human capital base".

This research study is concerned to investigate the problem of the attraction and retention of previously disadvantaged science research professionals in South Africa by conducting a case study of the CSIR.

Many science graduates have left the country searching for better career opportunities abroad. Science organisations and industries are suffering from major skills shortages and skills mismatches in their workplaces, and are unable to effectively attract and retain educated and skilled black research professionals who are in high demand in both the South African and the global research environment (Bailey, 2003: 235).

Authors, Bailey (2003: 234-255) and Kahn et al. (2004: 1-28) argue that although the development and production of educated professional human capital is an important aspect in any developing country, in the South Africa context, there is also the problem of the reluctance of previously historically disadvantaged individuals, to involve themselves with the study of scientific careers. This dilemma creates further challenges around the attraction, development and retention of these human resources in the South African science sector. Sociologically, speaking we need therefore to understand what contributes to the attraction of these previously historically disadvantaged professionals and what will make them stay in a professional science career.

1.4 Purpose of the Study

The primary focus of this study is to investigate what contributes to the attraction and retention of previously disadvantaged science research professionals at the CSIR. The science sector is faced with the need for an adequate pool of well- trained people to employ but the number of available South African previously disadvantaged graduates in science careers is slowly decreasing (Bailey, 2003: 235). The retention of well- trained employees reduces human resource processes as well as turnover costs. Retention further enhances employee morale, loyalty and productivity in the workplace. As has been suggested highly-skilled and educated previously disadvantaged South African science research professionals are critical to the development of the South African economy. They contribute to the stimulation of the knowledge base of the country, address issues of socio-political transformation and contribute to the reduction of the skills shortages of human capital. It is arguably imperative that organisations in the sciences sector (such as the CSIR) take cognizance of these previously disadvantaged research professionals and their perceptions, challenges and needs in the workplace.

1.5 Research Questions

The research questions listed below will focus the enquiry:

a) What are the career perceptions of previously disadvantaged CSIR research professionals?
b) What are the factors that contribute to the attraction of previously disadvantaged CSIR research professionals?
c) What are the major challenges or problems that previously disadvantaged CSIR research professionals face?
d) What are the factors that contribute to the retention of previously disadvantaged CSIR research professionals?

1.6 Research Methodology

The research questions can best be addressed by the adoption of a multi-methodological research approach, which includes the use of both qualitative and quantitative data analysis methods. The use of a focus group discussion with CSIR human resource representatives enables one to access in-depth information, views, nuances, comments, opinions, sentiments and contradictions that exist around attraction and retention strategies at the CSIR.

A quantitative research approach will make use of a structured cross-sectional online survey. The online survey will be used to elicit information from the respondents with regards to their opinions, desires and attitudes around specific questions dealing with the theme of attraction and retention. The population consists of previously disadvantaged South African employees at the CSIR from which a sample will be drawn.

1.7 Division of the Study

The different chapters of the dissertation are logically arranged to follow one another, so as to develop the dissertation. The study consists of six distinctly demarcated parts.

Chapter ONE: This chapter includes an introduction of the study, an overview of the research site, a research problem statement and a discussion of the purpose and relevance of the study questions. The section provides background information around the study area and also contextualises the research study within the South African context.

Chapter TWO: Research concepts and theoretical assumptions. This section sets out and provides an overview of key concepts to be used in the study. The theoretical assumptions of Gidden's work around structuration are discussed.

Chapter THREE: The literature review. This section contains a literature review pertaining to what is happening in the international and South African context around career professionals in the science sector.

Chapter FOUR: The research methodology. This chapter sets out the advantages of using both the qualitative and quantitative research methodologies used in the study. The data collection methods, the sampling method, the types of questions to be used in the cross-sectional online survey, the methods of data analysis and interpretation will also be unpacked.

Chapter FIVE: Presentation, analysis and interpretation of the research findings. Research result findings from the data obtained from the cross- sectional online survey and from the focus group discussions will be presented. The research findings will be analyzed and interpreted by making use of the literature reviewed and the sociological conceptual and theoretical tools set out in Chapters 2, 3 and 4. The limitations of the research study are also presented within the ambit of chapter five.

Chapter SIX: Summary and recommendations. This chapter sets out the conclusions of the research study as well as the suggestions for further research.

CHAPTER TWO

Conceptualisation and Theorisation

Conceptualisation and theorisation are central to any research project. They provide the tools that are used to guide, ground and interpret the research data. In this chapter, key concepts will be discussed. The theoretical assumptions of Giddens' theory of structuration will also be unpacked. The latter provides a useful and powerful analytical tool for understanding how people derive meanings for themselves around their lives and their vocation. The theoretical literature around the sociological aspects of careers, professionalism, attraction and retention are briefly presented to provide a better understanding of career choices and decisions, and how they are related to lifestyle, life chances and choices.

2. 1 Conceptualisation

The following key concepts will be used as defined here.

In terms of the South African Population Registration Act No. 30 of 1950 people were designated at birth into one of the four racial groups. People with dark- coloured skins, which include the groupings of African, Coloured and Asian (including Indian), people were excluded by law from full South African citizenship and disenfranchised. These people are referred to in the dissertation as previously disadvantaged individuals (PDI's). Those defined as white made up a fourth and advantaged category of people (Employment Equity Act No. 55 of 1998).

According to Cohen et al. (2006:283-284) a career by definition provides a link between an individual, an organisation and the changing social world. A career includes skills, experiences and knowledge in a particular field of study.

A professional is a formally educated and trained individual with a variety of skills and expertise linked to an occupation or workplace in a particular field or area of interest, and who moves along a career path (Miller & Wager, 1971:151-152).

Habitus, according to Bourdieu refers to the ways in which a person's beliefs, ideas and preferences are individually influenced by the objective social networks and cultural traditions in which that person lives (Hodkinson & Sparkes, 1997: 29-35).

A skill for purposes of this research project can be defined as a special technical ability that a person has in order to perform a task, or is trained towards, with or without formal education (www.allwords.com/word-skill.html, 2008).

An education is formal in nature. It is the act or process of acquiring knowledge, and is tacit and related to analytical and critical thinking. Education is a process of years of academic development that promotes and facilitates the practice of analytical and intellectual debate (www.selfknowledge.com/30119. htm, 2008).

A brain drain refers to the loss of skilled intellectual human capital moving to more favourable environments for professional, geographical, social, and or economic reasons (www. answers. com/ topic/ brain-drain, 2008).

Attraction is the luring of skilled people to the workplace and retention is the capacity to hold on to these important people to further optimise the organisation. The ability to attract and retain is key to an organisational competitive advantage (Hattingh, 2007: 1 & Kickul, 2001:320).

Professional knowledge workers refer to those professionals that are able to interpret information within a specific area. They use their knowledge to advance the overall understanding of the subject. Science researchers are considered to be professional knowledge workers as they are able to use their skills to define problems and find

solutions to the problems through their expertise (www.wikipedia.org/wiki/ Knowledge worker, 2009).

The psychological employment contract is the psychological agreement between employee and employer; it refers to the obligation between the organisation and the individual (Charb, 1999:1257l)

2.2 Theorisation

According to Slocum (1968:136), a career becomes internalised and part of a person's lifestyle; it reflects the way we respond, act and engage with the world. Giddens' (1984) theory of structuration is a useful theoretical tool to frame and facilitate understanding of how people make career choices and decisions. His work in this regard will help to understand how people are attracted to and, are retained in scientific careers.

2.2.1 Giddens' Theory of Structuration

Giddens defines structuration as "the structuring of social relations across time and space, in virtue of the duality of structure" (1984:376). In his 1984 book, Constitution of Society: Outline of the theory of structuration, he explains structuration theory by referring to human actors and their actions, which are reproduced, resisted and reconstructed through dominant values and perception within structured social institutions. According to Giddens therefore, a career is a social construct where individuals are held responsible for their own career perceptions, choices and decisions (1984:3). The human actors are the central point of analysis in the theory of structuration. He suggests that human actors are always knowledgeable about what they are doing (1984:3). Giddens is saying essentially that human actors' actions and choices are related to career perceptions, choices and decisions. According to Calhoun et al. (2002:221) Giddens' main focus is the study of human actions and choices within social institutions that are influenced inter alia by workplace changes across time and space. Therefore

Giddens' structuration theory becomes useful in contributing towards the sociological considerations and desegregations of career perceptions, choices and decisions.

Cohen et al. (2006:283-284) notes in his analysis of Giddens work that, careers provides a link between an individual, an organisation and the changing social world. Giddens (1984:5) argues that individual lives are shaped by both agency and the nature of social structures. This is what Giddens refers to as the relationship between structure and agency. He suggests that the perceptions of individuals are both constructed and constrained by their social world. Therefore, for Giddens careers hold a sense of individual as well as collective meaning (1991:35). This enables one to have developed an understanding of how careers are constructed by individuals, but also how a structure or social system influences career perceptions, choices and decisions.

Ritzer (1992:392) argues in his reading of Giddens work, that there are many theories that focus on human actors and the nature of structure, but that Giddens theory of stucturation (1984) provides the deepest understanding of recurring social action. He suggests that there is a dialectical relationship between structure and agency (1992:392). All social actions involve structures, and all structures involve social actions which are interwoven in human actions (Ritzer, 1992: 392-3).

Giddens (1984:25) argues further that agency and structure are dynamic in nature. He suggests that the recursive nature of structure is maintained through actions, and human actors are engaged with monitoring the flow of activities and structural conditions (Giddens, 1984: 5-7, 25). The human actors are reflective of their own role in the production and reproduction of social actions that exist in and through social structures. The human actors both monitor and are able to reflect on their thoughts, their behaviour and activity within their social context. This enables actors to try and make sense of their world as well as to develop behavioural patterns that enable them to deal with their social lives. Calhoun et al. (2002:224) notes furthermore that through the monitoring and reflection of action, actors are also orientated towards the behaviour of others. This enables actors to take up and internalise routine action that are the behaviour of others.

Giddens (1984:5-7) views agency as separate from intentions. He suggests that actions often end up different from what was intended by the actor. Therefore, according to Giddens, intentional actions often have unintentional consequences, this is key to Giddens' theory. According to Ritzer (1992:396) Giddens argues that actors have great power as they have the ability to make a difference in their social world, actors can also lose this power if they fail to use their ability to make a difference. Whilst there are constraints on actors given their social worlds, they nevertheless have the ability to make a difference and transform situations.

For Giddens (1984: 25) agency, structure, systems and the duality of structure are crucial if we are to make sense of the world. Ritzer (1992:396) sets out Giddens' discussion of structural properties. He suggests that there are rules and resources that make it possible for similar social actions to exist across time and space and consequently lead to systematic forms of structure. In other words, any social phenomenon has the capacity to be structured. Structure, Giddens suggests exists in and through the activities of human actors in other words. According to Calhoun et al. (2002: 223), agency is given meaningful form by Giddens through his notion of generative schemes of structure, and structure is maintained and changed through human actions. Calhoun et al. (2002: 224) also notes further that Giddens suggests that actors cannot act in meaningful ways if they do not draw on common collective interpretive schemes within and through the social system.

Time and space are also fundamental variables in Giddens' work. The theory is dependent on other people being present temporally and spatially to allow face to face interaction at the same time and in the same place (Ritzer, 1992:396). Social systems are integrated across time and space, in other words says Giddens. Institutions embody clusters of social action that change across time and space. Giddens, according to Ritzer (1992:397) suggests, that researchers engaged with the study of social actions within institutions be sensitive to the way actors within institutions may alter social patterns.

In summary of Giddens' (1984) theory of structuration, the work on structure and agency is valuable, as it explains how human actors' actions and decisions are integrated in and through structured social institutions. Agency and social structures shape the life choices, life chances and decisions of individuals which influence perceptions and decisions that people have and make around their vocation and their lives.

In the literature, many sociologists make reference to the importance of a sociological understanding of careers. Such an understanding will therefore add value to research studies around attraction and retention as it provides insight into career choice, decisions and needs (Bourdieu,1977:72-80, Charb,1997:1257, Coetzee & Schreuder,2008:46, Govender,2008:1, Hattingh,2007:1, Hodkinson & Sparkes,1997: 29-32, Jones,2007: 53, Keith and Moore,1995:200-210, Kickul,2001:320, Miller & Wagner,1971:153-158, Pillay,2008: 308-315, Spilerman,1977: 351-556, Tapia & Kvasny,2004: 84-85 and Van Dijk,2008: 338-9)

2.2.2 Careers: some sociological insights

The sociological literature on careers focuses on how individuals make career decisions, and how these career choices are influenced by their lifestyle choices and decisions. Literature highlights how career choices are impacted on by labour market structures, professionalism, attraction and retention, role orientations, the development of social networks and power relationships related to occupation selection and on knowledge within a social context (Bourdieu,1977:72-80, Charb,1997:1257, Coetzee & Schreuder,2008:46, Govender,2008:1, Hattingh,2007:1, Hodkinson & Sparkes,1997: 29-32, Jones,2007: 53, Keith and Moore,1995:200-210, Kickul,2001:320, Miller & Wagner,1971:153-158, Pillay,2008: 308-315, Spilerman,1977: 351-556, Tapia & Kvasny,2004: 84-85 and Van Dijk,2008: 338-9).

2.2.2.1 Hodkinson, Sparkes and Spilerman

Hodkinson and Sparkes (1997: 29-35) argue that there is a dominance of socially structured career pathways over which individuals have the freedom to choose a career. They provide a few models from which to explain this:

a) pragmatic rational decision making which considers the *habitus* of a person who makes the decisions (Bourdieu, 1977: 72);
b) the interaction with others in a career field which influences decisions;
c) the location of career decisions comprising partly unpredictable patterns of turning points in the life course of a person;
d) "traits theory" that matches a person's personality traits with career needs that best match the particular occupation (1997: 35-40) and
e) social learning theory models which are learning- based behaviour and which include the social and cultural factors of identity.

Other very significant variables that also influence career choice and decisions are social class, belief systems, ethnicity, gender and age which both constrain as well as enable career choices and decisions. The latter is particularly important in the developing world, for example in South Africa. Career opportunities are also restricted by the labour market, organisations and government regulations that constrain individual identification through careers (Hodkinson & Sparkes, 1997: 35-40). Hodkinson and Sparkes (1997: 30-40) suggest further that there needs to be a model that will situate individual preferences and how they integrate with career opportunity structures.

Moreover, Hodkinson and Sparkes (1997: 29-32) note that professional career paths are linked to the labour market as well the educational systems in the society. They suggest that individuals with different experiences, backgrounds and attitudes reflect inequalities that enter into different career trajectories, and that are often dependent on existing education systems. Spilerman(1977:551-556) elaborates on the different characteristics that segment the labour market by explaining the link between career and structural features that exist in the labour market. He argues that people hold different access to

resources and power relationships, which create and regulate a complex pattern of stakeholder relationships, perceptions and access to networks. Careers are understood as part of a complex interaction at local and global levels that involve the institutionalisation of cultural rules, of educational opportunity and employment located in socio-economic, and cultural environments and their respective historical contexts (1977:551-552). For example, a career experience in the 1970s in the science sector will not be the same as a career experience of a science researcher in 2009. A career experience of a woman in science may not be the same as that of a man in science. Hodkinson and Sparkes (1997: 40-44) suggest that previous research has done little to explain how and why these labour market inequalities exist.

2.2.2.2 Bourdieu

Bourdieu's (1977:72-80) work provides inter alia an explanation of occupational selection. The selection of a career or occupation is attributed to a lifestyle choice and can therefore be examined and explained as such. He suggests that individuals adopt a pragmatic rational approach to making decisions around their careers, and that they understand their careers in terms of their life history. He argues therefore that identity emerges through people's interaction with others in their career. People socially construct and shape maps of meaning to make sense of the world through their careers. Therefore, career aspirations and perceptions are located within these social structures of constructed meanings. In addition, a person's habitus, beliefs, perceptions and ideas are individually shaped by the objective social networks and cultural traditions in which a person lives (Bourdieu & Wacquant, 1992: 95-98).

The authors go on to explain that people respond within a horizon of action which contains boundaries that are characteristic of a belief system that they hold. This horizon of action can limit or enable the view of the world in which the person will act and make career choices. People's careers are coloured and shaped by their life experiences and horizon in terms of which they act in other words. Anything that appears outside the horizon in which to act will be rejected by the individual. This means that, if it does not

fit in with the view of the self or how people will identify themselves and how others will identify them (Bourdieu & Wacquant, 1992: 95-98). To conclude, Bourdieu's analysis leads to broader sociological questions around career decisions and needs, given that there are different career paths for people from different societies that have different backgrounds.

2.2.2.3 Authors Kanter, Kalleberg, Neil and Snizek, Maume and Sullivan

Neil and Snizek (1987:245-255) indicate that gender differences have a significant impact on our lives and these differences should be considered when examining career values. Women place more emphasis on the social aspects of their work, and men more emphasise on remuneration and career related values. Kanter (1977:415-420 argues that regardless of gender, lower opportunities and influence in the workplace lead to lower interest in career advancement and greater interest in security and social rewards for work.

Kalleberg (1977: 124-130) argues that perceptions of job conditions are only partly dependent on actual job conditions for individuals. Work values have a significant impact on the way careers are evaluated in terms of opportunities to learn as well as job security. Neil and Snizek (1987:245-250) suggest that an individual's work values influence the way a person perceives his or her career and this leads to a range of complex problems around work and careers.

With regards to job mobility Maume (1999: 1433-1440) suggest that workers with higher rewards have fewer jobs to move to. As rewards become proportionate to resources, the rate of job changing slows down. Maume (1999:1435-1440) suggests further that career ladders often give the perception of regular increases in wages and promotions. Inconsequence the career ladder is actually used to secure organisational commitment and reduce labour turnover. The paces of career ladders vary across sectors in the

economy, and therefore it is a complex matter to establish its effectiveness in meeting the needs and career aspirations of individuals across sectors.

Over time careers change in their nature. According to Sullivan (1999:457-459) the effects of globalisation have caused major changes to the employment relationship. In recent years the notion of a 'boundaryless career' has emerged, which allows for job opportunities that go beyond the organisation boundaries of single employment (Sullivan, 1999:458). The 'boundaryless career' has given individuals more career choices and decisions related to their increasing generic knowledge and abilities, personal identification with meaningful work and multiple networks of learning. This makes individuals responsible for their careers rather than organisations (Sullivan, 1999:458). Individuals now have more self identification with their careers than ever before.

Most studies that focus on careers have been performed on occupational mobility, psychological disposition, political preferences and prejudices related to career change (Sullivan, 1999: 477). There is some evidence that shows that, good career experiences lead to positive career aspirations. Conversely, bad career experiences lead to negative career aspirations (Sullivan, 1999:478). Career literature is dominated by case study analyses and is focused around individual occupations. There is little information and research on cross institutional career patterns.

2.2.2.4 Professionalism

Literature around professionalism by Miller & Wager (1971:151-152) argue that a professional is someone who has been formally educated and who is a trained individual with a variety of skills and expertise linked to occupation or workplace. They suggest that, professional people do not view their work as a job but rather view their work as a career, and are chiefly concerned with their career development and experiences. Miller and Wager (1971: 151) suggest further that we should be asking ourselves, "if whether professionals are entering careers or if career people are becoming professional in today's society". There seems to be a high commitment towards professionalism and the

acquisition of professional skills and networks of professional relationships. Certain organisations are even geared towards professional development through programmes and procedures. Miller and Wager (1971:153-158) explain that there are different degrees and forms of professionalism, and that there are certain characteristics that identify professionalism. These are: respect for the organisation, respect for the study field, international or national recognition and contribution, the importance of knowledge and, the pursuit of own ideas.

Professionals often manipulate the environments in which they are situated by applying their skills to their work (Miller & Wager, 1971:152-153). Research conducted by Miller and Wager (1971:151-155) shows that scientists who are socialised in particular schools have role orientations that are little affected by organisational experiences, even though organisations encourages professional commitment. Their research also shows that no conflict exists between professional goals and organisational objectives, as the training and education professionals receive while being educated, provides them with values and expectations to manage their careers accordingly.

Jones (2007:53) indicates that professionals are those people who want the world of work to conform to their professional views. Jones (2007:53) refers to "Professional utopian fantasy", which describes the situation when individuals have high expectations of their business environments, and prefer to work in environments that maintain and sustain their professional roles. In her article, Lunda (2007:80-83) highlights that "*new*" professional values make two important points, firstly, to challenge traditional practices, and secondly to have a balanced lifestyle. She goes on to argue that professionals today are not very different from those in the past; they still have to seek out opportunities and gather information.

Keith and Moore (1995:200) explain that professional socialisation is important to the maintenance of the discipline of study and to pass on traditions and memory. This is the way individuals develop professional aspirations and identities towards success in their careers. Professionals internalise implicit values and norms associated with their

profession. Therefore they aspire towards the careers that take on these informal values. Social support in professions is also important as individuals identify mentors with whom they can mirror their lifestyles and their career development. Mentors give guidance and encouragement to the person in becoming a professional. Mentors also support the individual's career aspirations (Keith & Moore, 1995:210).

2.2.2.5 Attraction and Retention

According to Kickul (2001:320) an organization's capacity to attract and retain talented people are key to establishing a competitive advantage. Kickul (2001:320) however suggests that, if promises and expectations of the organisation are not meet, this could have a considerable negative effect on employee attitudes, commitments and intention to stay or leave the organisation. Retention strategies have to include higher salaries to retain key research professionals argues Govender (2008:1) and the challenge to replace staff leaving creates gaps in critical areas in the organisation.

Hattingh, (2007:1) highlights the importance of attraction and retention and the optimization of talent. Talented people according to Van Dijk (2008:385) gravitate to the best organisations. Acquiring talent rather than growing it can be seen as a quick fix to the skills shortage challenge but may not lead to long term pay off in practices (Van Dijk, 2008: 387). He proposes that the real challenge is trying to understand what keeps people in organisations and what makes them leave organisations. Retention strategies should focus on (Van Dijk, 2008:338-9):

- Lifelong learning, personal development and capacity building
- Alignment between role and person,
- Creating an enabling environment as part of effective retention by motivation of talent to optimize organizational performance
- Managing future talent supply
- Measuring of talent according to specifications
- Cultivating talent through mentoring programmes
- Levering talent through motivation and employee involvement

- Caring for talent through personal wellness programmes
- Talent coaching through personal mastery

Van Dijk (2008:338-9) makes the assumption that talented people work for more than just money. Rather they want to make a meaningful contribution to the organisation. He argues that traditional recruitment and retention strategies are not sufficient. Organisations need to focus on what is important to talented employees, such as personal development and learning and growth. Learning is an integral part of everyday work and should be interwoven into the workplace according to Van Dijk (2008:389). De Long in Van Dijk (2008:391) argues that there needs to be a balance between developing individual's talent and adding value to organisation. He suggests that a strong mentoring experience provides positive organisational outcomes, enhances job performance, facilitates greater job satisfaction and organisation commitment, promotes personal learning and reduces turnover intentions (2008:392). Personal needs such as job satisfaction, recognition and career advancement are influenced by organisational conditions in the work environment in other words (Van Dijk, 2008:393).

Pillay et al. (2008: 308) indicates that there is a trend towards the retention of talented and skilled employees who bring significant value to the workplace in recent years. The absence of proper human resource systems to attract, develop and reward the right employees will create further challenges for organisations (Pillay, et al., 2008:315). Tapia and Kvasny (2004:84-85) argue that few studies have tackled issues of employee retention. In their study, they highlight that turnover costs are high and it is cheaper to retain people especially in critical sectors where skills are in short supply. They indicate that in the Information Technology sector which has a skills shortage, women are unrepresented and that efforts should be taken to encourage women to participate in the Information Technology sector. Although workplaces have changed over the past few years they argue that workplaces have also remained highly centralized and adapted new forms of peer and managerial control. Workplaces have been polarized between experts and non experts introducing issues of gender and race (Tapia & Kvasny, 2004:86-87). They argue that, views of gender that exist within organisations are imbued on a daily

basis with gender attitudes and behaviour that carry strong implications of power, exploitation and control in workplaces.

According to (Tapia & Kvasny, 2004:88-89) race is another disparity that exists in the workplace. They explain that, race is not a biological difference but a result of historical social construction of racial categorization. It is the ideology shaping conceptions of race that reduce the voices of people of colour who face unique challenges in areas of attraction, retention and development within organisations. The perception that exists in the science sector is that the sector consists of predominately white and male representation. If people feel that their expectation of their careers are not meet, these unmet expectations may produce feelings of unfairness and inequality, morale and productivity decreases and this impacts on the organizations.

Coetzee and Schreuder (2008:46) suggest that contemporary career studies show employees increasingly seeking broader career paths and values. Security and stability which were values of the past are no longer important to the professional rather they are orientated towards jobs in service sectors that provide flexible lifestyle options and opportunities for growth and development. According to Coetzee and Schreuder (2008:46) studies show a positive relationship between career satisfaction and individual career perceptions. If there is no fit between employee values and the organisation, job dissatisfaction and turnover results. Literature on career anchors suggest patterns and reasons for career decisions such as self perceptions, attitudes, values, needs and talents that develop overtime and shape career choices and decisions (Coetzee & Schreuder, 2008:47). They argue that career perceptions and choices affect decisions to move from one job to another and also effect the way people respond to events and experiences of work.

Charb (1999:1257) looks at career commitment. He suggests factors that affect perception are:

- Individual expectations in the workplace are compared with experiences and perceived realities, if positive then commitment arises;

- the psychological employment contract is refers to the obligation between the organisation and the individual, any entitlements affect behaviour and attitudes affect commitment and motivation.

In summary the aforementioned works by Bourdieu,1977:72-80, Charb,1997:1257, Coetzee & Schreuder,2008:46, Govender,2008:1, Hattingh,2007:1, Hodkinson & Sparkes,1997: 29-32, Jones,2007:53, Kalleberg,1977:124-130, Kanter,1976:415-420, Keith and Moore,1995:200-210, Kickul,2001:320, Maume,1999:1435-1440, Miller & Wagner,1971:153-158, Neil and Snizek,1987:245-255, Pillay,2008: 308-315, Spilerman,1977: 351-556, Sullivan,1999:457-459, Tapia & Kvasny,2004: 84-85 and Van Dijk,2008: 338-9refer to career choices and decisions influenced, sociologically speaking by professionalism, structured career paths, various career choice models, attraction and retention, occupation selection, inequalities in the labour market shaped by social class, age, gender, ethnicity, belief systems and access to networks, power relationships, resources and education were discussed. Having provided an overview of Giddens theory of structuration and some sociological insights on careers, literature on the international context and the South African science sector is looked at in the next chapter.

CHAPTER THREE

Literature Review

In the words of a World Development Report (1995: 64), ‘‘Can something be done to stop the exodus of trained workers from poorer countries?’’

This research study is concerned with questions of attraction and retention, of career perceptions and career challenges experienced by previously historically disadvantaged individuals in the South African science sector. Consulting the relevant literature around the study area it is evident that there are some key themes in the literature that need to be taken cognisance of.

3.1 The International Context

Bailey (2003:234) indicates that the development of a “knowledge society” is one of the key requirements for successful global economic competitiveness and national socio-economic development. Science research professionals are considered as professional knowledge workers. Existing literature focusing on professional knowledge workers in a global context suggests that, there is a need to increase the demand for SET professionals due to the aging population in research, which will impact on the growth rates of the world economies. A significant aspect of the professional knowledge worker according to Kahn et al. (2004: 1) is that the tools of their trade can travel with them wherever they go. In other words, professional knowledge workers can, transfer their knowledge from one employer to another without much difficulty (Harrigan and Dalmia: 1991:4-5). It also needs noting that the mobility these professional knowledge workers possess is not a unique feature to South Africa. It is a global trend related to the characteristics of professional labour (Kahn, 2004:1). Lundy (2008: 1) suggests that, many researchers have left the country through being attracted by better prospects and working conditions abroad and that there is no reliable statistical data to measure knowledge workers

emigration and migration rates. The loss of skilled professionals means, according to Kinnear and Sutherland (2000:106-7), the loss of tangible and intangible knowledge, of skills and competitive advantage.

Kahn et al. (2004: 2) argue that it is not easy for developing countries to compete with developed countries for professional knowledge workers. Since the opening up of world markets the mobility of professional knowledge workers has increased exponentially (Kahn et al., 2004:2). Professional knowledge workers can work anywhere in the world often at the cost of developing countries. International recruitment practices in the global science context help reduce skills shortages in developed countries and exacerbate problems in developing countries, such as South Africa. For example, developing countries cannot compete in terms of salary and working conditions according to Erasmus and Breier (2009: 1).

The exposure to global forces has no doubt had an influence on changes in the labour market and patterns in sectors in the economy. This in turn has an effect on individuals and their careers. Kahn et al. (2004:2) suggest that we should also note that South African previously historically disadvantages science research professionals are mobilising themselves and their careers not only between countries, but also within countries. In this way, globalisation has an impact on their individual career perceptions, choices and decisions which influence the attraction and retention of these professional knowledge workers in South Africa. The aforementioned indicates that professional individuals hold a dynamic labour market flexibility that is not restricted to a country, a place or a space, but which moves beyond that in search of new employment opportunities. According to Kahn et al. (2004:2) of importance is to determine if this mobility is uniquely related to their career perceptions, challenges and needs or to other external factors related to globalisation.

Hattingh (2007:1) suggests that Africa has well established universities but there are many challenges of funding, political indifferences and conditions of conflict, that reduce the opportunities for people to engage in professional careers. African universities are

also losing intellectual human capital due to the brain drain. Most of Africa needs investment in advancing research infrastructure, such as grant funding to support people to take up further education and through international participation and collaborations with African developing countries (Hattingh, 2007:1). Having briefly outlined the effect of globalisation on South African previously historically disadvantaged SET professionals, it is necessary to look further at the South African context with specific focus on what is happening in the science sector.

3.2 The South African Science Sector

Literature by Van Ameringen (1995: 4) suggests that during the initial period of transition to democracy there was willingness by the South African science sector leadership to participate and engage in the process of transformation and adaptation to post apartheid agendas. In other words, the South African science sector, post 1994 society experienced massive political and social transformation. Some of these social and economic reconstructions resulted in significant shifts in status and power bases in the South African workplace (Booysen, 2007:1). After 1994, the South African economy was moreover placed under pressure to complete with the world economy.

Many media reports over this time have highlighted concerns around the loss of skilled human resources in South Africa. Professionals are a crucial determinant in innovation, productivity and economic growth (Kahn et al, 2004: 7). Economic and management power in South Africa, however remains in white hands. Previously historically disadvantaged South Africans hold political power but limited power in management and in the workplace (Booysen, 2007:4).

The literature presented by authors and reports by Bhorat,2008: 1, the Human Science Research Council (HSRC) Reports, 2006-2009, Jones, 2004:2, Kahn et al., 2004:1-28 suggest that there is confusion around the impact of a brain drain or a skills crisis in the South African labour market. There are ongoing debates around the nature and extent of skills shortages in certain key areas (Erasmus and Breier, 2009: 1). Kahn et al. (2004: 1)

supports this view and suggests that there is no evidence of a brain drain but in some sectors the shortages of key human resources are acute.

On the contrary, Bailey (2003: 234-5) indicates that the South African labour market has a "skills crisis". The South African population does not have the necessary skills to partake in the available high skilled employment market. Bernstein and Johnston (2007:1) in an article in *Business Day* suggest that the skills crisis in South Africa is far more serious than it is made to be. They argue that we need a skills revolution that will enable us to sustain economic growth. However, according to Kahn et al. (2004: 1) South Africa has experienced significant outflow of science research professionals but there has also been an inflow of foreign expertise into South Africa. Jones (2004: 2) says that in 2003 some 6800 professionals left the country. He suggests that the outflows of science professionals are due to personal reasons, high crime rates and better employment opportunities in developed countries. At the same time the SET system in South Africa was and is undergoing major transformation, with added pressures to generate their own income and to achieve broader equitable mandates as past racial divides created inequalities of skilled workers at all levels (Kahn et al. 2004:1-9).

Bernstein and Johnston (2007:1) argue on the other hand that the problem lies with government who insist that South Africa has the necessary skilled and professional citizens and that the only problem is that they have been deployed in the wrong places and that human resource head hunters need merely to search for them. According to Bernstein and Johnston (2007: 1) this misconception further places the government of South Africa at a disadvantage in understanding the seriousness of the skills shortage (Bernstein & Johnston, 2007: 1).

The Human Resources Development Cooperation (HRDC) suggests that South Africa has a weakening science base (2004: 1). According to the HRDC South Africa ranked 107th out of 173 countries in 2002 in human development index. South Africa's position in the world economy is that of a double edged middle level developing country with poorly rated human resource development. However and on the other hand, South Africa has

extensive human resources and science infrastructure relative to other developing countries (HRDC, 2004:1).

Minister Mangena, then Minister of the Department of Science and Technology speaking at a National Advisory Council on Innovation (NACI) workshop in 2004 noted that, "it is important that we should aggressively work towards establishing a workforce of highly skilled women, black people and young people of all races in the science and technological fields".

Kahn et al. (2004: 10) argues that in order for South Africa to address skills shortages transformation needs to take place within the public schooling systems. Teachers need to be trained to address the socio-economic problems of the country and a holistic restructuring of the higher education system needs to take place. Restructuring of higher education institutions (HEI's) are an important area of transformation required to support the development needs of the country and to provide the labour market with the high level skills according to Kahn et al. (2004: 13).

Further challenges in this regard include the discrepancies that exist with regards to the participation rate of women in the science sector and the output mismatch produced by HEI's (Kahn et al. 2004: 13). Student funding is limiting the participation and the inflow of South Africans into the HEI's. The National Research Foundation (NRF) which supports post graduate funding programmes has strict rules around eligibility for funding, which constrain students from accessing the funding (Kahn et al. 2004: 15). He argues that the levels of NRF funding and support is not succeeding in addressing the retention needs of intellectual human capital in the country although the NRF has a strong drive towards capacity development of previously disadvantage individuals through many funding programmes(2004: 18-19).

According to Phugula (2000: 41-42) the development of previously disadvantaged individuals in South Africa is slow. One of the main reasons for this is the failure to pass at university level, which affects the colour of the labour markets and the nature and

quality of graduates produced in the sciences. Phugula (2000: 42) notes further that many previously disadvantaged individuals have not had exposure to laboratories and have no practical experiences in sciences. People who find themselves in this situation need strong career education and mentorship programmes that encourage a professional career path. Bhorat (2008:1) is in agreement with Phugula (2000:41-42). He argues that the education system is not adequately addressing the supply and quality needs in the labour market. Organisations that are failing to meet their equity targets and black economic empowerment (BEE) goals are forced to offer huge salary packages to previously disadvantaged scarce skilled professionals (Bhorat, 2008:1. Govender (2008:1) agrees and suggests in a *Sunday Times* article that a scarce skills allowance is used to retain these individuals.

In the South African context scientific research outputs are in decline, there is the challenge to attract and retain established science research professionals that publish. The aging publishing population is a white male, over 50 cohort, with no younger black cohorts waiting in the background. South Africa remains at a disjuncture-moving up the global value chain with a weak science system that cannot compete in the global context (HRDC, 2004: 2). The South African government is aware of the challenges and attempts to deal with the problem through strategies and policies aimed at the rapid turnaround of the South Africa science base. Initiatives in this regards includes the development of capacity in science platforms, the encouragement of more women and previously disadvantaged scientists in fields were they are under represented, as well as commitment to increasing science budgets to finance reforms (HRDC, 2004:2). However, these initiatives first introduced in 2004 are not yet in place. Complex social problems have not been addressed across sector levels. Science budgets to finance reforms have not been adequate to implement these initiatives. Studies situated in the South Africa labour market show specific trends (Erasmus and Breier, 2009:1). They include difficulties associated with affirmative action and the fact that skilled shortages exist alongside a large pool of unemployed graduates.

According to Jones (2004: 1) as well as Kahn et al. (2004: 1) another major challenges in the science sector is how to grow the SET workforce. Kahn et al. (2004:1) indicate that many science research professionals migrate to other professional fields from research based jobs to non research based jobs as they move into management and financial professions. Arguably there is a need for a parallel career path in the science sector. In addition to these challenges are the imbalances in racial and gender representation in the SET system that needs urgent attention. On a visit to science councils in 2003, the National Advisory Council of Innovation (NACI) establishes four major problems in the science sector. These are:

- experience staff resigning and leaving the organisation for various reasons
- the cost of developing the capacity of young researchers
- the low quality of research training offered at HEI's
- the in and out movement of middle and top black management staff (Kahn et al., 2004:2):

Furthermore, there is a serious need to address the threats that exist in the science sector through the development of a framework for understanding knowledge workers in the science sector according to Kahn et al. (2004: 4-7). Better pass rates in mathematics and science is a critical entry point into the science sector and unless addressed the South African science sector will experience further serious problems of supply. They argue that the research system has two major challenges, addressing past inequalities and strengthening and diversifying research capacity whilst remaining ahead of global trends. Any human resource response to address the challenges in the science sector needs a radical approach to addressing the imbalances of race and gender.

Jones (2004:1) argues to the contrary, that South Africa does have a robust SET system and science research professionals do return after some years. The South African Network of Skills Abroad (SANSA) encourages South Africans abroad to return home or to contribute to the development of South Africa from within their host country (Jones, 2008:2). The HSRC (2006:1) disagrees with Jones (2004:1) and suggests that in 2004 the skills shortage rate in South Africa was in the region of 12-16%. The HSRC (2006: 1)

further suggests that in order to address economic problems, skills shortages need to be addressed in conjunction with economic policies of growth and employment.

Highlighted SET initiatives included:

- improving results in mathematics and science,
- improving the participation in HEI,
- recruiting foreign skilled workers where necessary,
- increasing the amount of innovation in HEI'S in response to socio-economic needs,
- collaboration with industry,
- increasing the numbers of research and development workers through targeted support
- increasing the number of science and industry partnerships to drive equity growth and human resource development (Kahn et al., 2004: 18-19).

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The South African government's SET Human Capital Development Draft Strategy (2008) is not in the public domain as yet but reflects that government is aware of the need to address the serious skills shortages in the science sector. The Research and Development Strategy for South Africa (2002) indicates concern around the extent to which the best scientists and researchers are being lured by other countries and indicates the need for interventions to increase the participation and the performance of previously disadvantage science research professionals in the system. Initiatives taken should stimulate the NSI through long term research career planning initiatives; encourage previously disadvantaged individuals to take up science careers, funding schemes to support science and building the knowledge economy through human capital development and knowledge generation. If previously disadvantaged individuals and females remain outside of the system and do not participate, the science sector workforce will not be representative of the population of South Africa (Research and development Strategy, 2002).

South African policies that focus on skills development such as the Human Resources Development Strategy (HRDS, 2008) need to monitor and evaluate the effectiveness of

redress according to Kahn et al. (2004: 23). The nature of employment has over the last few years experienced some new changes. The most significant being the change to the psychological contract of employment between employee and employer. The psychological contact of employment, which refers to the relationship between employee and employer, has shifted, from power being in the hands of the employer to now being in the hands of the employee**.** One of the reasons for this is that the changing nature of work relations is directly related to the changes in the economy which has moved from being an industrial driven economy to one that is driven by the need to acquire and generate knowledge and knowledge services (Pine and Gilmore, 1998:97-8).

Booysen (2007:47) explains that a change in the employment relationship requires legislation to achieve greater social justice in addressing unfair discrimination in the workplace and that it has been slow and uneven. Literature reviewed suggests that there are many legislative policies, acts and strategies that address skills development in South Africa. The National Research and Development Strategy (NRDS) of August 2002 are aimed at enhancing research and development and boosting the NSI. Section 6.1 of the strategy indicates the importance of science in global activities.

According to Kahn et al. (2004: 12) the Skills Development Act No. 97 of 1998 provides a framework to devise and implement national sector and workplace strategies. The aim of the Act is to develop and improve the skills of the South African workforce though the National Skills fund (NSF); Sector Education and Training Authorities (SETA); the South African Qualification Authority (SAQA); the National Skills Board (NSB) and Education and Training Quality Assuror (ETQA). Recently there has been indication by government that the SETA's have not delivered on their mandate. Gower (2009:1) suggests that data from a study using the Statistics South Africa 2007 Community Survey and the education department's statistics show that one of the reasons for young people not being in education or employment was due to the SETA's not providing adequate training opportunities through learnerships.

Legislation that is aimed at redressing the inequalities in South Africa society has an effect on the mobility of researchers according to Kahn et al. (2004:20-21). Equity legislation is based on the assumption that disadvantage and inequality are of such an extent that they need to be urgently redressed through the abolishment of discriminatory laws. The Employment Equity Act (EEA) No. 55 of 1998, purpose is to promote the constitutional right of equity whilst eliminating unfair discrimination in employment. Workplaces are required to ensure the implementation of EE to redress the effects of discrimination and to achieve a diverse workforce with broader representation of previously disadvantaged groups in the South African population (Kahn, 2004: 20-21).

Another such act that aimed at redress is the, the Promoted Equality and Prevented Unfair Discrimination Act No. 4 of 2000. This redress legislation is meant to encourage the transition to a democratic society, increase diversity, fairness, equality, social progress, justice, human dignity and freedom. The act prohibits unfair discrimination, including the denial of opportunities on the grounds of race, gender and disability and therefore promotes equality for previously disadvantaged groups (Kahn et al. 2004:20). The Affirmative Action (AA) policy which forms part of the EEA promotes the employment of previously disadvantaged individuals who were excluded based on racial job restrictions in the past (Berman, 2007:1). The Natural Scientific Professions Bill of 2002 is aimed at encouraging the registration of scientists into practicing their professions with the council. Science research professionals are encouraged by the Bill to register with professional councils or associations (Kahn et al., 2004: 21).

Lack of communication and understanding of the EEA within the organization's culture, low leadership commitment and inconsistency in implementation are barriers to EE and the retention of previously disadvantaged employees according to Booysen (2007:47). He suggests that transformation in many organisations is slow because of the unwillingness of corporate South Africa to embrace the transformation agenda. The implementation of such strategies are systematic and in compliance with legislation. The challenge is to create an environment in which employees experience job satisfaction through fair employment practices and the achievement of organization objectives. Booysen (2007:

50-51) argues previously disadvantaged individuals are selected as tokens and not fully integrated into companies. Organizations focus on quota filling and undermine the intention of valuing diversity within the workplace.

Guest (2004:1) explains that the focus in South Africa has been placed on redistribution but not in the conventional way from rich to poor but rather from the white population to the black population. The South African workforce had to be transformed from mainly white professionals to including previously disadvantaged professionals and this has also to filter through to the workplace levels. However, the black population of South Africa has not had sufficient time to catch up as yet in relation to the quality of education needed in South Africa (Guest: 2007:1).The effects of policies and regulations also need to be monitored and evaluated in order to assess if these are effectively addressing the needs and career aspirations of previously disadvantaged science professionals, as well as the demands of the science sector (Kahn et al. 2004:20-21). They argue that gradual steps to change these patterns should take place. Key challenges include addressing gender and race participation, with demographic representation through transformation.

The literature highlighted in the above reviews debate around the skills shortages in South Africa and suggests that existing research carried out has led to more questions being asked rather than questions been answered around the attraction and retention of previously disadvantaged science research professionals in the South Africa science sector. It maybe concluded that we need to better understand career challenges around attraction and retention of previously disadvantaged individuals within the science sector of South Africa with the hope to addressing the skills crisis or, brain drain that is being experienced in society. Having an overview of both the international and South African literature in the science sector, questions arise to what is happening at the CSIR. The next chapter provides and overview of the research methodology used to investigate the research questions in the CSIR workplace.

CHAPTER FOUR

Research Context and Methodology

This chapter provides information on the research context, the research design and the empirical research methods and techniques used in the study. It describes how the researcher went about finding answers to the research questions. A case study approach is used to elicit information around careers from CSIR previously disadvantaged employees. An outline of the collection and the analysis of the data are also set out in this chapter. The research instruments used to collect the data around the study are a focus group discussion and a cross- sectional online based survey. The data collected will be analysed and interpreted using various research methods and techniques in order to present and interpret the research results.

The research questions listed drive and focus the enquiry.

a) What are the career perceptions of previously disadvantaged CSIR research professionals?
b) What are the factors that contribute to the attraction of previously disadvantaged CSIR research professionals?
c) What are the major problems that previously disadvantaged CSIR research professionals face?
d) What are the factors that contribute to the retention of previously disadvantaged CSIR research professionals?

4.1 The Research Context

After 1994 in South Africa, the CSIR was one of the science organisations that understood the importance of transformation and restructuring of the science base of the country and the need to align itself with the post apartheid priorities of transformation (Van Ameringen, 1995:20-22). According to Mazwai (2003:62) in the past, previously

disadvantaged individuals employed at the CSIR were the cleaners and gardeners but today they form part of the science employee base of the organisation.

Given the CSIR's awareness of the necessity of transformation and the restructuring of its workforce, the CSIR undertook an organisation- wide restructuring and transformation process called, the Beyond60 process in 2005. The main aim of the Beyond60 process was to streamline the organisation and optimise the use of its human resources in line with transformational goals. There were two outcomes from the Beyond60 process, the establishment of the CSIR Human Capital Development (HCD) strategy for SET skills and the introduction and implementation of CSIR professional career ladders in 2006 and 2007.

Both the CSIR HCD strategy for SET skills and the CSIR professional career ladders are still operational in the organisation. The CSIR CEO, Dr Sibisi indicated in the CSIR HCD strategy for SET skills (2006-7:1) that," the growth of human capital and the retention of skills are crucial to enable and to sustain a strong science and technology base. The CSIR can only realize its potential if it builds a core of exceptional scientists-living legends who are serious about making a difference through science". Dr Sibisi also suggests that people are attracted to the CSIR because they want to work on "mega science projects" according to Mazwai (2003:62).

The CSIR HCD strategy for SET skills (2006-7: 1-2) suggests that it is imperative to develop effective strategies to attract, develop and retain human capital within the CSIR. Although the CSIR does have a recruitment policy explaining the process of recruitment at the CSIR, there is no formal or published retention strategy indicating how key high skilled science research professionals are retained at the CSIR. The HCD department was established to address these gaps through the implementation of HCD programmes within the different business units at the CSIR (CSIR HCD strategy for SET skills, 2006-7: 1-2). The HCD drive at the CSIR focuses on professional growth of research staff, knowledge generation through the culture of sharing and learning and providing opportunities for young researchers that meet the needs of the CSIR's transformational targets.

The success of and commitment to HCD goals in the CSIR are measured by key performance indicators that focus on the support of skills development and the maintenance of a pipeline to redress the CSIR profile within each business unit contributing towards the overall HCD goals and targets (2006-7:8). In the June 2007 profile of the CSIR, the transformation results exceeded the targets which showed that of the total researcher base, 33% were black professionals and 30.4% were female professionals at the CSIR (CSIR HCD Strategy for SET skills, 2006-7:4-5).

Although the above presents a positive HCD profile of the CSIR in 2007, there are still major challenges related to HCD at the CSIR. The CSIR HCD strategy for SET skills (2006-7:7-9) suggests that the major challenges are the following:

- the national education systems provides a limited pool of SET professionals
- the problem of the integration of different HCD initiatives in the organisation towards the collective organisational HCD goals and targets
- the attraction and retention of well qualified researchers
- that the required SET profile should include a larger ratio of highly skilled science researchers, a larger ratio of women and previously disadvantaged individuals and an improvement in the qualifications profile of the CSIR
- the high end specialist skills required by the CSIR are not available in the educational streams in South Africa
- race and gender disparities still exist in the CSIR

With regards to the problems around attraction and retention at the CSIR, the CSIR HCD strategy for SET skills (2006-7:7-9) suggests that the number of CSIR staff leaving the organisation is higher than the number being recruited. Staff retention trends also showed more black staff leaving the organization than white. The CSIR HCD strategy for SET skills also suggests that most black staff do not have a positive experience at the CSIR. Some of the main reasons listed were a lack of mentoring; prospects for promotion seem limited and the social-cultural environment was regarded as unwelcoming (2006-7: 9). The CSIR HCD strategy for SET skills (2006-7: 9) also notes gender disparities in SET at

the CSIR, with females representing 30.4% of the research staff. Women were moreover often less qualified, in less senior positions, accessing a small percentage of research grants and had lower publication rates than their male counterparts. The CSIR HCD strategy for SET skills (2006-7:9) also notes that the constraints that prevent women and previously disadvantaged individuals from advancing in the CSIR needs to be understood and addressed, engaging their perceptions of the organisation.

Other initiatives that are currently used to address the main challenges at the CSIR are the, CSIR HCD Programmes (CSIR HCD Strategy, 2006-7:13) which are implemented across the CSIR. These programmes consist of the following:

- regular reporting by the different business units on HCD performance targets
- the availability of bursaries, studentships, internships, postdoctoral research opportunities, professional development programmes, sabbaticals, exchange programmes and strategic recruitment, management and leadership development, courses and the presentation of individual modules, provision of mentorship and special learning events, seminars and conferences

The second outcome from the Beyond60 process was the introduction and implementation of the CSIR professional career ladders. The system of professional career ladders was established to provide clear maps to career planning, development and growth opportunities at the CSIR. Their aim was to renew the focus on science research careers, grow researcher capacity and make the researcher more marketable in a wider context (Van Wilgen, 2006:1). He suggests further that the career ladders were a mechanism implemented to encourage career planning, establish growth opportunities and the distribution of recognition and rewards linked to performance. In other words, it is used to measure the research capacity of an individual relying on a combination of important career elements, which are: skills, performance, qualifications and experience. An important point to note is that career ladders were not designed to address the complexities of career progression at the CSIR but to represent a clear development path for research professionals within the CSIR (Van Wilgen, 2006:1).

Van Wilgen (2006: 2) also notes that the South African research community is relatively small with less than 20 000 full time researchers and with limited networking opportunities, but that for researchers with good career plans, there are opportunities to make an impact. Career development initiatives at the CSIR also encourage aspects of teamwork within a research context. The dynamics of the team are meant to inspire researchers to engage and collaborate for the purpose of science research.

On entering the CSIR environment, science research professionals are placed on one of the five rungs of the career ladder. The below **Table 4.1.1** indicates the five rungs of the CSIR career ladder.

Table 4.1.2: Rungs of the CSIR Career ladder (Van Wilgen, 2006:4)

Rungs	**Description**
Candidate researchers	Work under supervision
Researcher	Work independently with a masters degree in order to build a track record
Senior researcher	A seasoned professional with a track record in research, who has a doctoral degree and is a established researcher
Principal researcher	A specialist with a track record leading to widespread recognition in a particular field, may lead a research groups and work across various fields holding a doctoral degree
Chief researcher	A specialist with a track record that has international recognition as a leader with strategic responsibilities

The CSIR president can also appoint CSIR fellows from the ranks of chief researchers that have influence on the research environment at appropriate levels. To proceed up the ladder the science research professional must gain experience to deal with research complexities on two levels, technical and managerial (Van Wilgen, 2006:4).

Van Wilgen (2006:3) indicates that there are four stages (**Table 4.1.2)** to the CSIR career model:

Table 4.1.2: The four stages of the career model at the CSIR (Van Wilgen, 2006:3)

Stages	**Description**
Stage 1	Work under supervision
Stage 2	Competent to work without supervision in the organisation
Stage 3	Work by supervising others and interacting outside the organisation
Stage 4	High level leadership and development of overall organisational strategies

To advance through the various stages requires major career adjustment and depends on how researchers think and go about their work. Van Wilgen provides the following example by way of illustration, "to move from stage 1 to stage 2, you need greater confidence, reputation and growing independence. To move from stage 2 to stage 3, you need to go beyond your original area of expertise, be responsible for others and develop relationships with external stakeholders" (2006:4). The CSIR career ladder provides a transparent progression to measure and reward career achievements at the CSIR through career guidance by focusing on relevant science researcher attributes argues Van Wilgen (2006:4).

The career ladder is meant to allow individuals to take an introspective look at their careers and assess their own progress. CSIR employees are measured on; their level of formal qualification, on the job training, professional registration, rating by the NRF, research outputs, writing of funding proposals, mentoring and the development of students (Van Wilgen, 2006:6). Each person is given a value mark depending on how they measure on the ladder. One's value mark determines the appropriate salary band that

the person is placed. He also indicates that salary bands are revised from time to time in line with the market trends (Van Wilgen, 2006:9).

The next section of this chapter details the research design, the empirical research methods and techniques used in the study.

4.2 Research Design

The research design is an empirical study using both qualitative and quantitative research methods to investigate the research problem within a particular context. These research methods are common to social science research studies. According to Bryman (2008:140) the choice of research methods depend on the nature of the research questions and are influenced by the research objectives.

The rationale around using the aforementioned methods will enable the researcher to benefit from both research methods. The difference between quantitative and qualitative data according to Babbie (2007:23), simply speaking, is the difference between numerical and non-numerical data. Although, qualitative data can also be further translated into numerical format. The qualitative method is appropriate as it aims to facilitate a more nuanced account of the respondents' views. A qualitative research method enables the researcher to engage with the topic and respondents or participants through comments, opinions, views, sentiments and contradictions that arises through the discussions.

Bryman (2008:140) suggests that a quantitative method on the other hand is used to collect numerical data and engage the respondents in a structured format that is translated into numerical data. Quantitative data is useful to make comparisons and to identify broad trends. In particular, it has the advantage of numbers which qualitative data does not have but quantitative data does not usually provide the researcher with the richness of information that qualitative data can provide according to Babbie (2007:23). The choice of the research design in this study is therefore rational. Both qualitative and quantitative research approaches can best find answers to the research questions that drive the study.

In summary, the research study adopted the following research design that is, broadly speaking:

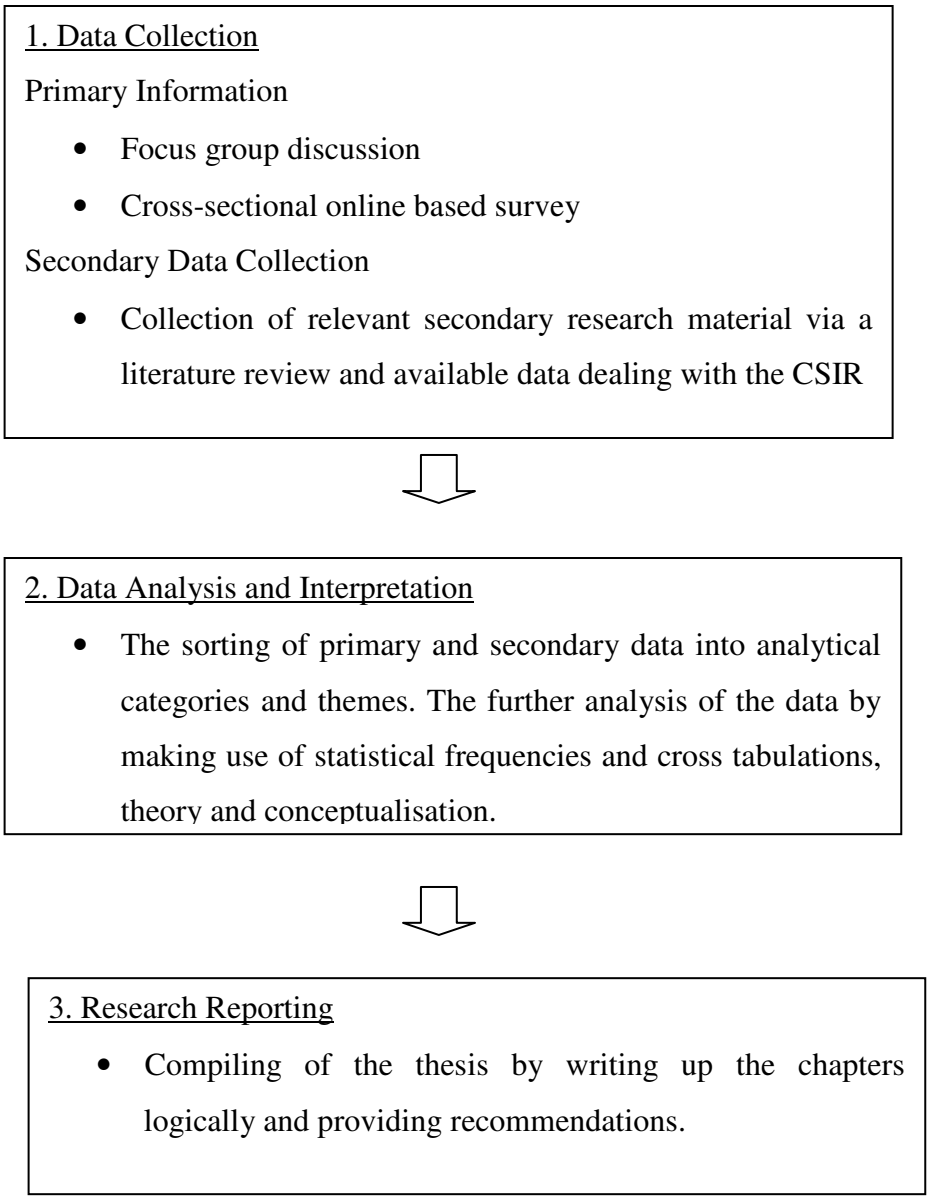

Diagram 4.2.1: Research Design

4.3 Research study population

The research study population consists of 650 South African previously disadvantaged science research professional employees at the CSIR. An e-mail explaining the purpose of the survey and how to access the online survey was sent out to the entire research study population. From the e-mails sent out, 30 emails were returned indicating that the people no longer worked at the CSIR. This reduced the research study population size to 620 respondents. Of these 620 respondents, 15 respondents were away from the CSIR during the period of data collection, further reducing the research study population size to 605 respondents. The rationale for targeting this group is clear.

4.4 Sample size

A total of 101 respondents returned completed online surveys representing a 16.7% return rate from the research study population. According to Babbie (2007: 262) there is no absolutely established acceptable return rate for surveys. One of the factors that could have contributed to the relatively low 16.7% return rate is that the CSIR employees have very active and busy careers and lifestyles. However a significant enough portion of the research population did respond to the survey.

4.5 Key concepts, theoretical arguments and literature reviewed

The literature reviewed provided an overview of some of the important works in the area. Journal articles, dissertations, internet articles, books and policy documents were studied and key themes were summarized, so as to provide both background to and to anchor the study within its context. Organisational documents can be a source of data although the reliability and validity of such documents are *"rarely perfect"* according to Bryman (2008: 120). Documents such as the CSIR policy, strategy and career guideline documents were accessed to help establish the types of questions the researcher included in the study. These documents help to explain the workplace context and culture in which the respondents work.

4.6 Research Instruments

4.6.1 Focus Group Discussion (See Appendix A and G: Focus group Discussion Questions and Transcription)

A focus group discussion is a special type of group interview (Babbie, 2007:308). The group encourages interaction between and amongst participants and the researcher who acts as the facilitator for the discussion. The participants share their experiences and ideas which allow for opinions, attitudes and behaviour to be explored. The approach used during the focus group discussion is to increase communication and interaction between the participants and to encourage them to engage with the subject matter of the research study. This enables the researcher to gain a clearer idea of the perceptions and views of the participants with regard to their experiences, perceptions and opinions. The researcher is also in a position to probe, to identify and to clarify important issues.

In some instances, the data obtained from the focus group discussion may be more useful than the data collected through one- on- one interviews. Interviews may be intimidating for some so a group dynamic helps participants to contribute to the discussion. On the other hand the group dynamic may also put pressure on participants and prevent them from articulating their views fully and openly in the discussion. A further limitation of the focus group discussion technique is that more vocal participants can dominate the conversation. There is also the aspect of "*group think*" where all participants behave in the same fashion (Babbie: 2007:309).

The participants of the focus group discussion were recruited by sending out an e-mail invitation to all CSIR human resource managers as well as to the talent manager to invite and inform their human resources staff of the focus group discussion. Interested participants contacted the researcher to confirm their attendance. The focus group discussion was held at the CSIR in one of the boardrooms in the human resource recruitment centre and organised by the talent management division of the CSIR. The

focus group consisted of 5 human resource practitioners from various business units within the CSIR (Defence, Peace, Safety and Security, Built Environment and Material Science and Manufacturing).

4.6.2 Cross- sectional online survey (See Appendix B: Cross- Sectional Online Survey)

The cross- sectional online based survey was designed to obtain information on a range of variables at the same time (Watkins, 2006:55). According to Hofstee (2006:43) a survey is an effective way to uncover opinions, desires and attitudes. According to Babbie (2007:280-281) surveys fall within a positivistic quantitative paradigm and allow for the opportunity to collect large quantities of information.

An effective and good survey is one that is guided by the existing literature. Questionnaires need to be short, clear, unambiguous and to the point. This method helps to contain and eliminate interviewer bias. It can be used to provide data that can be analysed and further manipulated to provide statistical data around the study. The nature of the construction of questionnaires and the techniques used influences the quality of the data according to Babbie (2007:280-281). Clear instructions must be given to guide respondents in answering the questions. Babbie (2007:281) suggests that online surveys are cheaper to conduct and are user friendly. Another strength of online surveys is that the response rates are higher than paper based surveys. The weaknesses of using an online survey are that the sample demographic is limited to those that have access to networks. Moreover respondents may be unsure about confidentiality because the questionnaire is hosted on a network and additional instructions need to be given to respondents to orientate them to the network (http://writing.colostate.edu/guides/research/survey/ com3c1.cfm, 2010).

The following types of questions were used in the research study cross-sectional online survey:

- closed ended questions that provided a number of alternative answers from which the respondents could select an answer
- open ended questions that allowed the respondents to formulate their own answers to the question
- two way or three way questions that provided two or three alternatives answers from which the respondents could select an answer
- checklist questions that provided respondents with a set of items and asked them to select one item from the list
- Likert scale questions that asked the respondents to select levels of agreement or disagreement by making use of a statement. The respondents have to select from alternatives answers that are from, strongly agree, agree, disagree, and strongly disagree (Babbie: 2007:170-1).

4.7 Pilot study

The first draft of the cross-sectional online questionnaire was sent to 10 randomly selected people at the CSIR from the study population.

The object of the pilot study was to determine:

- how long it took to complete the survey
- whether the questions were too long
- whether any of the questions were ambiguous and or unclear

Feedback from the pilot study indicated that the respondents understood the cross-sectional online survey and that it took approximately 10 minute to complete the survey. Minor technical and administrative adjustments were made to aspects of the questionnaire prior to the final survey being programmed online.

4.8 Data Collection (Gathering)

4.8.1 Focus group discussion

The focus group discussion was based on a semi-structured interview schedule. It allowed the researcher to access several participants systematically and simultaneously (Babbie: 2007:308). The focus group discussion was appropriately long, an hour session that was tape recorded and thereafter transcribed with the permission of the participants. The recording of the discussion allowed the researcher to listen to the comments and views of the participants repeatedly. A thank you e-mail was sent out to all the participants that attended and contributed to the discussion. The focus group discussion was held prior to sending out the cross-sectional online survey and was used inter alia as an explorative technique towards setting up good questions to be used in the survey.

4.8.2 Cross- sectional online survey

The survey was uploaded onto the Lime Survey website. It was hosted independently by a service provider for 30 days. An e-mail was sent out to potential respondents setting out the purpose of the study. The researcher's contact details were included together with the Lime Survey link that the respondents could click on to access the questionnaire. The deadline for the submission of completed surveys was also indicated on the e-mail as well as the instructions on how to answer and submit the online survey. A follow up e-email was sent to remind respondents of the deadline to submit responses. Once the respondent submitted the survey the information was pulled through to an online survey database. The database allowed for the collation and analysis of data frequencies in real-time. The database could also be accessed and manipulated for the further analysis of the data.

4.9 Data Analysis and Interpretation

The qualitative data from the focus group discussion and the cross-sectional online survey were coded. Coding of data is a process of transforming raw data into a standard form for analysis. Coding can be manifest, which involves a content analysis of the visible on the surface content or latent, focusing on the underlined meaning (Babbie: 2007:384-385). Only manifest content analysis was carried out on the qualitative data due to the time constraints. However, this was the best method of analysis of the qualitative data as it also allowed for further quantification of the data (Babbie, 2007:384-5).

Content analysis of textual data was also carried out on the focus group discussion's qualitative data. The qualitative data was grouped into categories that emerged through the responses. Qualitative data analysis involves a continual engagement with theory and analysis. When analysing the focus group discussion data the researcher tried to identify patterns as well as conflicting opinions that were presented in the data.

The quantitative data from the cross-sectional online survey was analyzed using a real-time approach. The quantitative data was captured electronically and processed by the Lime survey database for handling online surveys. As soon as the questionnaire was submitted by the respondent it was captured and the frequencies were calculated by the Lime Survey Online software. The software allowed for the conversion of data into tabulations and graphical representation of the data in pie charts, all in real- time.

Further statistical analysis and interpretation of the data was obtained through the help of an independent statistician using quantitative data analysis software SPSS 18 (SPSS Inc, 2010). The cross- sectional online survey data was explored and described using multiple frequency tables for categorizing demographic variables so as to enhance the interpretation of the distribution of the variables. A descriptive analysis of each question though frequency counts was done. A comparative analysis using cross tabulations was performed in order to investigate the relationships between demographic variables and responses to the survey questions. Chi square analysis was also carried out in order to

determine whether these relationships were statistically significant.

4.10 Validity and Reliability

Reliability refers to the obtaining of consistent results from the same measure whereas validity refers to getting results that accurately reflect the indicated concept being measured (Babbie: 2007: 150). Validity in the study relies on the honesty of respondents and participants. One of the main reasons for using both qualitative and quantitative research methods was to enhance the reliability and validity of the data. Surveys in general are weak on validity and strong on reliability. In order for data to be reliable and valid it has to meet the research objectives, be complete, as accurate as possible and, the data obtained from the surveys must be easy to be used for data analysis. This research study therefore relied on content, and face validity and reliability considerations.

4.11 Ethical Consideration

The research study was designed taking into consideration recognised ethical standards of scientific work. In the research study a great amount of care was taken both instrumentally and procedurally to consider ethical issues. According to Babbie (2007:27) research should avoid harm to people on both a physical and psychological level. It is therefore essential to ensure that all ethical issues related to this research study are taken into consideration when dealing with respondents or participants and their information. Respondents and participants were free to contribute to the research study on a voluntary basis. The researcher ensured the protection of respondent's and participant's privacy by holding the issues of respondent and participant confidentiality in high regard. At all stages of the research study informed consent was sought from respondents, participants and institutions engaging with it.

Participants and respondents from the focus group discussion and cross- sectional online survey were protected through an anonymous focus group discussion and cross-sectional online survey. Organisational ethical considerations were ensured through a legal

agreement with the CSIR. Any information sought from the CSIR systems with regards to personal information will be used merely for the purpose of the research study. The research study proposal was also submitted to the University of Pretoria's Ethics Committee to approve all ethical issues related to it before it was carried out.

Furthermore, the possibility that the research results may be misleading were minimised by the researcher's awareness of the reliability and validity of the research instruments that used both content and face validity as well as reliability considerations. The researcher ensured that all literature and research material is cited and acknowledged properly. The obligation of reporting the study's limitations and shortcomings is also an ethical consideration according to Babbie (2007: 80) and will be discussed in the interpretation of research results chapter.

In conclusion this chapter provides a motivation for the selected methodology and sets out how the methodology was implemented. Both qualitative and quantitative research methods were used. A focus group discussion and cross-sectional online survey were the research instruments used to collect data around career perceptions and challenges with regards to attraction and retention of South African previously disadvantaged science research professionals. The data collected was statistically and qualitatively analysed and interpreted. Content and face validity and reliability considerations were applied in order to ascertain the quality of the data. Research ethics were adhered to throughout.

CHAPTER FIVE

Presentation, Analysis and Interpretation of Research Results

This chapter reports on the research results from both the focus group discussion and the cross-sectional online survey. It is also engaged with the presentation, analysis and interpretation of the research results. Demographic data frequencies on the study population and the sample are provided.

The research study questions are grouped to provide information around six research themes: career perceptions, career opportunities, career challenges, attraction factors, retention factors and organisational commitment and satisfaction. These key research themes emerged as very important variables in the literature review and provide structure to the study in its pursuit of finding answers. Narratives drawn from the focus group discussion will be used to substantiate and illustrate the research findings. Graphical representation of the research findings can be found in **Appendix F**. The chapter also outlines the limitations of the study.

5.1 The Study Population

Table 5.1: Demographic data

Total population	605
Age	19-63 years
Qualifications	High school graduates- Doctoral level graduates
Level of seniority	Students- Principal science researchers
Gender	386 males and 219 females
Race	434 Black, 108 Asian and 63 Coloured

A list of names making up the target population was provided to the researcher by the CSIR human capital development department. **Table 5.1** sets out demographic data on the study or target population. The study population consisted of 605 South African

individuals from African, Coloured and Asian racial groupings within the CSIR. The age profile stretched from 19 years to 63 years. The qualification profile of the population ranged from high school graduates (matric level) to holders of doctoral degrees. The job seniority profile of the population ranged from individuals in student positions to those in principal science researcher positions. The gender profile of the study population consisted of 386 males and 219 females employees. The racial groupings in the study population consisted of 434 Black, 108 Asian and 63 Coloured employees. The study population provided the researcher with an adequate group of potential respondents to contact in order to find out the necessary information that would lead to answering the research questions underpinning the research study.

From the above group of potential respondents, 101 individuals responded to and completed the cross- sectional online survey. This represented a 16.7% return rate. This does represent a significant enough portion of the potential respondents from the study population (Babbie: 2007: 262) although depending on the analysis being used there are some statistical forms that require a minimum response rate. Some factors that could have affected or contributed to the return rate are:

- CSIR previously disadvantaged individuals place low emphasis on their career issues;
- lead very active and busy research careers and lifestyles;
- have not thought about their career challenges and perceptions in detailed;
- see attraction and retention challenges in the science sector to be the responsibility of the human resource department and are not active in human resource and transformation issues at the CSIR and
- feel that their voices will be ignored.

The above factors can arguably be addressed by encouraging more debate around career perceptions in science careers, creating greater awareness around attraction and retention of human capital in the CSIR and the need to not only attract but also to support the development and retention of currently employed South African previously

disadvantaged individuals. This is imperative in the South African science sector according to Kahn et al. (2004:1-2) when referring to the mobilization of previously disadvantaged individuals between countries and within countries. Kahn (2004: 1-2) goes on to explain the importance of supporting, developing and retaining these individuals. If these people feel that they are not receiving the necessary support and development needed to grow their careers, they will be more inclined to move organisation or countries.

5.2 The Sample

The sample consisted of a total of 101 respondents from the online survey and 5 human resource participants from the focus group discussion.

5.2.1 Profile of the Sample from the Online Survey

Table 5.2.1: Employment profile

Employment at the CSIR	Frequency	Percentage
Less than 1 year	14	13.86%
1 to 3 years	45	44.55%
4 to 5 years	22	21.78%
More than 5 years	20	19.80%

The largest concentrations of respondents have worked at the CSIR between 1 to 3 years (44.55%) and between 4 to 5 years (21.78%). These frequencies indicate that people tend to work at the CSIR for a reasonable period of time. This may also be an attribute of science careers that require the researcher to build a track record in the science fields through gaining exposure to various scientific environments. This is important as these individuals will have greater insight into the CSIR and therefore deliver good work. The group of people employed for more than 5 years (19.80%) was the third highest group of respondents. This could mean that they may arguably be more established research professionals and are therefore less interested in career issues.

Table 5.2.2: Gender profile

Gender	Frequency	Percentage
Male	66	65.35%
Female	35	34.65%

In terms of gender, more males (65.35%) than females (34.65%) responded to the survey. The ratio of the population of the study reflects the number of females as just over half that of the amount of males. This gender profile may arguably illustrate the trend that previously disadvantaged females are reluctant to involve themselves with science research careers. They may also place higher emphasis on other aspects of their lives compared to their male counterparts whom place a higher importance on their careers as suggested by Niel and Snizek (1987:245-255) for example.

Table 5.2.3: Age profile

Age	Frequency	Percentage
18-25	12	11.88%
26-30	44	43.56%
31-35	27	26.73%
36- 40	8	7.92%
41 and older	10	9.90%

The age category of respondents (43.56%) represents those in the age group between 26-30 years of age. (In the cross tabulation age categories 36-40 and 41 and older were collapsed into one.) The profile indicates that the younger people between the ages 26-35 are more responsive than the older people at the CSIR. Arguably this indicates that younger people pay more attention to their careers and career issues than dot the older people. Older people may feel more established in their science career. The age profile of respondents also illustrates that previously disadvantaged science research professionals at the CSIR are relatively young. They are entering science careers. This suggests that growth and development opportunities are very important to them.

Table 5.2.4: Race profile

Race	Frequency	Percentage
African	63	62.38%
Coloured	10	9.90%
Indian/ Asian	28	27.72%

In terms of the Apartheid (South African) Population Registration Act No. 30 of 1950 the racial profile suggests that the largest groups of respondents are those that were considered and defined as African people (62.38%). African people made up the majority in the research population. The race profile indicates a low response rate from all the different race groups. This may indicate that South African previously disadvantaged individuals do not place much emphasis on career issues that affect them.

Table 5.2.5: Qualification profile

Qualification	Frequency	Percentage
National Diploma	9	8.91%
Bachelor's Degree	14	13.86%
Honours Degree	22	21.78%
Masters Degree	41	40.59%
Doctoral Degree	13	12.87%
Other	2	1.98%

Table 5.2.5 illustrates the qualification profile of respondents. The largest group of respondents holds Masters degrees (40.59%). The second largest group holds Honours degrees (21.78%). Arguably these are the individuals that focus most on career issues and are interested in career growth and development opportunities. This ratio of qualifications indicates that post graduate degrees are essential to a career in science. It also indicates that, Honours and Masters degrees are the entry point into a professional science career.

Table 5.2.6: Level of Seniority at the CSIR

Level of Seniority at the CSIR	Frequency	Percentage
Student	22	21.78%
Candidate Researcher/ Researcher	45	44.55%
Senior/ Principal Researcher	14	13.86%
Management/ Research Group Leader	10	9.90%
Executive	0	0.00%
Other (Technical Researcher)	6	5.94%

Table 5.2.6 illustrates the level of seniority of the respondents in the CSIR. The majority of the respondents are at a candidate researcher or researcher (44.55%) level. This profile indicates that most of the respondents are working towards advancing their careers as science research professionals. These are people that are typically interested in career growth and development opportunities and the need to overcome career challenges. The low response rate from respondents that are at management and research group leader levels (10) suggest they have little interest in career issues. These individuals are supposed to be the people that attract, support and retain other staff at the CSIR. No executive members of the CSIR responded to the survey which could also reflect executive member's lack of interest in staffing and career issues.

5.2.2 Profile of the Focus Group Discussion

The focus group discussion participants consisted of 5 human resource practitioners at the CSIR these were people that deal with the attraction, support, development and retention of previously disadvantaged research professional people at the CSIR on a daily basis and will have more insight into these aspects. The participants combined years of experience are 30 years and 6 months. There was no objection from participants to the recording of the focus group discussion. The discussion was an hour session and the group was free to share their ideas and experiences related to the research study. Some participants were more dominant in the discussion whilst others participants were still learning and are new to human resources at the CSIR. The focus group questions can be found in **Appendix A**. A transcription of the focus group discussion can be found in **Appendix G.**

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5.3 Research Results from the Cross- Sectional Online Survey and Focus Group Discussion

The following research results were obtained from the cross- sectional online survey and the focus group discussion. The questions were grouped into the six themes mentioned above and linked to the research questions of the study to get a better understanding of the data collected.

A frequency analysis was performed on each survey question as well as cross tabulations between the quantitative question and the demographic categories of tenure, race, age, gender, qualification and level of seniority. Chi Square significance tests were also carried out on the data. Significance will be presented and noted should the data reflect a significant relationship as well as in cases where no significance exists but the data shows specific trends that may be meaningful to the study. These trends although not significant through statistical relationships are meaningful in understanding the perceptions of previously disadvantaged individuals around attraction and retention at the CSIR. Content analysis was performed on the qualitative data from the focus group discussion to look for general opinions, views, comment and trends that could be useful to the study.

5.3.1 Career Perceptions

The following eight questions were asked to establish the career perceptions and opinions of previously disadvantaged individuals as to ascertain the basis from which they are influenced to make career choices and decisions.

Q8. Do you feel that a career as a research science professional is an important career is South Africa?

Table 5.3.1.1: Importance of a career as a science professional

Answer	Frequency	Percentage
Yes	97	96.04%
No	4	3.96%

Table 5.3.1.1 illustrates the opinions of respondents around the importance of a career as a science professional in South Africa. An overwhelming majority of respondents (96.04%) indicate that a career as a science research professional is a very important career. This indication demonstrates that respondents are aware of the significance of their professional career choice or decision. It also provides an indication that they are aware that science research skills are in high demand and that they can make an impact to the development of the country's economy. This echoes Giddens's (1984:3) understandings that people derive meaning for themselves around their lives and careers. The awareness that a research science profession is an important one provides meaning for these respondents. Cohen et al. (2006:283-284) argues that careers provide the link between the individual, organisation and changing social world. In other words, respondents make sense of their lives by considering their career choices and decisions.

Q9. When you introduce yourself to someone for the first time, do you mention the type of work you do?

Table 5.3.1.2: Identification with career

Answer	Frequency	Percentage
Yes	42	41.58%
No	59	58.42%

A large group of the respondents (58.42%) indicated that they did not identify with their career informally and socially speaking. They do not introduce themselves to other people in such terms. This could be due to people not wanting to be seen as seeking status or acting in an inappropriate fashion given the convention or particular social context. However, there is not a big gap between those that indicated that they do identify with their respective careers when introducing themselves. This suggests that people may well consider their careers as an integrated part of their identity no mater the context in which they find themselves, that their careers are fully integrated into their very existence.

Ritzer (1992: 392-3) for example indicates that all structure involves social actions which are interwoven in human actions.

Q10. Do you prefer to be in the company of people who have a similar career to you or with people who have a different career?

Table 5.3.1.3: Social orientation through careers

Answer	Frequency	Percentage
Same	5	4.95%
Different	21	20.79%
Both	75	74.26%

Seventy four point twenty six percent of respondents have no preference. Science careers require the interaction of people with various skill and knowledge backgrounds. This question was asked to engage respondents' preference on career socialization at the CSIR. The literature reviewed, by Giddens (1984:3) inter alia, suggests that people tend to be orientated to people with similar career choices was not established in this instance. Giddens (1984:3), Structuration Theory suggests that there are dominant values and perceptions within structured social institutions and people have dominant perceptions, choices and decisions they make in a career context in this regard.

Q12. Do you think that South Africa adequately invests in bursaries for professional science researchers towards further studies?

Table 5.3.1.4: Perceptions on South Africa's bursary investment

Answer	Frequency	Percentage
Yes	33	32.67%
No	53	52.48%
Do not know	15	14.85%

The majority of the respondents (52.48%) indicate that South Africa does not invest adequately in bursaries for science researchers. This is congruent with the Kahn et al.

(2004:15) argument in this regard. It suggests that some of the major challenges that science research professionals are concerned with are the access to funding for further studies. Kahn et al. (2004:15) suggests that adequate funding is limited in South Africa.

Q13. Do you think that South Africa has a shortage of previously disadvantaged research science professionals in the science sector?

Table 5.3.1.5: Perceptions around skills shortage in science

Answer	Frequency	Percentage
Yes	87	86.14%
No	5	4.95%
Do not know	9	8.91%

Table 5.3.1.5 illustrates the perception of respondents around the skills shortage in the science sector. The majority of respondents (86.14%) are well aware of the fact that there is a skills shortage in the science sector. Arguably, this question also incorporates the issue of the brain drain in the science sector. Bailey (2003:234-5) and Bernstein and Johnston (2007:1) for example indicate there is a skills crisis whilst Kahn et al. (2004), Jones (2008), Bhorat (2008) and the Human Science Research Council (2006-2009) indicate confusion around the skills shortage and the brain drain in South Africa. This finding may well be supported as science research professionals are in high demand and there is a limited available pool of SET human resources internationally (Bernstein and Johnston, 2007:1). The focus group discussion supports this research finding as one of the participants indicate that there is a skills shortage in the science sector.

"Definitely there is a skills shortage. The CSIR is not paying real market related salaries. We find the people but we cannot afford to appoint them. They are already earning more than you can pay them based on CSIR career and salary scales…"

Q20. If you had to choose a career for yourself today, would your choice still be in the science sector?

Table 5.3.1.6: Perceptions on re- selection of career

Answer	Frequency	Percentage
Yes	76	75.25%
No	25	24.75%

The majority of respondents (75.25%) indicated that they would choose a career in the sciences if they had to make a career choice today. This finding indicates that science research professionals have a passion for their respective professions and despite the challenges they face.

Q21. In your opinion, did your gender influence the type of career choice you made?

Table 5.3.1.7: Perceptions of gender influence on career decisions

Answer	Frequency	Percentage
Yes	15	14.85%
No	86	85.15%

Table 5.3.1.7 illustrates the perception of gender influence on career choices and decisions. The majority of the respondents (85.15%) indicate that gender does not influence career choices and decisions. This finding is contradictory to the literature by Niel and Snizek (1987:245-255) who argue that gender does influence career choices. According to the authors, woman place more emphasis on social aspects of work while men place greater importance on remuneration and career related aspects. Gender influence on career choice and decision making may arguably have shifted in South African in other words. More females are entering science professions and workplaces. There is a need for further in-depth sociological study in this regard. One of the participants in the focus group noted in this regard, *"…now women are entering science and being acknowledged. However, women are now making an impact and some are even opening up their own science companies"*.

Q29. Many people feel that it is bad to remain in the same job for more than 2 years. Does this apply to the science sector?

Table 5.3.1.8: Perceptions around remaining in the same job

Answer	Frequency	Percentage
Yes	10	9.90%
No	91	90.10%

The great majority of respondents (90.10%) indicate that it is not bad to remain in the same job for more than two years. This question attempts to ascertain whether the respondents had a perception around the frequency of job changing in the science sector. This finding supports the argument that science research professionals have to establish a reputation for themselves in order to advancing their careers.

Cross tabulations around career perceptions

From the eight questions that were asked around career perceptions, there were no difference between the respondents' views regardless of gender, age, race, tenure, level of seniority and qualification

In summary the findings around career perception are:

- respondents indicated that a research career is an important career in South Africa
- respondents tend to not mention their occupation when introducing themselves to someone else for the first time
- respondents have no preference around being in the company of people with both similar and different careers as their own
- respondents do not think that South Africa invests adequately in bursaries for professional science researchers in order to advance their careers
- respondents are aware of the shortage of previously disadvantage people in the science sector

- respondents indicated that they will still choose a career in the science sector if they had to re-select a career for themselves today
- respondents indicated that they do not feel that their gender difference influences their career choices
- respondents indicated that it is not bad to remain in the same job for more than two years in the science sector

The exceptions to these findings are results obtained through the survey that do not follow the above main research trends but are meaningful. Respondents that fall in the age group 36 years and older where Coloured people and senior staff indicates that they are more likely to mention their occupation when introducing themselves for the first time. This research finding may suggest that the older people, coloured people and senior people are more inclined towards the status linked to their profession. This is congruent with literature indicating that career choices and decisions have influence on lifestyle choices for example, (Giddens, 1984:3).

A further exemption between my main research findings on career perceptions and the literature is that respondents with diploma qualifications indicate that their career choices are influenced by their gender, this subgroup is in agreement with work by Niel and Snizek (1987: 245-255) that point to a link between gender, career choice and decisions people make for themselves.

There is arguably a difference between the career perceptions of older and senior respondents when compared to those that are younger and less senior. The gaps between the perceptions of the older and senior respondents and the younger and less senior respondents need to be further engaged and addressed. Research finding from the focus group discussion indicated (by one of the participants) that, "*Younger people do not tend to mix with the senior people during lunchtimes"*. The CSIR needs, for example, to look into targeted programmes that will help realign the perceptions of older and senior respondents and younger and less senior respondents. One of the ways of doing this is through stronger structured mentorship programmes, where older more established

researchers build a mentoring relationship with the younger and less experienced researchers. This will help close the generation gap that exists within the CSIR and help integrate the different age groups in the organisation.

5.3.2 Career Opportunities

The below questions were asked to respondents to determine their opinions around career development and opportunities.

Q11. Do you belong to a professional science association?

Table 5.3.2.1: Belonging to professional science association

Answer	Frequency	Percentage
Yes	42	41.58%
No	59	58.42%

The majority of the respondents (58.42%) indicate that they do not belong to professional science associations. The literature by Bourdieu (1997:72-80) for example indicates career selection and decisions are made through social networks and cultural traditions. He suggests that if people belong to professional associations they are more likely to adopt characteristics from their professional choices into their lifestyle choices. The CSIR encourages their staff to belong to a professional association and take up professional membership (CSIR HCD Strategy, 2006/7:13).

The fact that the majority for the respondents do not belong to professional associations may indicate that they do not see the value that professional networks and associations have on their careers. These professional associations maintain and encourage career development opportunities and keep people updated in their professional career choices. According to one of the participants from the focus group discussion, *"Some people tend to be registered with professional bodies because of their careers…, it is essential to be part of the association to practice. This also exposes them to conferences and other*

professional events. Professional associations also have career paths and advice for these professionals". Miller and Wager (1971:152-3) indicate that there needs to be a degree of professional commitment and Keith and Moore (1995: 200) mention that professional socialization helps to maintain ones professional networks.

Q15. Do you think the CSIR provides adequate career advice and development opportunities so as to assist you in advancing your personal career?

Table 5.3.2.2: Career advice and development opportunities

Answer	Frequency	Percentage
Yes	54	53.47%
No	47	46.53%

The majority of respondents (53.47%) indicated that the CSIR did provide adequate career advice and development. The literature around the CSIR HCD drive referred to in the HCD strategy (2006/7:1-2) noted that the CSIR has taken some initiatives to provide career advice and development opportunities to assist staff with the planning and advancement of their careers. It may be suggested that such initiatives at the CSIR are useful in helping people advance their careers. This will have a positive impact on the organisation.

Cross tabulations around career opportunities

From the two questions above, there were no differences between the respondents' views regardless of gender, age, race, tenure, level of seniority and qualification

The significant points established through the findings around career opportunities are the following:

- the majority of respondents indicated that they do not belong to professional associations

- the majority of the respondents indicated that the CSIR provided reasonably adequate career advice and development opportunity to assist them in advancing their careers

Once again there were certain subgroups whose results did not quite match the main trends as indicated above. These are respondents with doctoral qualifications, respondents working at the CSIR for more than 5 years, respondents in the age group 36 and older and senior staff. The latter belong to professional associations. There is a significant relationship between seniority and belonging to professional science association. There is also a significant relationship between age and belonging to professional science associations. From the findings it may be argued that those with the highest qualifications; those who have worked at the CSIR for a longer period of time, older people and senior people tend to take up membership in professional associations. This greater exposure to career networks and opportunities arguably facilitates career advancement. This may also mean that these are people that are more established in their careers are more willing to join professional associations. People with lower qualifications, those working for a short period of time and those in lower positions in the organisation need to be encouraged to join professional science associations. This may help them in further advancing their careers and also expose them to professional networks and career opportunities.

Another exception (does not follow the main trends) to the findings was that respondents working for more than 5 years at the CSIR, respondents in the age group 18-25 and the Asian group of respondents indicated that the CSIR did not provide them with adequate career advice and opportunities. It may be suggested that these aforementioned groups need more focused career advice and development opportunity in order to grow their careers. Human capital development programmes at the CSIR should target these groups to increase their career opportunities at the CSIR.

5.3.3 Career Challenges

The questions below focuses on respondents indicating career challenges that they experience as a science professional.

Q33. What are the 3 major challenges that you as a previously disadvantaged South African research science professional face in your career?

Table 5.3.3.1: Major Career Challenges

Major Career Challenges	Frequency
Lack of recognition of qualifications from previously black institutions	5
Lack of training	6
Making an impact in field of study- Internationally and Nationally	7
Language barrier	8
Access to funding	10
Lack of mentorship and support	15
Poor remuneration	15
Prejudice, racism, victimization	15
Career advancement and growth opportunities	29
Low consideration and recognition	43

A full list of the major career challenges can be found in **Appendix C.**

Table 5.3.3.1 illustrates the top ten major career challenges identified by respondents. The two major career challenges facing previously disadvantaged individuals at the CSIR are low consideration and recognition (43) and career advancement and growth opportunities (29). The findings suggest that although they may be getting adequate career advice and support to assist them in advancing their careers. Due to the low consideration and recognition this is not translating into real career advancement and growth opportunities. The CSIR arguably needs to look further into increasing consideration of their previously disadvantaged science research professionals through rewards and recognition incentive programmes that are linked to career advancement and growth opportunities.

Q35. Are there any further comments or suggestions around the research study?

Table 5.3.3.2: Additional Information and Comments

Additional Information and Comments	Frequency
Targeted programmes towards development and exposure to SET	4
Better mentorship and role models for PDI are requested	4
Projects should be given to those that know how to "work" the system those that know how to play the system	4
Career growth should be linked to funding incentives	5
Higher salaries and better career prospects outside. The CSIR cannot compete and therefore cannot retain its personnel	6

A full list of the additional information and comments can be found in **Appendix D.**

Respondents were asked to provide any additional information they believed to be related to the study. This question elicited a low frequency response. Many of the respondents had already indicated their comments in the other qualitative questions around career challenges and solutions to career challenges.

From the information above it, higher salaries and better career prospects exist outside of the CSIR. This maybe the reason that the CSIR cannot retain its previously disadvantaged science professionals. In **Table 5.3.3.1** the fourth major career challenge was also indicated as poor remuneration. This finding suggests that poor remuneration is a major challenge. Arguably better salaries are to be found outside of the CSIR and are used to lure staff to take up more lucrative offers placing further strain on CSIR human capital targets.

One of the focus group participants stated, *"They leave because of the poor benefits and exposure in their careers. Exit interviews indicate that people get training but it's not enough. The younger generation wants exposure, they want an opportunity to grow and develop skills at a faster pace than before, and take control of their careers. Due to the*

CSIR's flat structure it is difficult to progress from a candidate researcher to chief researcher in a short space of time….. In the CSIR you have to work at career advancement you cannot become a manager in 2 years. This affects people's egos. They move for better titles, positions and salaries outside the CSIR".

The CSIR will need to consider revising remuneration packages offered to previously disadvantaged science research professionals in line with the attraction and retention strategy although scholars such as Van Dijk (2008: 338-9) indicate that people do not only work for remuneration but also because of the meaning linked to employment.

5.3.4 Attraction Factors

This question was asked in order to identify attraction factors.

Q14. Which one of the following factors most attracted and influenced you to join the CSIR?

Table 5.3.4.1: Attraction factors to the CSIR

Answer	Frequency	Percentage
Salary package	4	3.96%
Career development opportunities	70	69.31%
Good working environment with co-workers and supervisors	9	8.91%
Flexible working hours	3	2.97%
Other	12	11.88%
Not displayed	3	2.97%

The majority of respondents (69.31%) indicated that they were attracted to the CSIR because of career opportunities. This is congruent with the CSIR CEO and President's statement highlighted in the literature (Mazwai, 2003:62).

Cross tabulations on attraction factors

The research findings indicated that the majority of respondents regardless of race, gender, age, tenure, seniority and qualification level indicated that they were attracted to the CSIR for career development opportunities. The CSIR is one of the leading science organisations in South Africa. The CSIR is also one of the very few organisations that can provide exposure to various science related fields that are involved in everyday science, technology, research and development that is often novel and applicable to the everyday lives of people. Kickul (2001: 320) for example supports the argument in this regard by suggesting that people are attracted to the top organisations.

5.3.5 Retention Factors

The following three questions were asked to identify retention factors.

Q18. Which is the main reason keeping you in a professional science career?

Table 5.3.5.1: Retention factors in the CSIR

Answer	Frequency	Percentage
Good financial package	3	2.97%
Good fringe benefits	0	0.00%
Good career prospects	36	35.64%
Work security	15	14.85%
Job satisfaction	37	36.63%
Flexible working hours	3	2.97%
Fewer working hour than the normal	0	0.00%
A good work location	7	6.93%

Table 5.3.5.1 illustrates retention factors to be found at the CSIR. The majority of respondents (36.63%) indicate that they remained at the CSIR due to job satisfaction. The second highest response was due to good career prospects (35.64%). The findings suggest that respondents at the CSIR underline aspects of job satisfaction and good career prospects as retention factors in the CSIR. If the CSIR wants to retain their previously disadvantaged science research professionals they should consider focusing on increasing

the level of job satisfaction and provide better career prospects. Improved remuneration, better fringe benefits, work security and career growth opportunities for existing employees also need addressing. Currently the CSIR does not have a retention policy. This is a shortfall and needs to be addressed. It is shortsighted to focus on the attraction of new staff if existing staff cannot be maintained. This finding is also supported by a participant in the focus group discussion that: "*We need proper strategy in the CSIR that focuses on both the attraction and retain of people. This is not available at the moment. Policies and strategies do not always talk to each other, they are disconnected. Human capital development area but the human resource staff drives attraction and retention in the units. Focus is place on the next recruitment and not enough on retention of the people we have already recruited. That is why we not successful in securing the required skills*".

Q19. If you are considering leaving your current career, which of the following is the main reason that will make you leave?

Table 5.3.5.2: Main reasons for leaving career

Answer	Frequency	Percentage
Better financial package	48	47.52%
Better fringe benefits	2	1.98%
Better career prospects	25	24.75%
Greater work security	1	0.99%
Better position	8	7.92%
Job satisfaction	13	12.87%
Flexible working hours	2	1.98%
Flexible working hours	0	0.00%
Better work location	2	1.98%

The majority of the respondents (47.52%) predictably indicate that they would leave for a better financial package. The second highest cohort of people would leave for better career prospects (24.75%). This finding was also confirmed by responses towards the questions on career challenges.

Q24. Have you been contacted by a recruitment company or personnel search agency with regard to another job opportunity over the past year?

Table 5.3.5.3: Contacted by recruitment agencies

Answer	Frequency	Percentage
Yes	72	71.29%
No	29	28.71%

The majority of the respondents (71.29%) were contacted by recruitment companies during the year before. Erasmus and Breier (2009:1) indicate that international recruitment agencies are always on the look out for talented people and that local organisation should be able to effectively look after their staff and not lose them to other organisation. CSIR previously disadvantaged science research professionals are apparently in high demand and are sort after in the job market.

Cross tabulation on retention factors

From the three questions that were asked around retention factors there were no difference between the respondents' views regardless of gender, age, race, tenure, level of seniority and qualification.

The significant points established through the findings around retention are the following:

- respondents indicated that the main reason keeping them in a professional science career was due to the good career prospects and job satisfaction;
- coloured and Asian respondents were more interested in work security and job satisfaction than others;
- respondents that have been at the CSIR for a shorter period of time were interested in career prospects and respondents that have been at the CSIR for a long period of time are more interested in job satisfaction;
- respondents with lower qualifications seem to be more interested in good career prospects and those with higher qualifications seem to be more interested in greater job satisfaction;

- respondents will consider leaving a science career for a better financial packages and career prospects and
- the majority of respondents indicated that they have been contacted by a recruitment agency over the past year.

The exception (does not follow the main trends) in the above research findings is that senior people are more interested in a better financial packages and job satisfaction. The organisation should try and make the coloured and Asian groups of people feel more secure and valued in the workplace.

5.3.6 Organisational Commitment and Satisfaction

The seven questions below were asked to the respondents in order to determine their commitment in and their satisfaction with the CSIR.

Q16. In your opinion, is the CSIR a good environment to explore your career aspirations?

Table 5.3.6.1: CSIR, A good working environment

Answer	Frequency	Percentage
Yes	79	78.22%
No	22	21.78%

The majority of respondents (78.22%) indicated that the CSIR is a good environment to explore ones career aspirations. Respondents recognize that the CSIR is a good environment for scientists to develop their career and explore their career aspirations. This is related to the literature by Mazwai (2003:63) quoting the CSIR CEO and President noting that people are attracted to the CSIR to work on mega projects.

Q17. Do you believe that the CSIR career ladder displays a transparent process in which you are fairly measured?

Table 5.3.6.2: CSIR Career Ladder

Answer	Frequency	Percentage
Yes	37	36.63%
No	64	63.37%

The majority for respondents (63.37%) indicate that the career ladder is not a transparent process in which they are fairly measured. The CSIR needs to consider revising the career ladders to make them more transparent and fair in the assessment of individuals and their careers. A revision of the career ladder could also address issues of career opportunities, advancement and satisfaction.

Q23. On a scale of 1-5 (1 being the lowest and 5 being the highest), how satisfied are you in your current organisation?

Table 5.3.6.3: Satisfaction at the CSIR

Answer	Frequency	Percentage
1 (Very high satisfaction)	8	7.92%
2 (High satisfaction)	17	16.83%
3 (Average satisfaction)	52	51.49%
4 (Below average satisfaction)	22	21.78%
5 (Low satisfaction)	2	1.98%

The majority of the respondents (51.49%) indicate that they are averagely satisfied with working at the CSIR. This is a safe measure. The CSIR should however consider increasing the satisfaction level by taking into consideration career aspirations as suggested in previous answers to the survey respondents. Kickul (2001: 320) notes that if employment expectations are not met it will impact on the retention of staff. Govender (2008:1) also highlights that it is difficult to replace existing staff and therefore there is a need to retain and optimize the existing talent.

Q26. I feel that I get enough recognition and acknowledgement for the work I do at the CSIR.

Table 5.3.6.4: Recognition and acknowledgement for work

Answer	Frequency	Percentage
Strongly Agree	3	2.97%
Agree	50	49.50%
Disagree	40	39.60%
Strongly disagree	8	7.92%

The majority of respondents (49.50%) agree that they get enough recognition and acknowledgement for the work that they do at the CSIR, however the 39.60% of respondents disagree that they do not get enough recognition and acknowledgement for their work at the CSIR. There is almost a 10% difference between those that agree and those that disagree that they get enough recognition and acknowledgement for the work that they do. One of the major challenges indicated by respondents was low consideration and recognition towards previously disadvantaged science research professionals. People that feel appreciated valued and acknowledged tend to have more commitment and loyalty towards the organisation they work in for example, (Kickul, 2001: 320).

Q27. The CSIR is concerned about the career needs of their employees.

Table 5.3.6.5: Career needs of employees

Answer	Frequency	Percentage
Strongly agree	6	5.94%
Agree	56	55.45%
Disagree	33	32.67%
Strongly disagree	6	5.94%

The majority of respondents (55.45%) agree that the CSIR is concerned about the career needs of their employees. The focus group data also supports this finding (one of the

participants indicated): "*Yes, but it depends on the person and manager. If managers take an interest person grows. It is there but it depends if the person has the necessary support*". People tend to be more committed and satisfied with their organisation if they feel that the organisation is concerned about them. According to Charb (1999:1257) we should focus on individual needs, experiences and perceived realities as well as the relationship that exists between the employee and employer. If there is a lack of adequate attention to career needs, employees' sense of commitment and satisfaction in organisation decrease.

Q28. Where I work, all employees are treated fairly and equally in relation to career opportunities.

Table 5.3.6.6: Equality in the Workplace

Answer	Frequency	Percentage
Strongly agree	6	5.94%
Agree	36	35.64%
Disagree	51	50.50%
Strongly Agree	8	7.92%

Table 5.3.6.6 illustrates the opinion by respondents around equality in the workplace. The majority of respondents (50.50%) disagree that all employees are treated fairly and equally in relation to career opportunities in the workplace. Equality and fairness in the workplace is very important issue. Kahn et al. (2004:4-7) agree and suggest that radical redress of inequality in the workplace needs to take place in such conditions. If respondents believe that they are unfairly treated their productivity, commitment and job satisfaction will be compromised. Fundamental problems around equity and fairness in the workplace will cause serious problem if not addressed through targeted interventions.

Q30. I feel that I am earning a market related salary based on my experience, commitment and qualifications.

Table 5.3.6.7: Market related salary related to commitment, experience and qualification

Answer	Frequency	Percentage
Yes	29	28.71%
No	72	71.29%

The great majority of respondents (71.29%) indicate that they do not feel that they earn a market related salary in relation to their commitment, experience and qualifications. This research finding is related to that of what people feel when they are poorly remunerated. One of the participants also noted, "*CSIR fringe benefits are low, do not compare with other companies, meals, transport, cellphone allowance, training, travelling for work. CSIR cannot compete. Salaries at CSIR are cost to company*".

Cross tabulations around organisational commitment and satisfaction

From the seven questions that were asked around organisational commitment and satisfaction, there were no measures of significance between the respondents' views regardless of age, race, tenure, level of seniority and qualification

The significant points established through the findings around organisational commitment and satisfactions are as follows:

- respondents feel that the CSIR is a good environment to explore their career aspirations. There is a significant relationship between gender and the opinions of respondents around whether the CSIR is a good environment to explore your career aspirations
- respondents indicate that there is no transparency around the career ladder process and they feel that they are not fairly measured on the ladder
- respondents are averagely satisfied by being in the employment of the CSIR
- respondents indicate that they get enough recognition and acknowledgement for the work they do at the CSIR

Some exceptions (does not follow the major trends) to these findings are coloured respondents and senior people in the organisation indicating that the career ladder is a transparent and fair measure. The relationship between race and the opinions of respondents around the CSIR career ladder
being a transparent process is approaching significance. Senior people may feel the career ladder is a transparent and fair process arguably because these are the people that have helped design it and are responsible for the implementation there. Booysen (2007: 47) supports this finding in the literature by suggesting that policies to address discrimination in the workplace need to be legislated.

Another exception to the findings are that respondents with Honours degrees, respondents working for more than 5 years at the CSIR, respondents in senior positions and the Asian group of respondents indicate they do not get enough recognition and acknowledgement at the CSIR. These are the groups of people that the CSIR need to pay special attention, making them feel more valued, recognized and acknowledged for their contribution at the CSIR. If this is not addressed retention of these groups of people will be compromised.

Respondents in lower research positions indicated the CSIR is not concerned about their career needs. Respondents with doctoral degrees, student respondents and respondents that worked for less than a year at the CSIR indicate that they are treated fairly and equally in terms of career opportunities at the CSIR. Respondents with doctoral degrees are perhaps highly regarded in the CSIR while those in lower research positions are not given sufficient attention. Respondents that work for the CSIR for less than a year and those that are students feel that they are treated equally in terms of career opportunities. This is perhaps due to the fact that students are in specific development programmes at the CSIR. Those that are employed for less than one year have arguably not been at the CSIR long enough to assess if they are treated fairly and equally in terms of career opportunities. The CSIR should consider standardizing their policies and processes in order to incorporate aspects of fairness and equality in the workplace.

5.3.7 Career Mobility

As professional knowledge workers have high levels of mobility, the questions around career mobility were addressed through the following questions to respondents.

Q22. Do you think that your generic knowledge and skills can be directly transferred from one type of organisation to another type of organisation?

Table 5.3.7.1: Skills and knowledge transfer

Answer	Frequency	Percentage
Yes	94	93.07%
No	7	6.93%

The great majority for respondents (93.07%) indicated that their generic knowledge and skill capacities could be directly transferred from one organisation to another organisation. This finding indicates that science research professionals can move easily from one organisation to another taking with them their knowledge and skills which is constituted as part of the organisation's competitive advantage. The loss of skills and knowledge result in a negative impact on the organisation's competitive advantage. Kahn et al. (2004: 2) argues in this regard that people move between and within countries and also from science jobs to non science related jobs which is a challenge in the science sector. Sullivan (1999:457-459) on the other hand suggest that we should not be overly concerned with this phenomena. He argues that it is a global trend of the boundaryless careers. One of the participants from the focus group indicated: "*Globalisation has impacted on the science sector, more access to technology than we did before, CSIR programmes, sabbaticals, working outside South Africa and expanding your knowledge. CSIR employees needs to compete worldwide, they have no choice*".

Q25. Many people feel that moving from company to company, enhance their employability and increase the opportunity to further their careers. Do you agree?

Table 5.3.7.2: Career Mobility

Answer	Frequency	Percentage
Yes	49	48.51%
No	52	51.49%

The majority for respondents (51.49%) indicate that moving from company to company will not enhance their employability and career opportunities. On the other hand the remaining respondents (48.51%) indicate that moving from company to company will enhance their employability and career opportunities. Employees of the CSIR are attractive in the job market. If they are provided with better opportunities outside the CSIR they will consider leaving the CSIR. However they do not seem like they are in the habit of job hopping to advance their career opportunities and employability. The CSIR should consider strengthening their relationship with their existing employees and make them feel more valued in the organisation. If previously disadvantaged science research professionals do not see that they are getting career opportunities and their attractiveness to the job market is reducing they will consider moving to organisation that can provide them with these opportunities and exposure.

Q31. Have you ever thought of emigrating from South Africa?

Table 5.3.7.3: Possible emigration from South Africa

Answer	Frequency	Percentage
Yes	29	28.71%
No	72	71.29%

Table 5.3.7.3 illustrates the number of respondents that have thought of emigrating from South Africa. The majority of respondents (71.29%) do not think of emigrating from South Africa. This research finding indicates that respondents hold a feeling of loyalty

towards South Africa. They are interested in contribute to the National System of Innovation in the country. It also suggests that South Africa may be able likely to retain key high skilled people should they pay sufficient attention to the career aspirations of these people. This will arguably further add to the development of the South African economy and the National System of Innovation. In this regard Lundy (2008:1) indicates that many people have left the country in search of better employment opportunities and salaries whilst Jones (2008:1) on the other hand, indicates that we should not be concerned about this matter as it is coupled with the high return rate of South Africans from abroad each year.

Q32. If your answer to Q31 is yes, what is the main reason for thinking this?

Table 5.3.7.4: Main reason for possible emigration

Answer	Frequency	Percentage
To further my education	14	13.86%
Because of better economic conditions	9	8.91%
Improved quality of life	8	7.92%
High crime rates	6	5.94%
Lack of service delivery	1	0.99%
Racism	1	0.99%
Political issues	2	1.98%
The general deterioration of infrastructure	0	0.00%
The lack of employment opportunities	9	8.91%
Other	5	4.95%
No answer	46	45.54%

The majority of respondents (45.54%) did not select an answer. This could be due to the fact that they do not think about emigration or about why they should consider emigration. The second highest response was to further their education (13.86%). This finding indicates that some professionals wish to further their education overseas which is to be expected. The choice of study specialization have in other words is limited and there are a variety of outstanding institutions elsewhere in the world. Expertise is not always available in South Africa.

Cross tabulation on career mobility

From the four questions that were asked around career mobility, there were no differences between the respondents' views regardless of gender, race, tenure, level of seniority and qualification.

The significant points established through the findings around career mobility are the following:

- respondents indicated that they believed that their generic knowledge and skills can be easily transferred from one type of organisation to another type of organisation;
- respondents indicate that moving from company to company will not necessarily enhance their employability and increase their career opportunities;
- most respondents did not seriously consider emigrating from South Africa;
- age difference contributed to whether people considered emigration, for example younger respondents (18-35) would most likely consider emigrating to further their education whereas older respondents (36 and older) indicated they would considered emigration for better employment opportunities;
- of those that considered emigration, respondents employed for between 1 and 3 years considered emigration to further their education whereas those employed for more than 4 years upwards indicated they considered emigration because of the high crime rates in South Africa;
- of those that considered emigration both male and female respondents are most likely to emigrate to further their education
- of those that considered emigration African respondents considered emigration to further their education, Coloured respondents thought of emigration because of the high crime rates and the Asian group considered emigration to improve their quality of life;
- of those that considered emigration, most respondents are interested in emigration to further their education but those with in senior positions that hold doctoral degrees are interested in employment opportunities, better economic conditions, high crime rates and political issues.

Some exceptions, which do not follow the main trends to the findings are male respondents, respondents that hold a bachelor's degree and lower, respondents that were employed at the CSIR for less than 1 year and those that are employed at the CSIR for more than 5 years, respondents in the 31-35 age groups, respondents that are students, and senior people in the organisation indicate that moving from company to company will enhance their employability and increase career opportunities. Respondents in lower research positions and candidate researchers, African and coloured racial groups indicate that moving from company to company will enhance their employability and increase career opportunities.

In the findings male respondents feel that moving companies will provide them with greater opportunities. This may arguably be due to the fact that South African organisation are focusing on the employment of more females in the organisation in order to address equity issues. Male respondents may not be receiving the same career opportunities as they did in the past. People with lower qualifications may not have many opportunities at the CSIR as the CSIR is an organisation that focuses on people with high qualifications. People in the CSIR with higher qualifications may be recognized and given greater exposure and opportunity than their lower qualified counterparts. Those working for less than a year at the CSIR know less about the organisation and may be still adjusting to the organisation but those that have worked for more than 5 years at the CSIR and know about the organisation may have taken advantage of all the career opportunities that the CSIR has to offer and hence need further programmes engaging them to develop outside the CSIR environment.

Another exception to the findings is that female respondents, respondents with an Honours qualification, those respondents in the 36 and older age group and senior people in the organisation have considered emigration from South Africa. This finding suggests that the female respondents are arguably very willing to emigrate to expand their careers. The global workplaces have become more feminized. It may also suggest that females feel that they are less restricted from development by being outside their home country.

Respondents with honours degrees may also consider emigration to expand their career opportunities. Respondents 36 years and older may also be looking for better career prospects outside South Africa as they are not at a very popular age to be recruited in the South African labour market. Therefore they can access greater career opportunities abroad. Senior people in the organisation are always in high demand and may have considered emigration for better career prospects and also for further career advancements. These people are key to the organisation and it will be a great loss should the CSIR not be able to retain them. The CSIR should consider structured programmes that focus on the retention of these key individuals.

5.3.7 Solutions to Career Challenges

Table 5.3.8.1: Solutions to career challenges

Solutions to Challenges	Frequency
Encourage International Collaborations, Short Visits	4
Equality In The Workplace	4
Government Support For HBI	4
Reform Policies	4
Skills Development	4
Greater Recognition Of Capabilities And Challenges	5
Lucrative Financial Rewards And Remuneration	5
Career Opportunities Without Obstacles To Development Through Policies	6
Increase Funding Budgets, Access To Funding	12
Better Mentorship Through Focused Development Programme	16

A full list of the solutions to career challenges provided by respondents can be found in **Appendix E**.

Respondents were asked the following question to provide solutions to their career challenges.

Q34. Please provide a recommendation on how to best address your first and most important challenge as listed in Question 33.

Of the 64 respondents that answered this question, 16 suggested that better mentorship through focused development programmes would be a solution to career challenges at the CSIR. Proper mentorship programmes should be incorporated at all levels in the workplace on lateral and vertical levels. A vigorous mentoring system should be used to uplift the capacity of human capital in the organisation and provide further exposure and opportunities. Keith and Moore (1995:20) support that mentorship programmes are important for social support of career aspirations and the structuring of professional careers. The other finding was that increased access to funding grants and greater research funding budgets will also help to further expose respondents to greater career opportunities.

5.3.9 Cultural Aspects

One of the research findings that were strongly presented through the focus groups discussion is the notion of culture and the impact that cultural aspects had on previously disadvantaged science professionals.

Some of the comments related to cultural aspects that participants from the focus group discussion indicate are:

"The environment we grow up in influences our career choices. Educated families tend to educate their children into professional careers. They motivate you to study further. However it depends on your level of exposure, there are also differences between urban and rural exposure. Some people want to be involved in science. How you are orientated determines your career perceptions and intentions".

"People want a better quality life and this is also influenced by cultural issues. Career choices are influenced by social background and life context and also freedom to choose through your exposure".

"Some recruitment in certain programmes only target previously disadvantaged people and females. In certain cases we do however recruit none previously disadvantaged individuals. We need to still address these gaps. It becomes a greater cost to the organisation, no time for training although it is needed. Two different cultures, Ubutu culture- staying together, white culture- time is money, very competitive, result driven".

From the above findings it can be suggested that cultural aspects do influence our career choices and decisions. Choices are influenced by social background and life context as indicated by the participants. The cultural gaps at the CSIR still need to be addressed as one participant suggested. The existence of two different cultures in the workplace could mean huge challenges for the CSIR. These cultural polarities could mean that the work environment may not be suitable for the attraction, development and retention of previously disadvantaged individuals. The CSIR should consider addressing this challenge through the holding of cultural workshops and events such as family and heritage days. This will allow people of different backgrounds to engage with each other on a social level and develop better understanding and tolerance towards each other. Addressing the cultural challenges that exist in the CSIR may increase the productivity of the people in the organisation.

5. 4 Limitations of the Study

Every research study has specific limitations to the research that is conducted. This research study is no exception. The points listed below were some of the study limitations that need to be taken into consideration if further studies are conducted around the area of research.

- It was difficult to focus on a selected group of people (previously disadvantaged science research professionals) as the challenges experienced may also exist in those groups of individuals that were not studied.
- Although there is a high volume of literature around the research topic, no literature was found that focused on the total area of study before. Difference

studies focused on aspects thereof. Piecing the literature together to form an understanding thereof was a challenge.

- Access to data was also a challenge as the researcher had to sign an agreement with the CSIR that the findings of the research would not be used to harm them in anyway before the preliminary data could be released and the research could be conducted.
- The researcher's personal bias may have influenced the research having been employed by the CSIR's human resource department. This may also have a benefit as the researcher had prior understanding of the research environment.
- Data collection through the cross-sectional online survey was not. A large study population was targeted for the research study but there was no way of tracking those people that did not response to the survey given that the responses were anonymous. A tracking token should have been linked to the online survey. This would have helped increase the response rate on the online survey.
- Dominant participants in the focus group discussion influenced the direction of the discussion and some participants may have provided socially accepted responses may have influenced the data.
- Statistical data sets were in some cases too low on responses and needed to be collapsed for better data analysis as was in the case of the age category.
- Statistical data analysis was also expensive as a statistical consultant was used,
- The coding and interpretation of the qualitative data was a very time consuming process.
- Given that the study was a case study of a science organisation it can not merely be generalized

In conclusion, the research results from the survey and focus group discussion are presented, analyzed and interpreted to address the answers to the research questions of the study. Important findings were noted in the chapter and chi square tests were used to determine significance findings. The analysis of the qualitative data was done through using coding and interpretive analysis looking for trends. The interpretation of the research findings was accomplished by comparing the research findings to the theory and

the literature reviewed in previous chapters. The chapter also outlined the study limitations that should be taken into consideration should further research be undertaken.

CHAPTER SIX

Recommendations and Conclusions

This chapter provides a summary of the research objectives, chapters and key findings in this research study. The chapter also consists of recommendations around each of the research themes and suggestions for further research.

The research questions that focus the aims and objectives of the research study are:

e) What are the career perceptions of previously disadvantaged CSIR research professionals?
f) What are the factors that contribute to the attraction of previously disadvantaged CSIR research professionals?
g) What are the major challenges or problems that previously disadvantaged CSIR research professionals face?
h) What are the factors that contribute to the retention of previously disadvantaged CSIR research professionals

6.1 Summary of Chapters

One of the major challenges for South African workplaces has been the need to attract, develop and retain previously disadvantage individuals with the appropriate skills. The introductory chapter focuses on this problem and the importance of attraction, development and retention of previously disadvantaged science research professionals. The study took a closer look at a pure science workplace and career issues of previously disadvantaged science research professionals at the CSIR. The first chapter provides background information and contextualized the study in the South African context. It explains government acknowledgement of the skills shortage and how they plan to treat the problem as a critical issue. The human capacity developments of previously disadvantaged people are critical to the development of the South African economy as

they will stimulate the knowledge base of the country. The study places focus on career perceptions, challenges and the needs of previously disadvantaged science research professionals and the factors that contribute to their attraction and retention.

The second chapter focuses on the research concepts and theoretical assumptions. An understanding of the research concepts and theoretical assumptions helps one understand how people make career choices and decisions. The theoretical assumption of Giddens's work is used and the theoretical sociological literature around careers is presented. This explains how people derive meanings for themselves around their lives and their respective vocations through dominant values or perceptions within structured social institutions. This helps to understand what keeps people in organisations and what makes them leave organisations.

The literature review forms the third chapter and presents the literature from an international and South African context around career professionals in the science sector. The global demand for SET knowledge workers is highlighted in this chapter. These people have high career mobility and developing countries have to compete with developed countries for these limited human resources. Some of the major challenges in the South Africa context is the schooling systems and limited access to funding and support for higher education (Phugula: 2004:41-42). Race and gender inequalities continue to exist in the South African science sector even though policies and legislation that focus on transformation of the workplace have been put in place.

The research methodology used was a multi-methodological approach using both qualitative and quantitative data analysis methods. The rationale for using both methods is to benefit from the advantages of each method. The data collection, sampling method, methods of data analysis and interpretation of the data is discussed in the fourth chapter. A focus group discussion was held with CSIR human resource representatives to establish their views, comments, opinions around attraction and retention strategies at the CSIR. An online survey with CSIR previously disadvantaged individuals was carried out to establish their views, attitudes and opinions around their career perceptions, factors of

attraction and retention and their career challenges. Chapter four also provides background information on the CSIR environment and relevant policies, documents and strategies around human capital development and attraction and retention of their staff.

The fifth chapter presents the analysis and interpretation of the research findings. The data was obtained from the cross- sectional online survey and the focus group discussion. The data was analyzed and interpretation by making use of the literature reviewed, the sociological, methodological and theoretical tools set out in the previous chapters of the study. The limitations of the study were also presented in the fifth chapter.

Chapter six is the concluding chapter of the dissertation, it sets out the conclusion of the study, provides a summary of the major research findings and provides recommendations for further research in the study area.

6.2 Research Findings and Recommendations

The study population consisted of 605 potential respondents, 101 individuals responded to and completed the online survey. This return rate was a significant enough portion to perform the analysis on the information collected. However, the response rate could also indicate that CSIR previously disadvantaged individual lead very busy careers and lifestyles and have not given much thought to their career issues. It is recommended that the above be addressed by encouraging more debate and awareness around career issues with previously disadvantaged science professionals at the CSIR. This is important to stimulate their career interests and help them to remain more committed to science careers.

Overall demographic findings:

- most people that responded had been working between 1 and 3 years;
- most respondents were males respondents;

- most respondents were those between the age group of 26-35 years reflecting that younger people at the CSIR showed more interest in career issues than did the older people;
- African people responded more than coloured and Indian people;
- most respondents were those that held Masters degrees;
- most respondents were those in candidate researcher/ researcher level;
- the low response rate for those in senior positions at the CSIR, could suggest their interest in staffing and career issues.

The research findings were grouped into six research themes: career perceptions, career opportunities, career challenges and solutions, attraction factors, retention factors and organisational commitment and satisfaction to derive more information and understanding from each of the questions that were asked. Frequency analysis, cross tabulations and chi square tests were carried out on the quantitative data and content analysis was carried out on the qualitative data from the focus group discussion.

6.2.1 Research Findings and Recommendations around Career Perceptions

From the responses received from participants and respondents around their career perceptions of previously disadvantaged science research professionals it can be suggested that a research career is an important career in South Africa. Despite the career challenges that exist most respondents will still choose a science career for themselves. They are also aware of the skills shortages of previously disadvantaged individuals in the science sector. Respondents tend to not be influenced through career socialization and gender difference into career choices and decisions as indicated by the literature. They hold the perception that the South African government does not invest adequately in funding opportunities for them to advance in their careers. There is a gap between the perceptions of the older and senior respondents and the younger and less senior respondents.

Given the research findings around the career perceptions of previously disadvantaged individuals it can be recommended that science research professionals should be more valued in South Africa then they are as they are aware of the importance of being in a science career. If a research career is given more recognition and exposure more people will be willing to engage in such careers, helping to increase the pool of available science research professionals and addressing the skills shortage in the science sector. Respondents indicated that they tend to not socialize with people with similar careers as themselves and not be seeking status from their career choices. The CSIR should structure programmes that encourage career integration and exposure to multi-disciplinary research in their laboratories. The South African government should consider increasing funding support for previously disadvantaged science professionals to advance in their careers, current funding levels are too limited to support those in need of support. The skills shortages in the science sector needs to be addressed through the development of a pipeline of skilled research professionals to be available for science workplaces to access.

The CSIR should focus on igniting the passion within their previously disadvantaged research professionals as despite the challenges they face in a science career they will still choose to be doing research. There seems to be major changes taking in relations to the impact gender difference has on career choices and decisions in contemporary society as more woman enter science careers, however the CSIR should ensure that their woman science professionals get exposure to grow and move to higher positions in the organisation. An in-depth sociological study around the influence of gender in science professions should be carried out to investigate this further as the research findings contradict the literature around the influence of gender on career choices and decisions. The CSIR should have targeted more intensive formal and informal mentoring programmes to help close the generation gap that exists between the older and senior respondents and the younger and less senior respondents.

6.2.2 Research Findings and Recommendations around Career Opportunities

From the research findings around career opportunities for previously disadvantaged science research professionals it was suggested that most of the respondents do not belong to professional associations, however there is a significant relationship between age and belonging to a professional association. Most respondents indicated that the CSIR provided reasonably adequate career advice and development opportunity to assist them in advancing their careers although the Asian group of respondents indicated that the CSIR did not provide adequate career advice and opportunities for them.

Given the above research findings it can be suggested that the CSIR should encourage their staff to belong to professional associations and the benefits that professional association can have on careers, career development and career opportunities. They should continue providing adequate career support and advice to help previously disadvantaged science research professionals to advance in their career. They should consider initiatives that encourage the younger, less experienced people that are in lower positions at the CSIR to join professional associations since belonging to a professional association is associated with the age groups at the CSIR. Targeted programmes and workshops that focus on the groups that feel they are not getting enough career advice and opportunities at the CSIR. By encouragement of professional socialisation within and across science related fields of study, this will provide greater career opportunities through innovation of science and technology.

6.2.3 Research Findings and Recommendations around Career Challenges and Solutions

The research findings around the career challenges and solutions are that most respondents indicate low consideration, recognition; career advancement and growth opportunities are a serious career challenge. Better salaries and career prospects exist

outside the CSIR. Respondents indicated that one of the solutions to the career challenges is that better mentorship programmes are needed through focused development on individuals and their needs.

Given the above research findings it can be recommended that the CSIR should consider giving more attention to their previously disadvantaged research professionals though reward and recognition programmes that are linked to career advancement and growth opportunities**.** They should also consider revising their remuneration packages to make it above market related packages in order to attract the necessary skills and human resources**.** A strong retention strategy focusing on addressing some of the key career challenges would also help to not only attract but also retain previously disadvantaged science professionals in the CSIR.

6.2.4 Research Findings and Recommendations on Attraction and Retention Factors

From the research findings around the attraction and retention factors for previously disadvantaged science research professionals it was suggested that one of the major attraction factors at the CSIR is career opportunities. Previously disadvantaged individuals are attracted to the CSIR as they get exposure to leading scientific research. Most respondents indicated that the main reason keeping them in a professional science career was due to the good career prospects and job satisfaction however coloured and Asian respondents were more interested in work security and job satisfaction. Those respondents that have been at the CSIR for a shorter period of time were interested in career prospects and respondents that have been at the CSIR for a long period of time are more interested in job satisfaction **.** Respondents with lower qualifications seem to be more interested in good career prospects and those with higher qualifications seem to be more interested in greater job satisfaction. A greater number of respondents will consider leaving a science career for a better financial package and better nonetheless career prospect and the majority have been already contacted by recruitment agency over the past year**.**

Given the research findings around the attraction and retention factors of previously disadvantaged individuals it can be recommended that the CSIR should consider that career opportunities, job satisfaction and good career prospects are their strengths when it comes to attraction and retention of human capital. Other factors that could also assist in the attraction and retention of human capacity are improved remuneration, better fringe benefits, work security, and better career opportunities for existing staff. Attention to these retention factors will assist in retaining previously disadvantaged science research professionals whom are highly sort after each year. The CSIR should use these attraction and retention factors in building up an attraction and retention strategy which currently does not exist at the CSIR. The strategy should form an integral part of the human resource development policy and plans at the CSIR. There is also the need to have a balance between the attraction and the retention of staff, strong focus on attraction factors may cause a weak retention of staff or visa versa.

6. 2 .5 Research Findings and Recommendations around Organisational Commitment and Satisfaction

From the research findings around organisational commitment and satisfaction it can be suggested that the majority of respondents feel that the CSIR is a good environment to explore their career aspirations. There is a significant relationship between gender and the opinions of respondents around, if the CSIR is a good environment to explore your career aspirations. Although most respondents are hold average satisfaction levels of the CSIR as a workplace they suggest that there is no transparency around the career ladder process and they feel that they are not fairly measured on the ladder. The relationship between race and the opinions of respondents around the career ladder being transparent and fair is approaching significance. Those respondents in lower positions indicate that the CSIR is not concerned about their career needs.

From the research findings around organisational commitment and satisfaction it can be suggested that consideration needs to be given to the revision of the career ladder to make

it more transparent and fair. The revision of the career ladder should also address issues of career opportunities, remuneration issues, advancement and satisfaction. The CSIR should increase the level of job satisfaction and optimized existing talent within the organisation. They should also try to increase the level of acknowledgement for the work people do in the organisation. Levels of equality in the workplace need to be addressed through interventions and structured policies. The CSIR needs to also focus on increasing their concern about career needs of people in lower positions in the organisation.

6.2.6 Research Findings and Recommendations around Career Mobility

The research findings around career mobility indicate that respondents feel that their generic knowledge and skills can be easily transferred from one type of organisation to another type of organisation. The majority of respondents indicate that moving from company to company will not enhance their employability and increase their career opportunities. Although most respondents did not seriously consider emigrating from South Africa those that did think of emigration would emigrate to further their education or for career opportunities. Those in junior positions and more female respondents considered emigration from South Africa.

From the above research findings it can be recommended that the awareness of their generic skills can cause respondents to easily move from one organisation to another, with strong retention strategies the CSIR will be able to stop these individuals from leaving the organisation. The value of loyalty to one's career and workplace should be clear to these science research professionals to encourage them to stay for long periods in science careers rather than changing organisations and career paths. The CSIR should take into consideration the needs of previously disadvantaged science research professionals by making the work environment more favourable to their career needs, this will assist in helping them remain committed to South Africa and South African organisation. The CSIR should also consider providing courses in the workplace that specialize in their research fields as this will help to not only retain but also to advance

the careers of previously disadvantaged individuals. High crime rates was the second reason why people would most consider emigration, this is a serious societal problem in South Africa that should be addressed by stronger government strategies. The CSIR should focus on programmes for their female previously disadvantaged employees as they feel that emigration will provide them with better opportunities. The CSIR should increase the levels of career exposure and opportunities for these female employees.

6.2.7 Research findings and Recommendations on Cultural Aspects

From the research findings on the cultural aspects of careers it can be determined that cultural aspects do influence career choices and decisions. The social context and background that people grow up in influences to some extent the career choices and decisions that are made. There is a cultural gap that exists at the CSIR that needs to be addressed. Two different cultures in the workplace could be a serious challenge for the CSIR. These cultural differences could mean that the work environment may not be suitable for the attraction, development and retention of previously disadvantaged individuals. The CSIR should consider addressing this challenge through cultural workshop. This will allow people of different backgrounds to engage with each other on a social level and develop better understanding and tolerance towards each others cultures. Addressing the cultural challenges that exist in the CSIR may increase the productivity of the people in the organisation.

6.3 Suggestions on Further Research

It can be recommended that a more detailed study be conducted around the career perceptions of science research professionals in general at the CSIR rather than focusing on a particular group of people it should focus on all race groupings to see if the career challenges are experienced by all science professionals at the CSIR. The research topic is an important topic and very little work has been done on the topic as limited sociological literature can be found around the topic. Another suggestion is that a sociological inquiry

into gender influence on career choices in specific industries or sectors should be carried out. Further research into cultural career aspects, career opportunities, attraction and retention policies, organisational commitment and satisfaction factors, career mobility, labour market inequalities, career decision models, research around cross institutional career paths can be conducted in this study field.

In conclusion this chapter provided a summary of the chapters that constitute this research thesis, it summaries the key research findings and recommendations for each research question by addressing the research themes in the study. The chapter also suggests ideas around further research that can be undertaken around this research topic.

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Appendices

Appendix A: Focus Group Discussion Questions

Q1: What are the characteristics of a research professional at the CSIR/ What do you look for when recruiting people?

Q2: Are career decisions made through social orientation at the CSIR, in your opinion?

Q3: Career orientation and networking in the workplace

Q4: Associations and memberships

Q5: Are career ladders valuable or hurdles for career development at the CSIR?

Q6: Are there challenges related to the career ladder?

Q7: Do females take up different careers or professions in the sector?

Q8: South African Brain drain? There are debates around the brain drain and skills crisis and the need for high skilled people. Do we have a skills crisis in the science sector? Is this a reality at the CSIR?

Q9: Attraction and Retention, professional people are moving to developed countries. Is it important to retain previously disadvantaged science research professional?

Q10: Is recognition important in the CSIR?

Q11: Do professionals adopt certain values and norms related to their profession?

Q12: Career development and initiatives at the CSIR. Does the career ladder successfully address career development and needs of employees in your Business units?

Q13: Is the necessary and adequate career opportunity created for employees to advance within the CSIR environment?

Q14: Does the CSIR provide a nurturing environment for researchers to develop?

Q15: What does the CSIR do to attract and retain essential previously disadvantaged research professionals?

Q16: Impact of globalisation on CSIR employees, what is the impact?

Q17: Employment relationship has it changed over the last few years especially in the CSIR with the beyond 60 process, has things changed for the better?

Q18: Targeted programmes for development of previously disadvantaged individuals, is there an interest in the CSIR?

Q19: Exit interviews, what is the main reason for people leaving organisation.

Q20: Initiatives that government can take to further develop South African previously disadvantage professionals.

Q21: Any further comments, suggestions, ideas, shared experiences related to the topic?

Appendix B: Cross- Sectional Online Survey

Survey on the Attraction and Retention of Previously Disadvantaged South African Research Science Research Professionals at the CSIR

This survey is about the attraction and retention of previously disadvantaged South African science research professionals at the CSIR. It is an independent research study towards my master's degree based at the University of Pretoria in the Department of Sociology. The survey is strictly confidential and no names of respondents will be used in the research report to ensure respondent confidentiality. Should any of your narrative be used, you will be referred to under a pseudonym.

We are going to ask questions about your career and talent management strategies at the CSIR.

The purpose of this survey is to investigate your career needs and to find out if the organisation is addressing your career aspirations. Your participation in completing the survey will make a contribution towards understanding the career aspirations of previously disadvantaged South African research professionals in science organisations.

When you complete the survey, it is important that you answer all questions. However should there be a question you cannot answer, just skip it and go on to the next one.

It should take you about 30 minutes to complete the survey.

Thank you for your participation.

Filling in the survey is voluntary and should you wish to withdraw at any point, you are free to do so.

Thashni Maistry

Instructions:
Please mark your answers with an X in the appropriate block provided.

Section A: Demographical Information

Q1. How long have you worked at the CSIR?

a. Less than 1 year……..... | |
b. 1 to 3 years……..…….. | |
c. More than 3 to 5 years……..... | |
d. More than 5 years...……..... | |

Q2. What is your gender?

a. Male ……..……. | |
b. Female…… | |

Q3. What is your current age?

a. 18-25……. | |
b. 26-30……. | |
c. 31-35……..……. | |
d. 36- 40……..……..……. | |
e. 41 and older……..……. | |

Q4. What is your race group that is in terms of the Apartheid Population?

Registration Act No. 30 of 1950?

a. Black…….. | |
b. Coloured…… | |
c. Indian/ Asian……..... | |

Q5. Which one of the following would you most use to describe yourself?

a. Black……..... ☐
b. Asian/ Indian……. ☐
c. Coloured …… ☐
d. African……... ☐
e. South African……. ☐

Q6. What is your highest qualification?

a. National Diploma……. ☐
b. Bachelor's Degree… ……. ☐
c. Honours Degree…….. ☐
d. Masters Degree……..…….. ☐
e. Doctoral Degree…….. ☐
f. Other (please specify in the space provided)…….. ☐

Other:…….

Q7. Level of seniority

a. Student……. ☐
b. Candidate Researcher/ Researcher……..……. ☐
c. Senior/ Principal Researcher…… ☐
d. Management/ Research Group Leader……. ☐
e. Executive…….. ☐
f. Other (please specify in the space provided) …… ☐

Other: …….

Section B: Career- Related Questions

Q8. Do you feel that a career as a research science professional is an important career in South Africa?

a. Yes…….. ☐

b. No…..……. ☐

Q9. When you introduce yourself to someone for the first time, do you mention the type of work you do?

a. Yes……. ☐

b. No……... ☐

Q10. Do you prefer to be in the company of people who have a similar career to you or with people who have a different career?

a. Same…….. ☐

b. Different.....……. ☐

c. Both…..…….. ☐

Q11. Do you belong to a professional science association?

a. Yes…… ☐

b. No…..……. ☐

Q12. Do you think that South Africa adequately invests in bursaries for professional science researchers towards further studies?

a. Yes……..…….. ☐

b. No…… ☐

c. Do not know…..…… ☐

Section C: Talent Management (Attraction and Retention)

Q13. Do you think that South Africa has a shortage of previously disadvantaged research science professionals in the science sector?

a. Yes…… ☐
b. No…… ☐
c. Do not know…… ☐

Q14. Which one of the following factors most attracted and influenced you to join the CSIR? (Please *select only one option* from the list below)

a. Salary package…….. ☐
b. Career development opportunities…….... ☐
c. Good working environment with co-workers and supervisor……. ☐
d. Flexible working hours…… ☐
e. Other (please specify in the space provided)…….. ☐

Other:……..

Q15. Do you think the CSIR provides adequate career advice and development opportunities so as to assist you in advancing your personal career?

a. Yes…….. ☐
b. No…… ☐

Q16. In your opinion, is the CSIR a good environment to explore your career aspirations?

a. Yes …..…… ☐
b. No…… ☐

Q17. Do you believe that the CSIR career ladder displays a transparent process in which you are fairly measured?

a. Yes…….. ☐
b. No…… ☐

Instructions for Q18 & 19:
Please *select only one option* from the list below.

Q18. Which is the main reason keeping you in a professional science career?

a. Good financial package…….. ☐
b. Good fringe benefits…….. ☐
c. Good career prospects……. ☐
d. Work security…….. ☐
e. Job satisfaction…….. ☐
f. Flexible working hours…….. ☐
g. Fewer working hour than the normal…..……..……... ☐
h. A good work location…..…….. ☐

Q19. If you are considering leaving your current career, which of the following is the main reasons that will make you leave?

a. Better financial package……. ☐
b. Better fringe benefits..…….... ☐
c. Better career prospects……..…….... ☐
d. Greater work security……. ☐
e. Better position…….... ☐
f. Job satisfaction…….. ☐
g. Flexible working hours……. ☐
h. Fewer working hours than at present……..……. ☐
i. Better work location……..…….…….. ☐

Instructions:
Please mark your answers with an X in the appropriate block provided.

Q20. If you had to choose a career for yourself today, would your choice still be in the science sector?

a. Yes…… ☐
b. No…….. ☐

Q21. In you opinion, did your gender influence the type of career choice you made?

a. Yes…… ☐
b. No……. ☐

Q22. Do you think that your generic knowledge and skills can be directly transferred from one type of organisation to another type of organisation?

a. Yes…… ☐
b. No…….. ☐

Q23. On a scale of 1-5 (1 being the lowest and 5 being the highest), how satisfied are you in your current organisation?

1	2	3	4	5

Q24. Have you been contacted by a recruitment company or personnel search agency with regard to another job opportunity over the past year?

a. Yes……

b. No……..

Q25. Many people feel that moving from company to company, enhances their employability and increases the opportunity to further their careers. Do you agree?

a. Yes……..

b. No……

Q26. I feel that I get enough recognition and acknowledgement for the work I do at the CSIR.

Strongly agree	Agree	Disagree	Strongly disagree

Q27. The CSIR is concerned about the career needs of their employees.

Strongly agree	Agree	Disagree	Strongly disagree

Q28. Where I work, all employees are treated fairly and equally in relation to career opportunities.

Strongly agree	Agree	Disagree	Strongly disagree

Q29. Many people feel that it is bad to remain in the same job for more than 2 years. Does this apply to the science sector?

a. Yes…… ☐
b. No……. ☐

Q30. I feel that I am earning a market related salary based on my experience, commitment and qualifications.

a. Yes……. ☐
b. No……...…… ☐

Q31. Have you ever thought of emigrating from South Africa?

a. Yes……..……. ☐
b. No……...…….. ☐

Q32. If your answer to Q31 is yes, what is the main reason for thinking this? (Please *select only one option* from the list below).

a. To further my education…… ☐
b. Because of better economic conditions……. ☐
c. Improved quality of life……..…… ☐
d. High crime rates…….. ☐
e. Lack of service delivery……. ☐
f. Racism…… ☐
g. Political issues…… ☐
h. The general deterioration of infrastructure……..……... ☐
i. The lack of employment opportunities…..……. ☐
j. Other (please specify in the space provided)…….. ☐

Q33. What are the 3 major challenges that you as a previously disadvantaged South African research science professional face in your career? (*Please answer in the space provided below. Indicate the most important challenge as 1, and the least important challenge as 3*)

1……..

2……..

3……..

Q34. Please provide a recommendation on how to best address your first and most important challenge you listed in Q33.

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Q35. Are there any further comments or suggestions around the research study that you would like to include? Please do so in the space provided below.

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Thank you for taking the time to complete the survey. Your effort is most appreciated.

Thashni Maistry

Appendix C: List of major career challenges

Q33: Major Challenges	Frequency
Employee Well Being	1
Having Person Less Qualified Review Work And Career Ladder	1
Professional Network	1
Role Models	1
Short Time Frames For Development	1
Working In An Environment Were Most Black People Are Cleaners And Gardeners	1
Age	1
Background Not Sufficient To Meet Requirements	1
Contractors Based At CSIR Used To Blanket Equity Figures Or Lack Thereof	1
Deciding On Career Choices	1
Inflexible Research Direction	1
Lack Of Growth Opportunities	1
Lack Of Job Satisfaction	1
Management Positions Still Held By Whites	1
Managers No Not Do Their Best To Retain PDI	1
Poor Leadership In Workplace	1
Transportation Problems	1
Work Overload	1
Adapt To New Environments	2
Allocation Of Resources	2
Educational Support	2
Financial Pressure	2
Lack Of Management Support	2
Lack Of Transformation And Knowledge Transfer	2
Managing A Career And Household	2
Micromanagement	2
Nepotism	2
Gender Inequality, Male Dominated Profession	3
Project Management	3
Acceptance In Journal Publishing World	3
Career Development Ladder Inconsistencies	3
Connect With Different Cultures And Cultural Differences	3
Challenging R &D Projects And Marginalization	4
Favouritism	4
Job Security	4
Affirmative Action, Fill Quotas	5
Lack Of Recognition Of Qualifications From Black Institutions	5

Lack Of Training	6
Making A Impact In Field Of Study- Nationally And Internationally	7
Language Barrier	8
Access To Funding	10
Lack Of Mentorship And Support	15
Poor Remuneration	15
Prejudice, Racism, Victimization	15
Career Advancement And Growth Opportunities	29
Low Consideration And Recognition	43

Appendix D: List of additional information and comments

Q35: Additional Information and Comments	Frequency
Changing Jobs Not For Salary Increases But Because Underestimated	1
Gap In Research, Experienced Overworked And Inexperienced Not Much To Do	1
International Studies To Further Develop	1
Many Old People Make Up The Culture Of The CSIR, Not Many Young People	1
CSIR Does Prove A Nurturing Environment To Develop Skills For Experienced Researchers	1
CSIR Focus On Recruitment Of People They Do Not Have Rather Than Focusing On Those People They Do Have. Isolation Of Current Employees, Attraction And Retention At The CSIR Is Therefore Not Clear.	1
CSIR Losing Staff To These Companies Even After Training Them	1
Encourage Cultural Fairness And Diversity In The Workplace	1
Engagement In Real Impact Projects And Not Just Report Writing	1
Good Skills Development At The CSIR, Not Accessible To Everyone	1
Huge Salaries To Retain But PDI Are Highly Sought After	1
Improve Quality Of Life	1
Interest In Development Rather Than Bigger Salary Leading To People Leaving Organisation	1
Low Job Satisfaction Leads To People Leaving As Technologies Developed Sits On CSIR Shelves	1
No CSIR Retention Plan, Do Not Encourage And Support Ideas Of Research Towards Commercialization	1
PDI Do Not Feel Part Of The Organisation Culture	1
Professional Development Works On A Self Development Basis At The CSIR, Difficult When You Have Little To No Experience	1
Provide Resources To Rural Communities To Involve Them In Science Fields Of Study	1
Rather Focus On Attraction And Retention Of Talented People	1
Remuneration Policies Need To Be Improved And Transparent	1
Research Groups Should Have Both A Non Scientific Manager And A Scientific Manager Not The Case In The CSIR Which Makes Project Management	1
Strengthen The Education Systems To Produce Better Scientists	1
Transformation Agenda In Certain Areas Of The CSIR Is Lacking	1
Transparent And Fairness Across All Levels	1
We Focus On The Problems And Highlight To Problems Rather Than The Solutions To The Problems	1
Failure To Redress Will Lead To Greater Issues	2
Funding To Carry Of Research Not Managed In A Good Business Fashion At The CSIR	2
Lack Of Recognition	2
Unequal Pay For Different Race Groups Problem, Retention Will Remain A Problem	2
Huge Socio-Economic Pressures On PDI	3
International Training For Specialized Fields Of Science Not Available In South Africa	3
Targeted Programmes Towards Development And Exposure To SET	4
Better Mentorship And Role Models For PDI	4
Mentorship By People Who Lack Academic Reputation, Projects Give To Those That Know	4

Projects should be given to those that know how to "work" the system those that know how to play the system	4
Career Growth Linked To Access To Funding	5
Higher Salaries And Better Career Prospects Outside CSIR Cannot Compete And Therefore Cannot Retain	6

Appendix E: List of solutions to career challenges

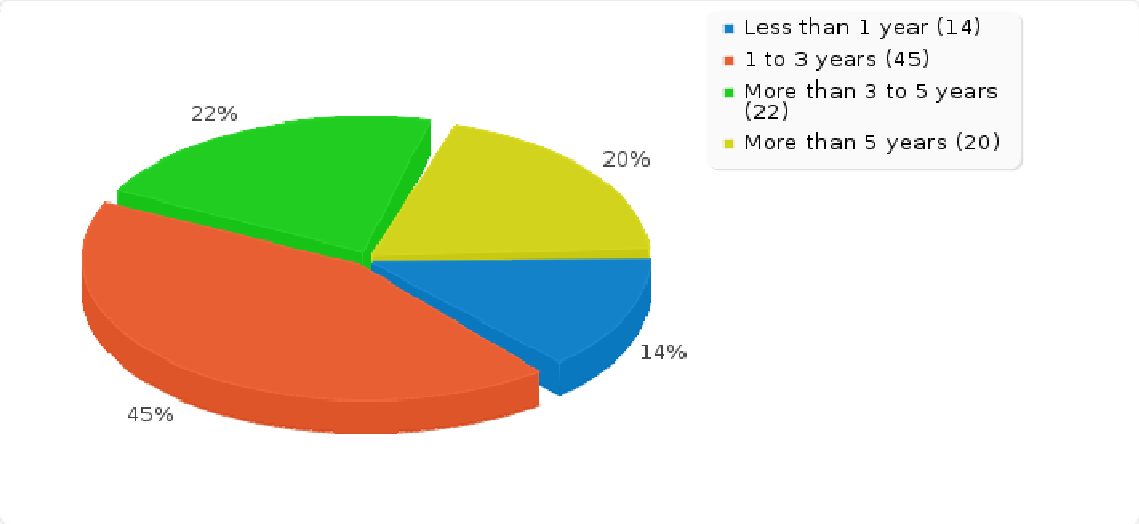
Q34: Solution to career challenges	Frequency
BEE Gives The Impression That PDI Are Appointed For Quota Reasons And Not Because Of Their Competency	1
Build Confidence And Be Inquisitive About The Research	1
Change Management With Priorities Recruitment	1
Create Enabling Environment For Researchers To Return To After A Break From Science	1
Detailed Audit Of Employ Satisfaction In The CSIR	1
Encourage Teamwork Not Evident At CSIR	1
Equal Access To Research Resources	1
External Auditor For Career And Remuneration	1
Fair Measurement Of Performance	1
Flexible Working Hours Or Environment	1
Government Monitoring	1
Improve Motivation And Communication In The Workplace	1
Legislation Sometimes Restricts Progress In The Workplace Rather Than Helping With The Problems	1
More New And Exciting Projects And Ways Of Doing Research	1
Need Better Managers	1
Promote From Within The Organisation Rather Than Looking Outwards	1
Proper HR Policy Changes Need To Be Strictly Adhered To	1
Review Salary Structures To Link Into Other Good Initiatives At The CSIR To Retain People	1
Science Workshops, Schools With National Geographic And Discovery Exposure Of Children To Science	1
Support Transformation Agenda	1
Work On Research That Has An Impact To Society	1
Expand Research Into The Rural Areas Of South Africa	2
Improve Educational Structures	2
Increase Academic Qualifications	2
Supportive Environment	2
Allow People Autonomy And Not Micro Manage	2
Career Ladder Transparency And Improvement	2
Collaborate With Other PDI That Can Act As Role Models	2
Cultural Tolerance	2
Encourage Discussion Around Research Topic	2
Match People To The Job	2
More Specialized Courses At Universities	2
Overcome Unconscious Racism In The Workplace, Actual And Perceived Racism	2
Reward Mentors To Encourage Them To Mentor Young Researchers	2
Better Career Planning And Monitoring	3
Address Language And Academic Writing Issues	3

Changing Mindsets	3
Increase Training	3
Re-Evaluate The Problems With The CSIR Career Ladder	3
Better Fringe Benefits	4
Encourage International Collaborations, Short Visits	4
Equality In The Workplace	4
Government Support For HBI	4
Reform Policies	4
Skills Development	4
Greater Recognition Of Capabilities And Challenges	5
Lucrative Financial Rewards And Remuneration	5
Career Opportunities Without Obstacles To Development Through Policies	6
Increase Funding Budgets, Access To Funding	12
Better Mentorship Through Focused Development Programme	16

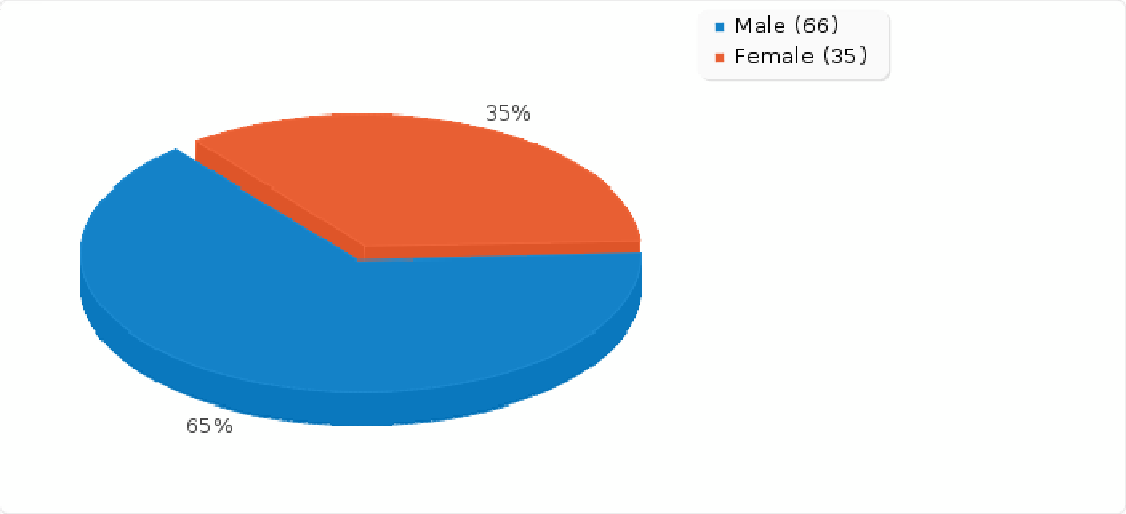
Appendix F: Graphical representation of data corresponding to the Tables

5.2.1 Profile of the sample

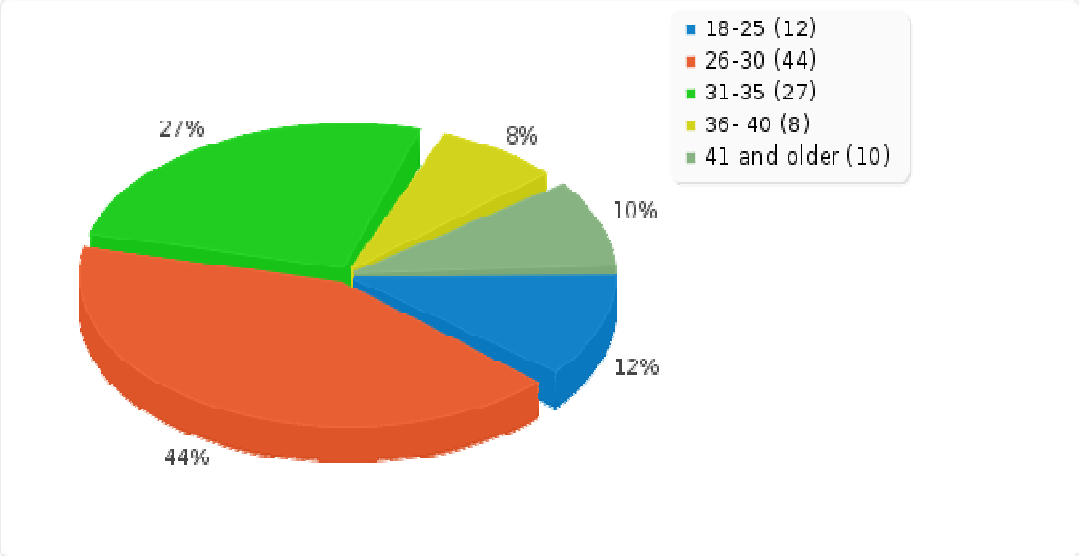
Graph 5.2.1: Employment profile



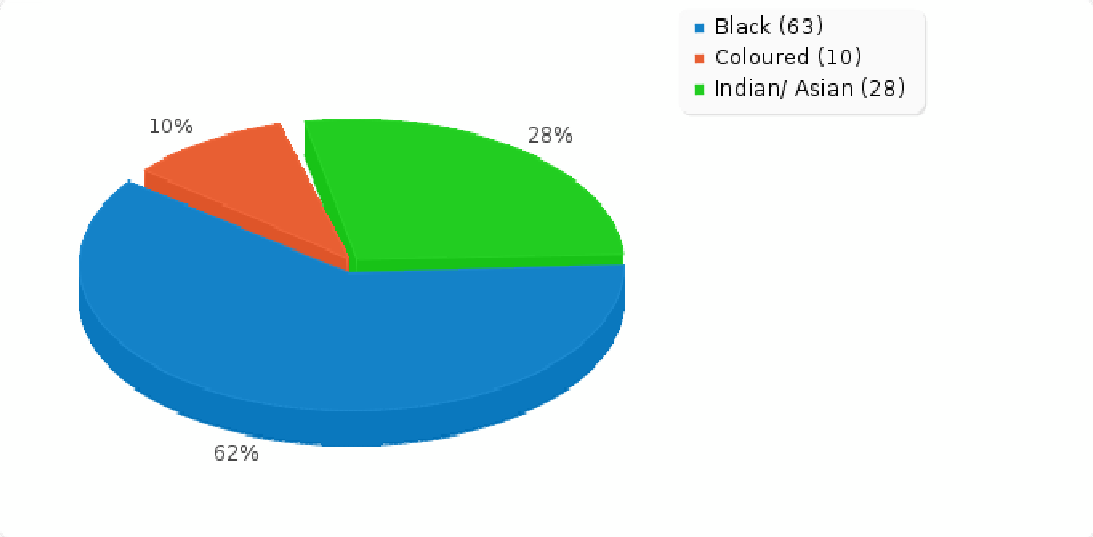
Graph 5.2.2: Gender profile



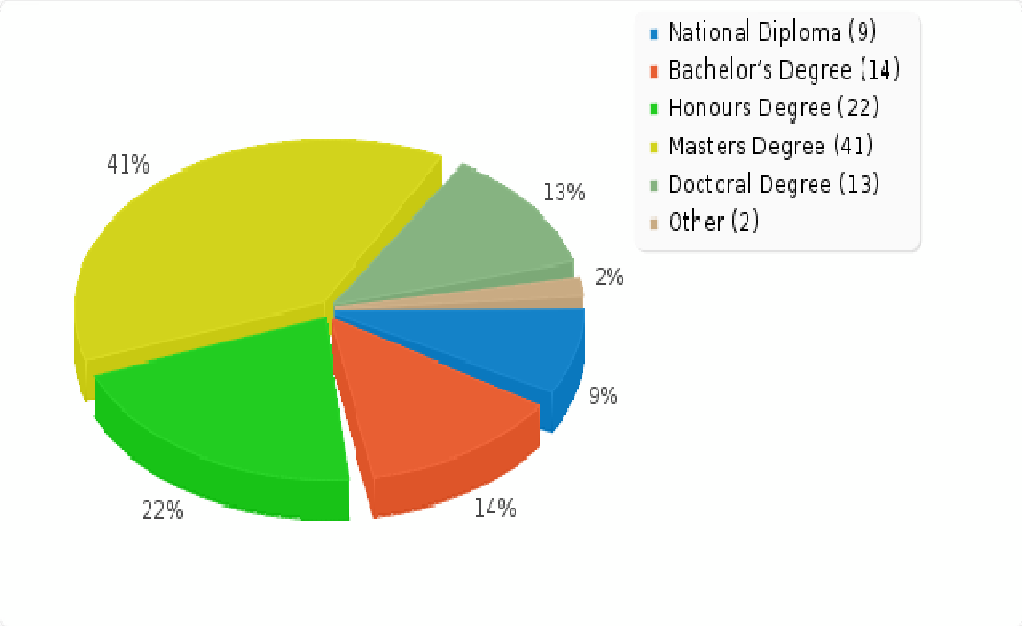
Graph 5.2.3: of Age profile



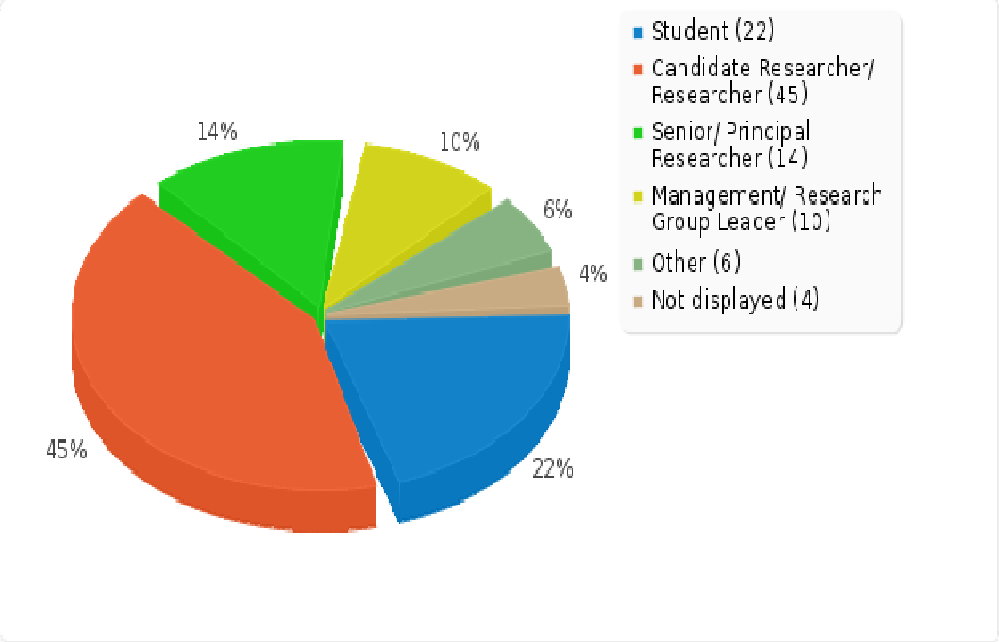
Graph 5.2.4: Race profile



Graph 5.2.5: Qualification profile



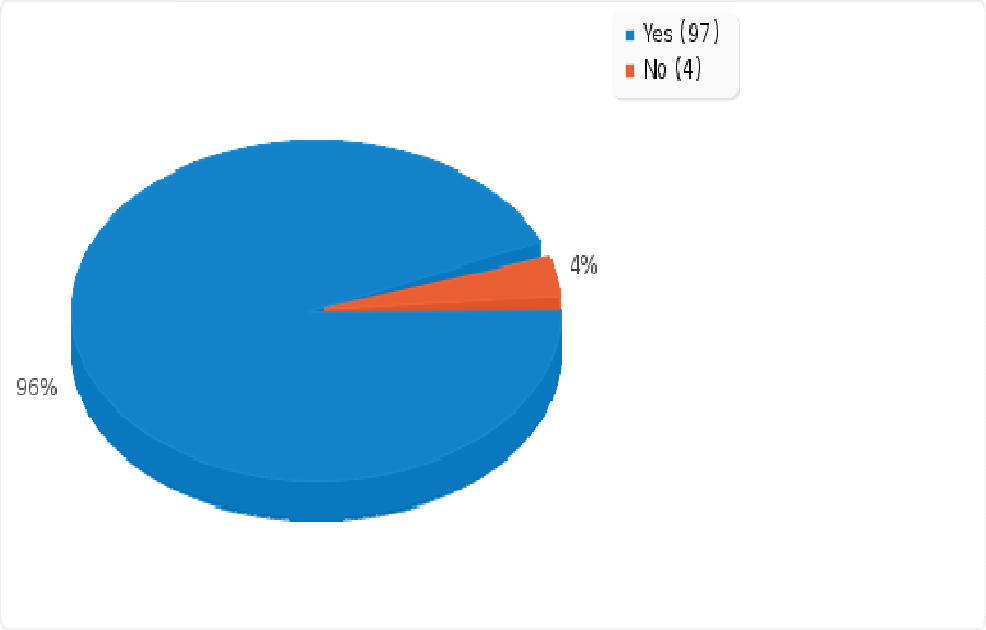
Graph 5.2.6: Level of Seniority



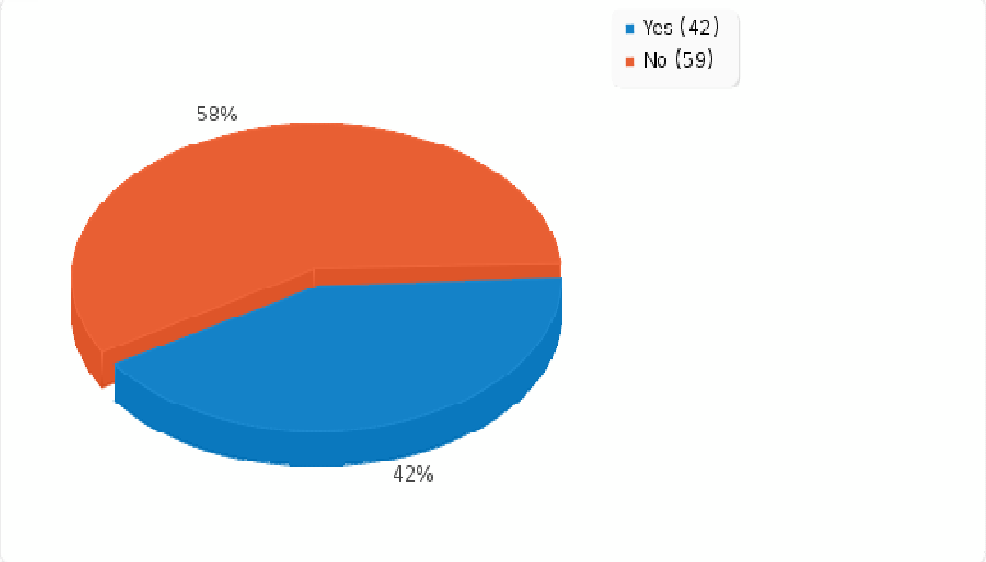
5.3 Research results from the cross- sectional online survey

5.3.1 Career Perceptions

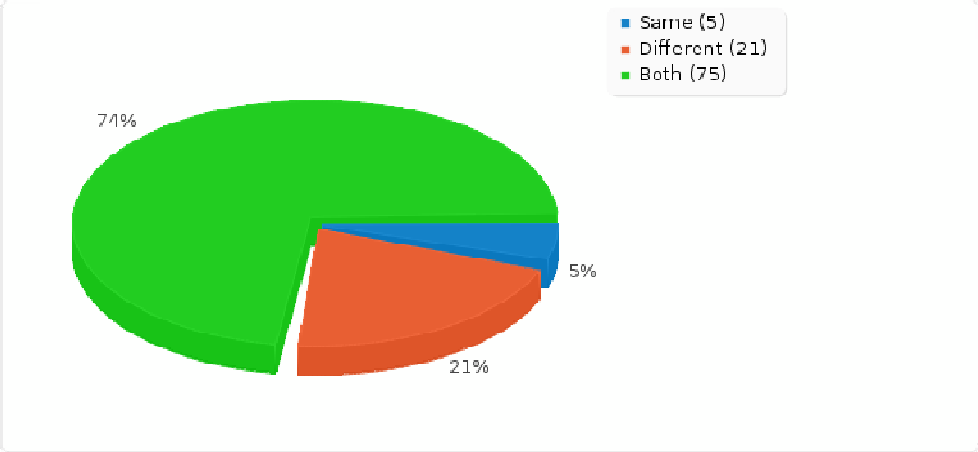
Graph 5.3.1.1: Importance of a career as a science professional



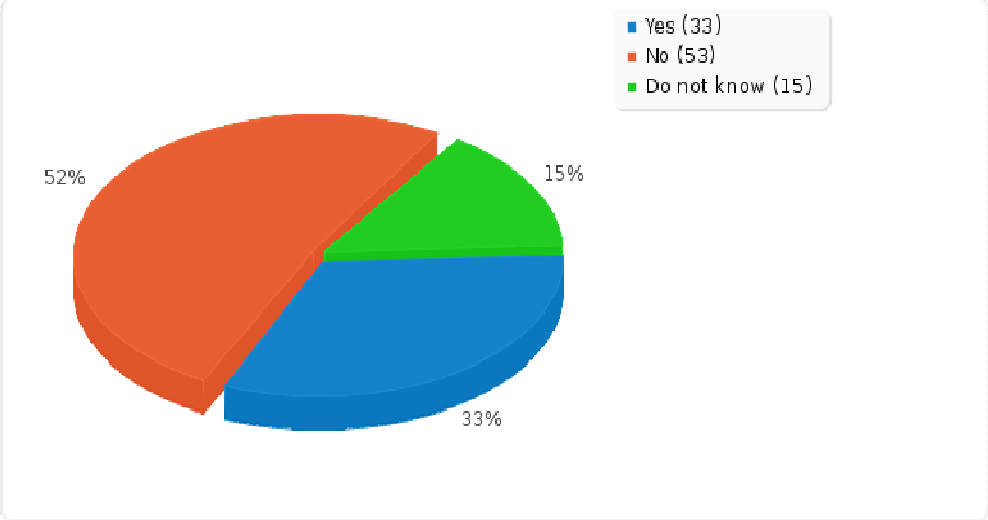
Graph 5.3.1.2: Identification with career



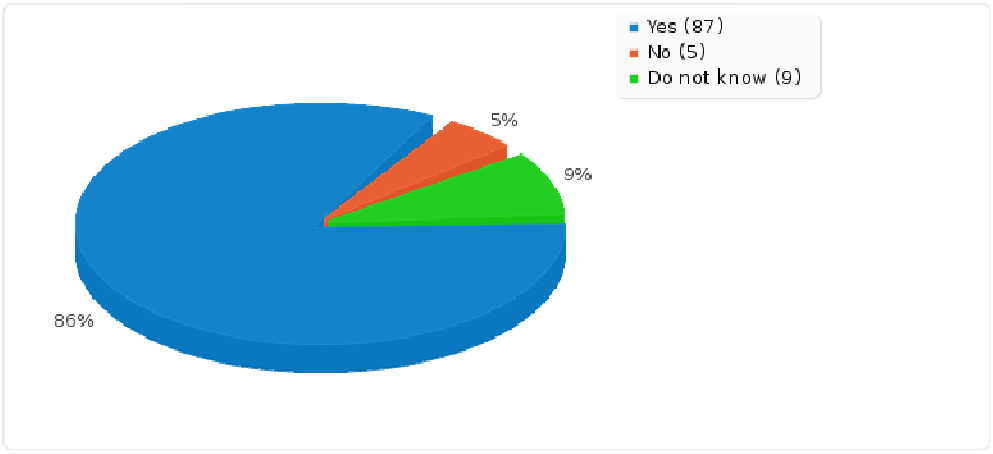
Graph 5.3.1.3: Social orientation through careers



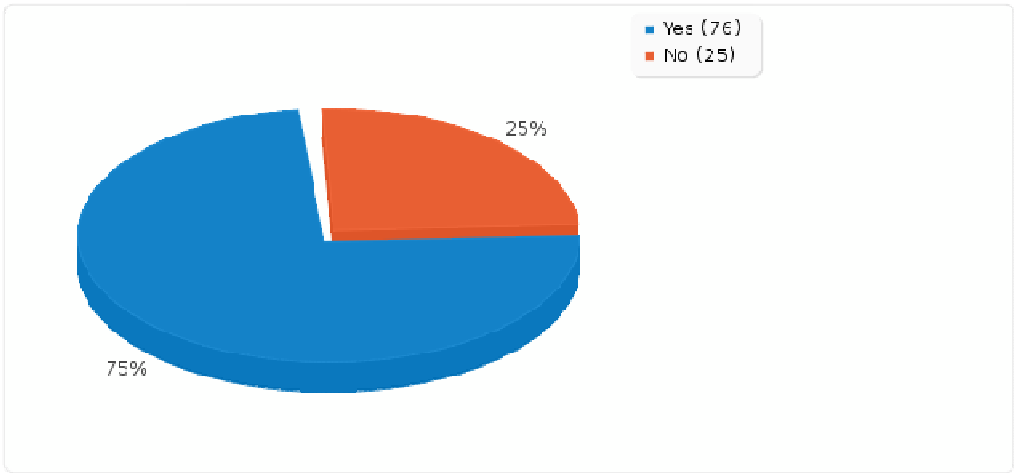
Graph 5.3.1.4: Perception on South Africa's bursary investment



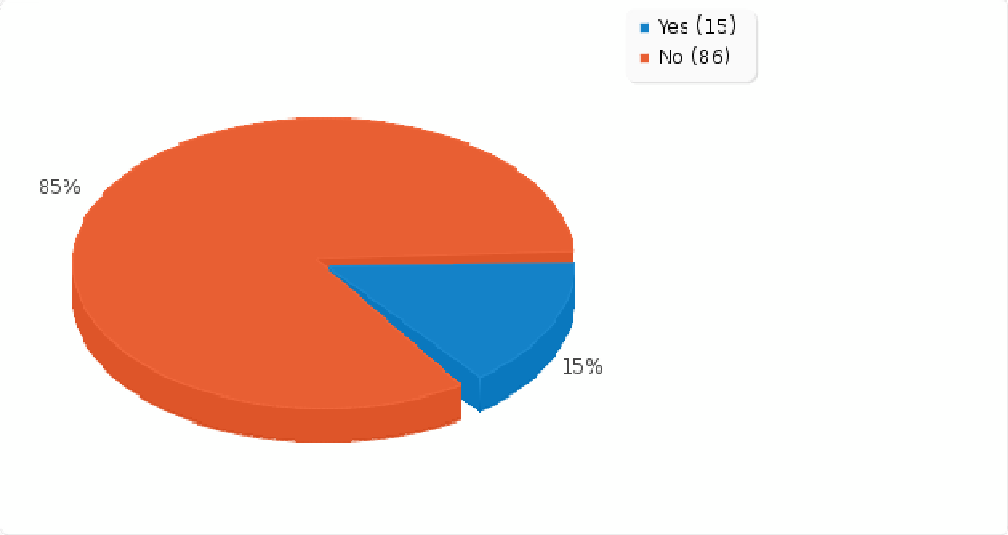
Graph 5.3.1.5: Perceptions around skills shortage in science



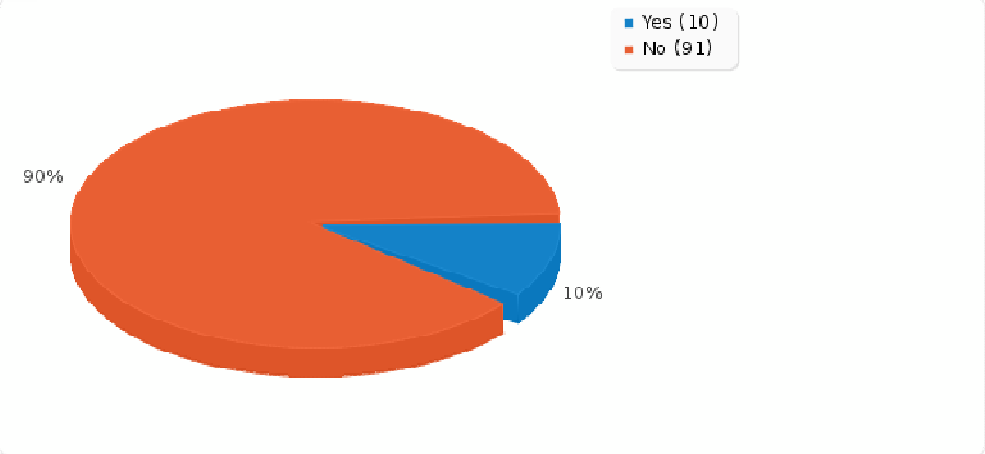
Graph 5.3.1.6: Perceptions on re- selection of career



Graph 5.3.1.7: Perceptions of gender influence on career decisions

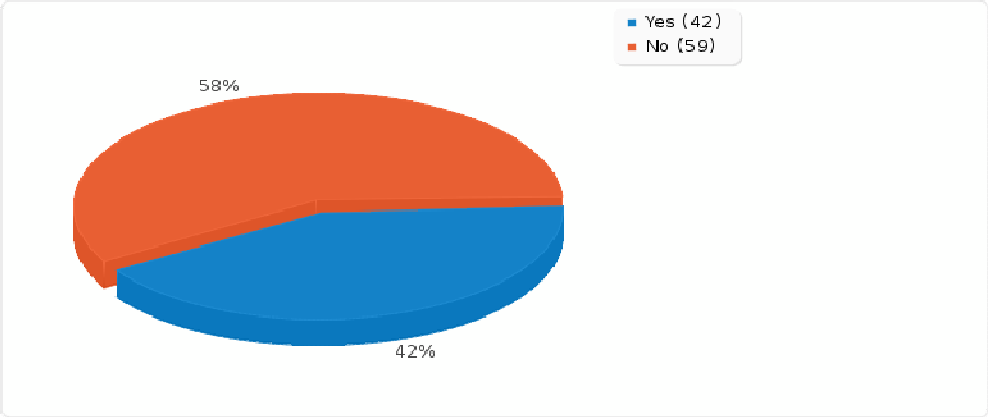


Graph 5.3.1.8: Perceptions around remaining in the same job

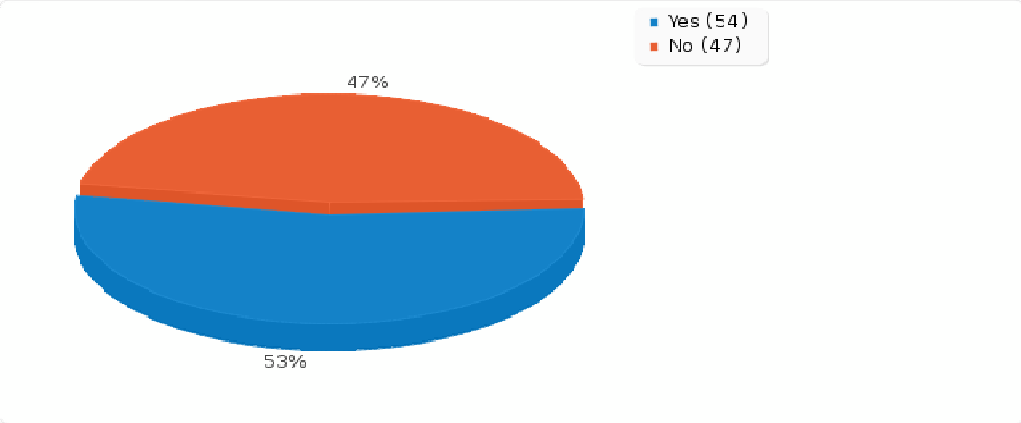


5.3.2 Career Opportunities

Graph 5.3.2.1: Belonging to professional science association

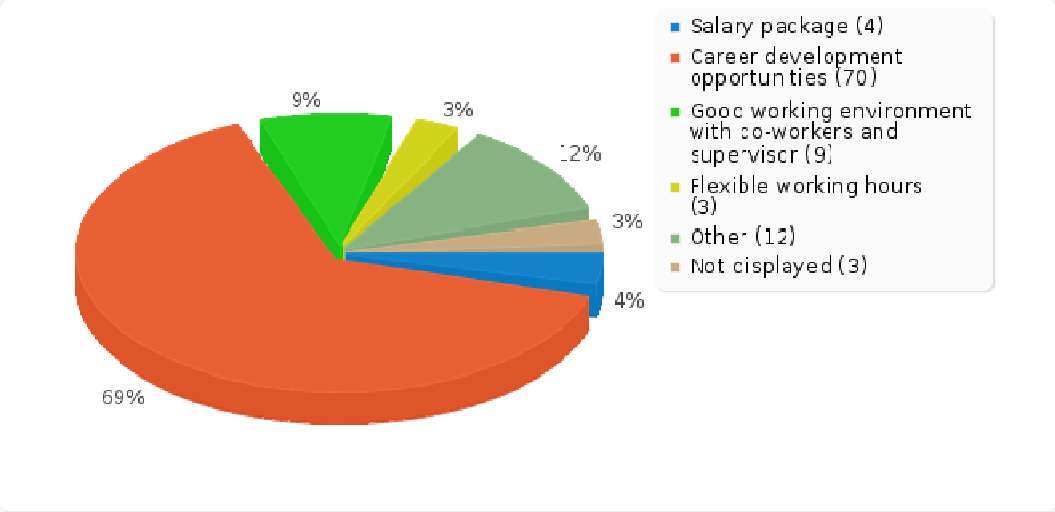


Graph 5.3.2.2: Career advice and development opportunities



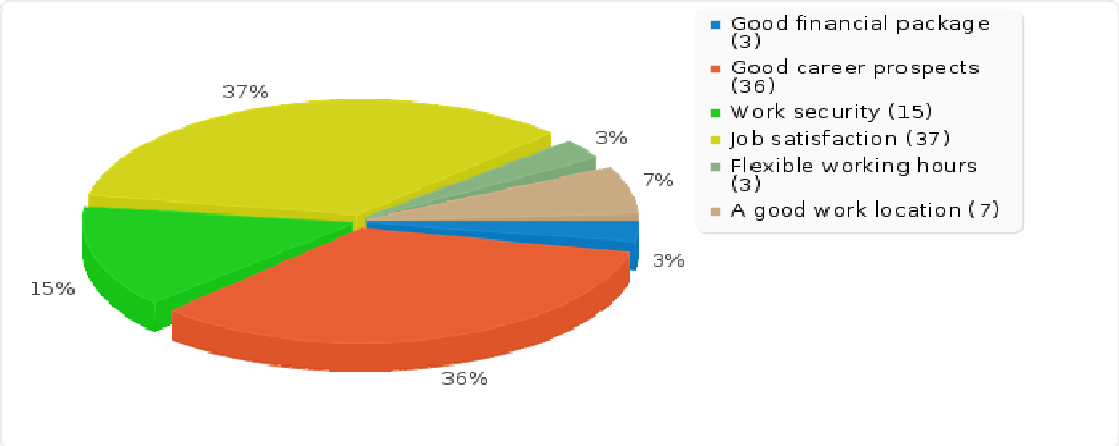
5.3.4 Attraction Factors

Graph 5.3.4.1: Attraction factors to the CSIR

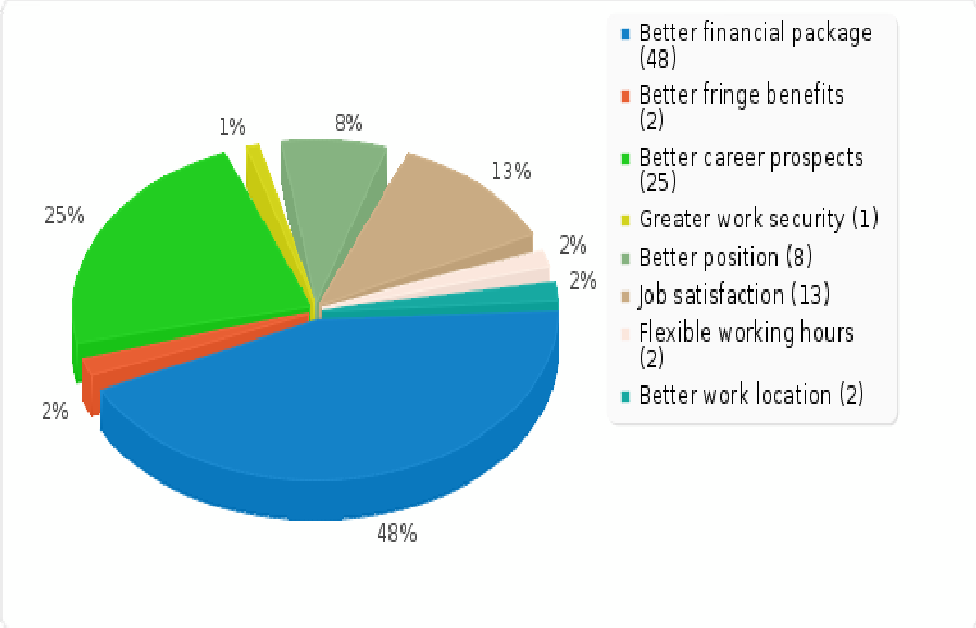


5.3.5 Retention Factors

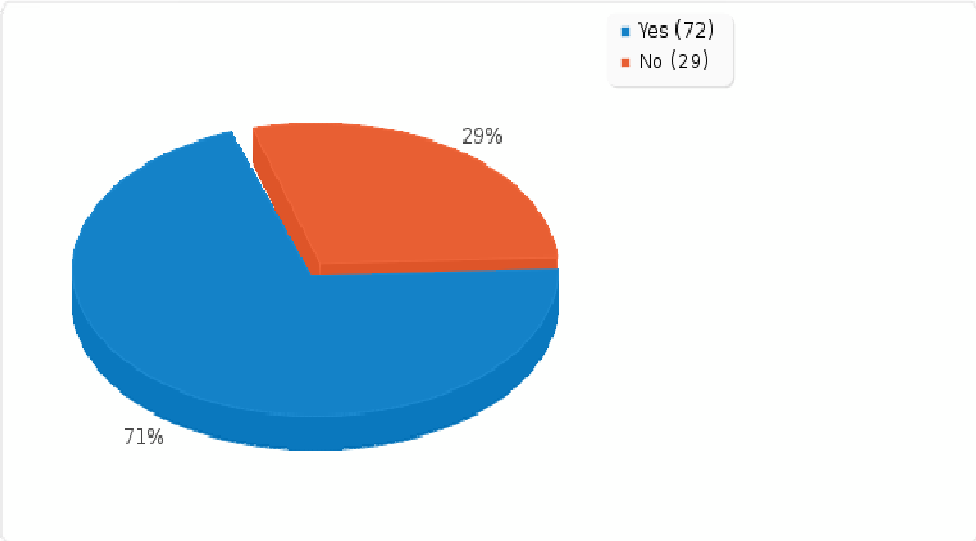
Graph 5.3.5.1: Retention factors in the CSIR



Graph 5.3.5.2: Main reasons for leaving career

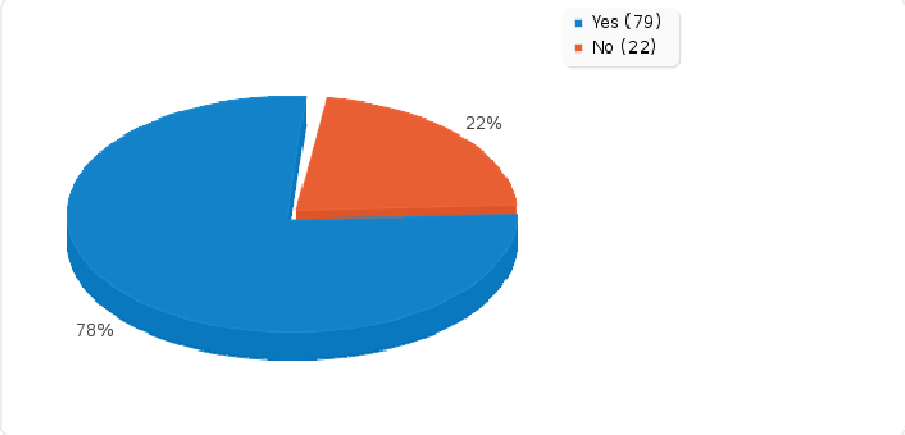


Graph 5.3.5.3: Contacted by recruitment agencies

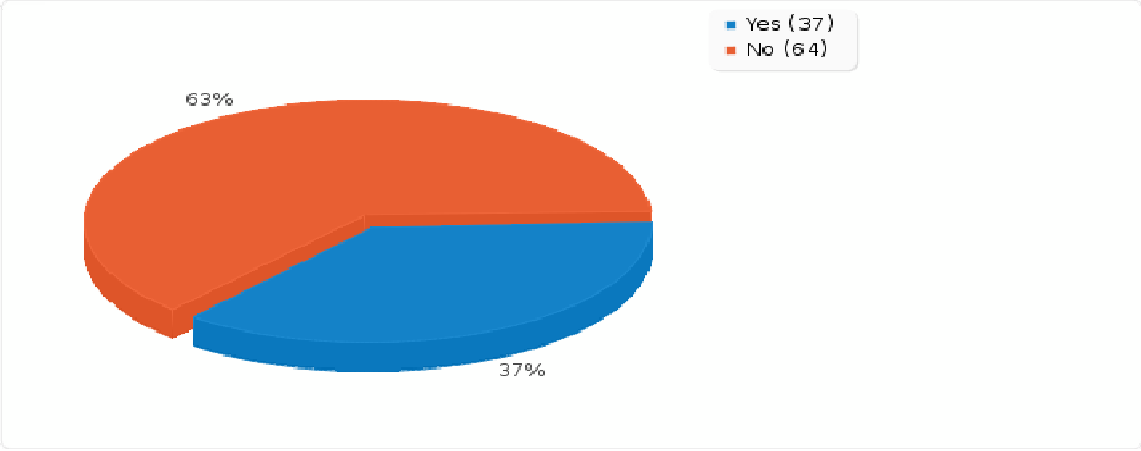


5.3.6 Organisational Commitment and Satisfaction

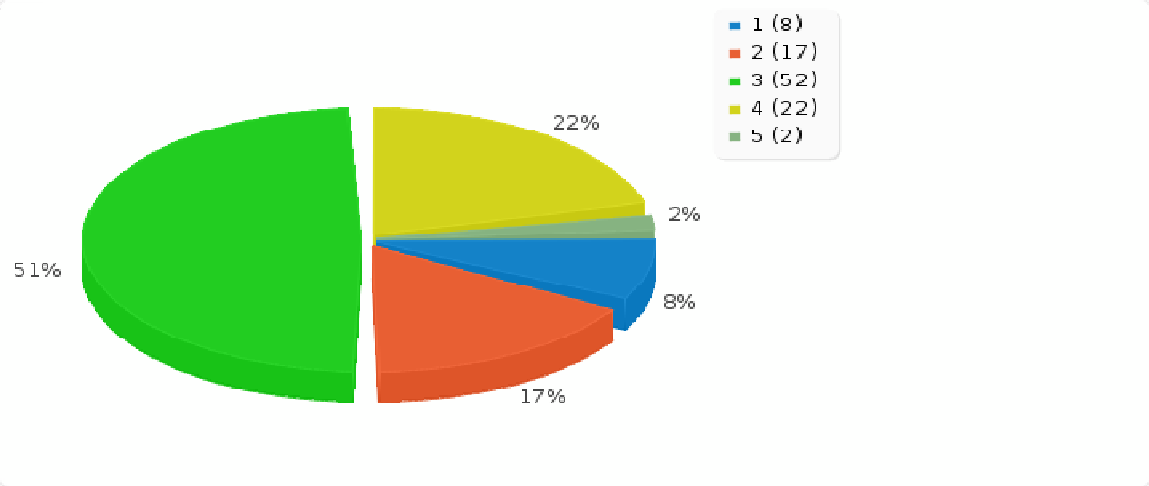
Graph 5.3.6.1: CSIR, A good working environment



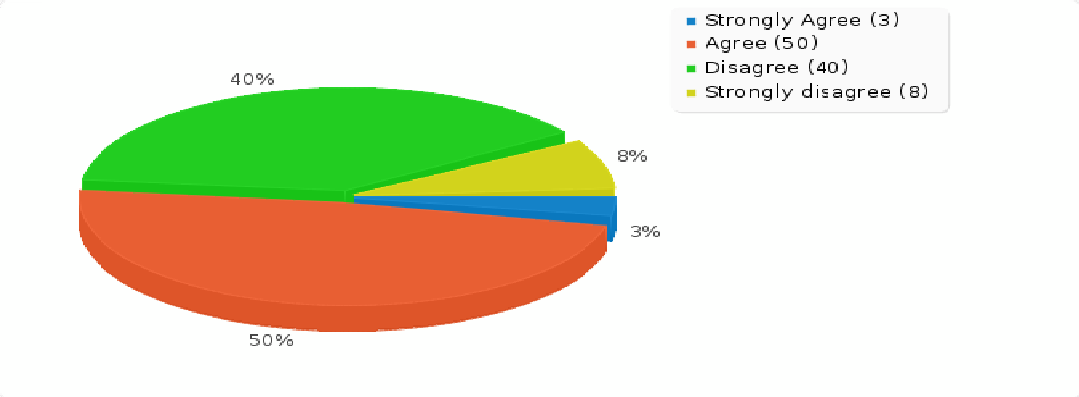
Graph 5.3.6.2: CSIR Career Ladder



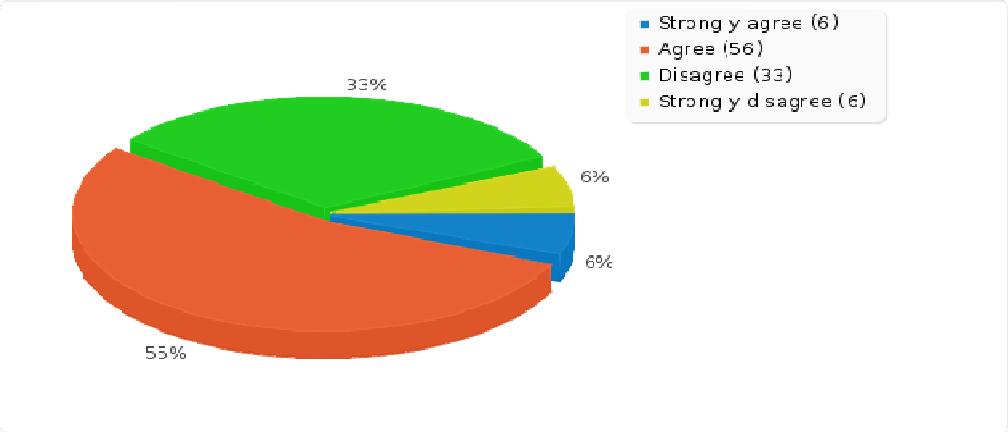
Graph 5.3.6.3: Satisfaction in the CSIR



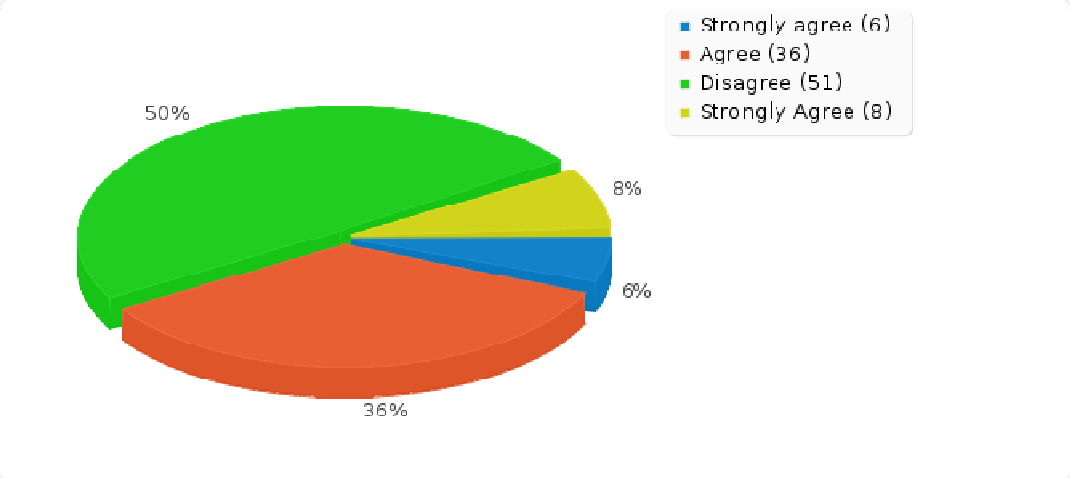
Graph 5.3.6.4: Recognition and acknowledgement for work



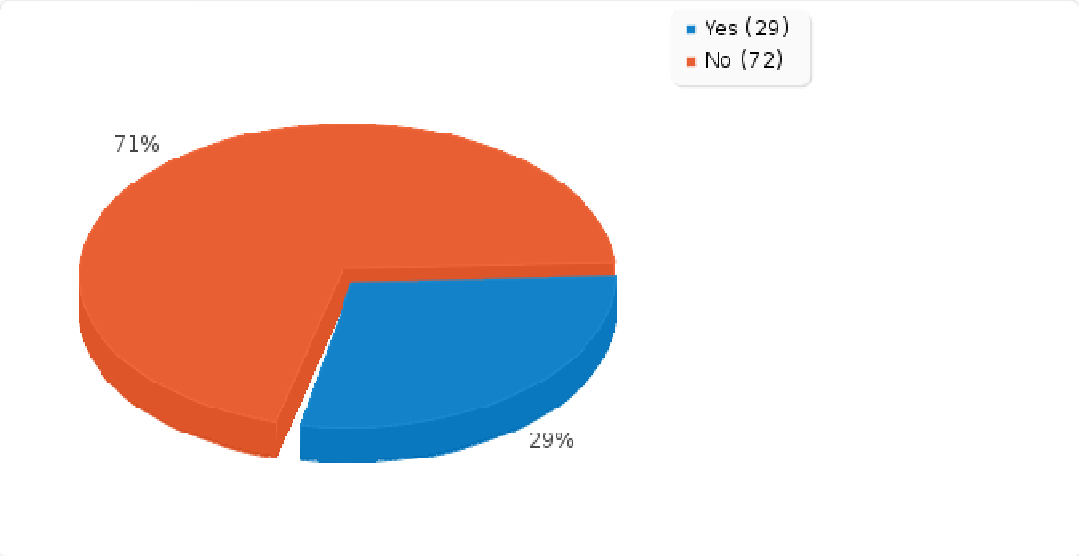
Graph 5.3.6.5: Career needs of employees



Graph 5.3.6.6: Equality in the Workplace

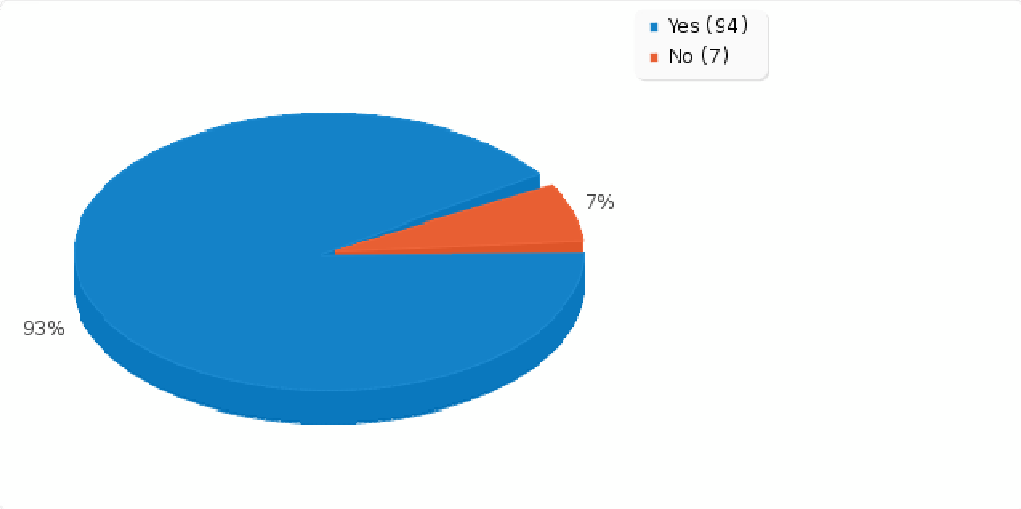


Graph 5.3.6.7: Market related salary related to commitment, experience and qualification

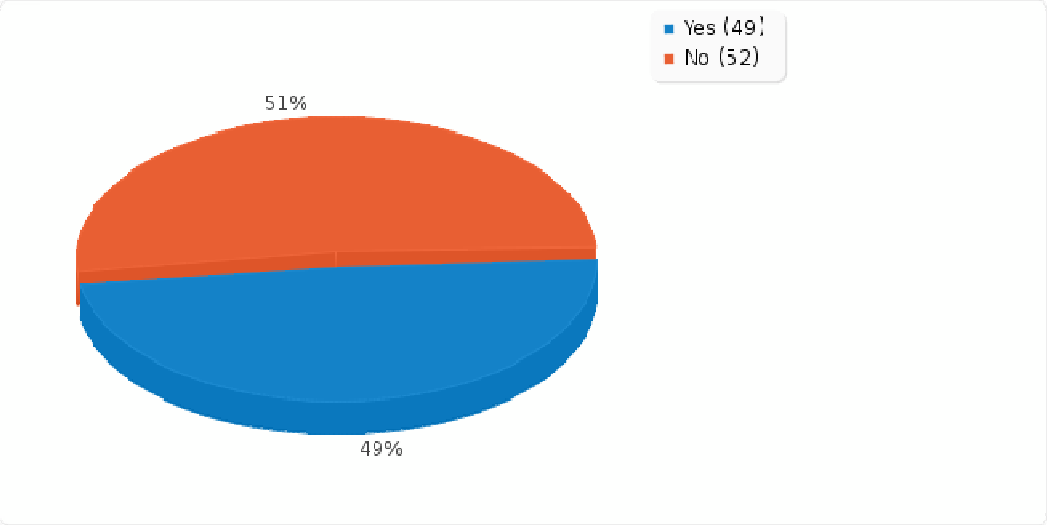


5.3.7 Career Mobility

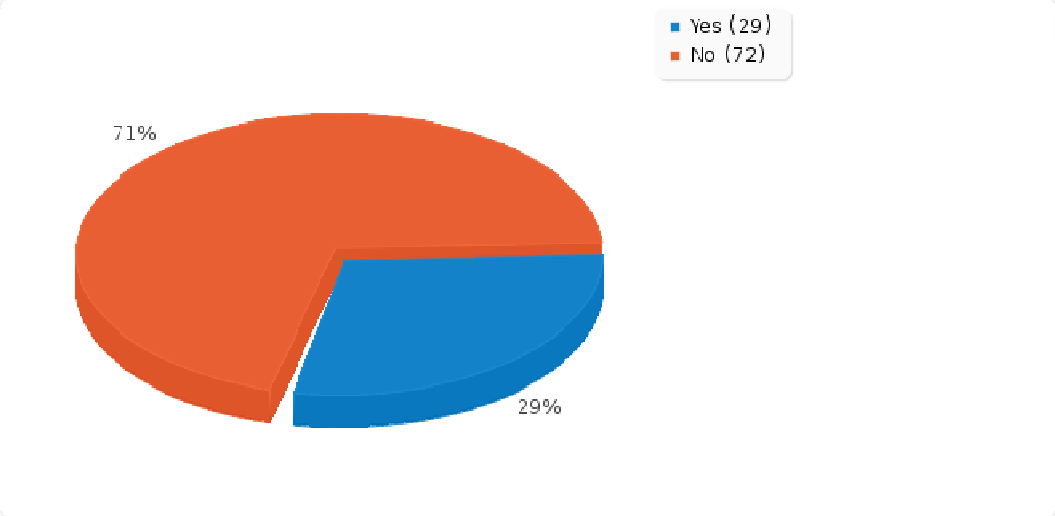
Graph 5.3.7.1: Skills and knowledge transfer



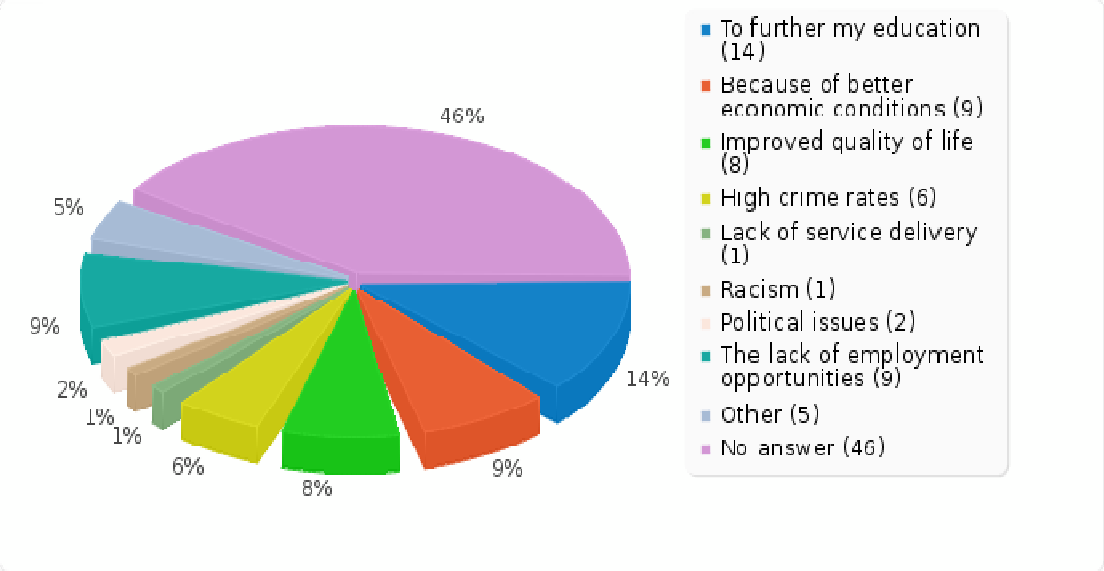
Graph 5.3.7.2: Career Mobility



Graph 5.3.7.3: Possible emigration from South Africa



Graph 5.3.7.4: Main reason for possible emigration



Appendix G: Transcription of the Focus Group Discussion

Q1: What are the characteristics of a research professional at the CSIR/ What do you look for when recruiting people?

Speaker 1: *"The CSIR looks for academic performance, experience and expertise when they begin to recruit someone. They begin their recruitment search early and try to recruit people from a student level into career development programmes and build a human capital pipeline through their different human capital development programmes".*

Speaker 2: *"There are opportunities to enter and be exposed to science careers that focus on people strengthens and weaknesses".*

Speaker 3*: "People are moulded into science careers at the CSIR in line with their own career objectives. They work on science projects; get exposure to laboratories, techniques until they can work on their own projects*".

Speaker 1: "*People on student programmes they already have their own career perceptions. In-service training provides on- the- job training and experience. Some work programmes are linked to universities and the CSIR trains people in certain aspects towards their final qualification. They however seldom employ students permanently*".

Speaker 2: *"People come to the CSIR for the experience they really want to work in industry. CSIR is involved with pure research and very little applied research. When people are exposed to research they can decide if this is what they want to do or move on to something else. The CSIR environment comprises of a conceptual high system level thinking and extremely intelligent people that want to do PhD's or have high qualifications. The CSIR human resource staffs go out to universities and career expos to attract the final year science students".*

Q2: Are career decisions made through social orientation at the CSIR, in your opinion?

Speaker 2*: "Career decisions are not make only through social orientation, people nowadays have more career choices and better career exposure than before. Scientists go to schools to speak about science and make people interested in science careers".*

Speaker 4: *"The environment we grow up in influences our career choices. Educated families tend to educate their children into professional careers. They motivate you to study further. However it depends on your level of exposure, there are also differences between urban and rural exposure. Some people want to be involved in science. How you are orientated determines your career perceptions and intentions*".

Speaker 5*: "People want a better quality life and this is also influenced by cultural issues. Career choices are influenced by social background and life context and also freedom to choose through your exposure".*

Q3: Career orientation and networking in the workplace

Speaker 2: "*It is natural to be orientating to people with like careers, people you have something in common with and know. At CSIR functions people group themselves into these career categories when socializing. They also have committees and research forums to discuss research".*

Speaker 1: "*Younger people do not tend to mix with the senior people during lunchtimes".*

Q4: Associations and memberships

Speaker 3: *"Some people tend to be registered with professional bodies because of their careers, some professions, it is essential to be part of the association to practice. This*

also exposes them to conferences and other professional events. Professional associations also have career paths and advice for these professionals".

Speaker 1: "*We speak to junior staff about their career challenges but it is more a discussion on issues or problems they experience. People at the CSIR are always looking for information and are interested in gaining knowledge".*

Q5: Are career ladders valuable or hurdles for career development at the CSIR?

Speaker 2: *"Debates in the CSIR around the value of career ladders, older people do not like it but the younger people embrace it, it's a mind shift for the old people".*

Speaker 3: *"CSIR was more focused on consulting in the past. The younger people are more willing to embrace the career ladders. The human resource staffs explain the career ladders to the young people so that they can see the benefits and how to advance in their careers through research collaborations. Career ladders are applied across the board".*

Q6: Are there challenges related to the career ladder?

Speaker 1: "*There are challenges but alignment with each aspect on the ladder helps so when its time for the next assessment the person already has been exposed to things that help them advance on the ladder. They have career milestones. Cadet schools are established in some area and training schools in the business units".*

Q7: Do females take up different careers or professions in the sector?

Speaker 2*: "Yes, sometimes. In the past this wasn't the case, but now women are entering science and being acknowledged. However, women are now making an impact and some are even opening up their own science companies".*

Speaker 3: *"There are still more females at the lower levels in the CSIR than at the top. The CSIR is trying to attract more females to science careers. Females experience more challenges in the workplace in comparison to males".*

Speaker 1: *"There is also the issue of intelligence related to career choice. Engineers do not like scientists. Females for example are not always given high impact projects to work on, not getting the full exposure they desire even though they are at the same career level as their male counterparts that are working on high impact projects".*

Speaker 2: *"It also depends on the manager; some people give their staff exposure to move up. This is however changing the areas are involving females more and more. We are also socialised from an early age around careers and things related to a boy and what is related to a girl. This is changing because gender issues are being addressed but there is still no real gender plan and no direct initiative to address gender issues at the CSIR".*

Q8: South African Brain drain? There are debates around the brain drain and skills crisis and the need for high skilled people. Do we have a skills crisis in the science sector? Is this a reality at the CSIR?

Speaker 3: "*Definitely there is a skills shortage. The CSIR is not paying real market related salaries. We find the people but we cannot afford to appoint them. They are already earning more than you can pay them based on CSIR career and salary scales. If you place new recruits on the ladder, they come out lower in relation to our existing employees. When they go through a first assessment they can be demoted if they are placed to high on the ladder. So it becomes difficult to attract them on a low salary".*

Speaker 2: *"Qualification are very important, you must have a Masters or PhD. "Career ladders are strict on qualification "if you've got less than a Masters you get 20 points. Masters, I think if you've got a Masters its 150. So look at the difference". Outside the CSIR people don't really care about qualifications, publishing. Senior*

researchers from outside are not scoring high on the career ladder because they do not have what the CSIR considers as important".

Speaker 3*: "People are available; we just cannot attract or retain them, maybe due to the economic recession in the country. Top companies scoop up the best people as they can afford to pay them".*

Speaker 2: "*The CSIR does not want to take a high risk, only invest in people at 3rd year/ 4t h year. The CSIR should perhaps start looking for talent earlier. For example in the financial sector there are shortages, top firms engaging with schools, honorary clubs send you newsletters and the scholar looks forward to an accounting career. CSIR starts recruiting late. CSIR fringe benefits are low, do not compare with other companies, meals, transport, cellphone allowance, training, travelling for work. CSIR cannot compete. Salaries at CSIR are cost to company".*

Speaker 1: *"To a certain extent there is a skills crisis but only in certain fields. There are shortages of people with a combination of skills. The CSIR employs people with specialisations in certain fields and these people are hard to find. The CSIR current pipeline is 30% and will only be effective in 5 years time".*

Q9: Attraction and Retention, professional people are moving to developed countries. Is it important to retain previously disadvantaged science research professional?

Speaker 3: "*It is important to retain previously disadvantaged science researchers that fit the demographical profile of the country and develop the country. EE legislation aimed at redressing the past helps to expose people and helps in the recruitment of previously disadvantaged people. If our previously disadvantaged people are leaving then we will never develop and transform as a country. We will keep on training people without being able to retain them. Succession plans will fail which focus on retaining skills and transfer skills in the workplace. There is no proper succession planning*

happening at the CSIR. When people start, you train them, after 2 year they leave the organisation, get better offers outside the CSIR".

Speaker 2: *"They leave because of the poor benefits and exposure in their careers. Exit interviews indicate that people get training but it's not enough. The younger generation wants exposure, they want an opportunity to grow and develop skills at a faster pace than before, and take control of their careers. Due to the CSIR's flat structure it is difficult to progress from a candidate researcher to chief researcher in a short space of time. Previously disadvantage people get a degree and feel that is enough. It's a cultural thing, pressure to be a manager. In the CSIR you have to work at career advancement you cannot become a manager in 2 years. This affects people's egos. They move for better titles and positions, salaries outside the CSIR".*

Q10: Is recognition important in the CSIR?

Speaker 1: "*Very important to people, especially previously disadvantaged people, it's all about what you do and who you are? At the CSIR even if you study for long, you just one of the many genius people. In the community people make fun of you if you study for so long and are not even a manager. It's cultural. CSIR does not have a proper BEE plan. This will definitely benefit the CSIR. We comply with BEE legislation but do not have a plan within the CSIR to develop previously disadvantaged researchers. The CSIR has the career ladders, step by step guide to grow careers, but it takes to long for people to develop on the career ladder. They need to feel part of projects and see outputs with their names on it, this motivated people in the CSIR".*

Speaker 5: *"Management should also make this a priority for them. Greater supported by managers is needed, mostly people leave their jobs because of lack of management commitment to their needs. Things need to change, mindsets of the people at the top need to improve to give people more ownership of their work, let them feel responsible for projects. Managers at the CSIR do not have very good people skills, most are negative about their subordinate's capabilities. The senior researchers are not big on mentoring.*

Junior people want to be given opportunities, young people need to take initiatives and need to be encouraged by these senior researchers. We find that young people are scared to ask for mentoring and guidance. Senior scientists are just not people persons. As the CSIR focuses on developing people mentoring is added to the career ladder so now it's directly affects senior career advancements. Senior researchers need to supervise a number of people, write reports and articles".

Q11. Do professionals adopt certain values and norms related to their profession?

Speaker 4: *"It is a requirement in certain professionals to be keeping updated and be in a network. The CSIR encourages professional membership"*.

Q12: Career development and initiatives at the CSIR. Does the career ladder successfully address career development and needs of employees in your Business units?

Speaker 1: *"Some people not all people. People now realize if they do not meet the requirements they will not grow. Outside the CSIR it is different, there is much debates around the successfulness of the career ladders in the CSIR"*.

Q13: Is the necessary and adequate career opportunity created for employees to advance within the CSIR environment?

Speaker 2: "*Yes, but it depends on the person and manager. If managers take an interest person grows. It is there but it depends if the person has the necessary support*".

Q14: Does the CSIR provide a nurturing environment for researchers to develop?

Speaker 1:*" There are structured career paths. It depends on the individual again. People have key performance areas and project objectives. People get sidetracked from their career objectives or lose interest in what they are doing. Sometimes following the*

career path helps. It helps to link the individual's career aspirations to where they want to go in their career".

Q15: What does the CSIR do to attract and retain essential previously disadvantaged research professionals?

Speaker 1: *"Scarce skills and engineering allowance use it to attract especially senior people. This is not part of the salary scales; it is on top of salary package.*

Speaker 3: *"It's between 8-10% scarce skills and affirmative action allowance, not everyone gets it, it's unofficial. The allowances are used to try to address the gaps. However this is not the same in all business units at the CSIR. If you add value then you get the scarce skills".*

Q16: Impact of globalisation on CSIR employees, what is the impact?

Speaker 3: *"Definitely had an impact, people are moving around in sector between organisation and between countries. Things keep on changing. It has not changed for the better. I am talking about, humanity, the way people are treated, and scientifically it has changed for the better. There were lots of fringe benefits in the past, these are no more available. Companies still paying fringe benefits are doing so illegally; only government can pay fringe benefits".*

Speaker 5: "*Globalisation has impacted on the science sector, more access to technology than we did before, CSIR programmes, sabbaticals, working outside South Africa and expanding your knowledge. CSIR employees needs to compete worldwide, they have no choice".*

Q17: Employment relationship has it changed over the last few years especially in the CSIR with the beyond 60 processes, has things changed for the better?

Speaker 3: *"There are lots of committees, employee wellbeing programmes to support and assist people but, the really caring of the people is lacking. Day to day acknowledgements, how are you doing? How is the project going? It's all about work and more work, the working environment has become cold. Nobody takes time to greet people anymore. It seems like it is not the responsibility of the organisation and HR. Before HR use to do these things and people were happier. Scientists do not get to chat about the projects with other people. The employment relationship has not changed for the better. The environment lacks motivation for people, especially young people experiencing problems to fit in to the CSIR. The environment is depressing. Stress levels of the people are higher. Women for example, also have the careers stress, home stress, kids, and daycares for the kids".*

Speaker 5: *"There also needs to be more transparency between the business units".*

Q18: Targeted programmes for development of previously disadvantaged individuals, is there an interest in the CSIR?

Speaker 1: *"Some recruitment in certain programmes only target previously disadvantaged people and females. In certain cases we do however recruit none previously disadvantaged individuals. We need to still address these gaps. It becomes a greater cost to the organisation, no time for training although it is needed. Two different cultures, Ubutu culture- staying together, white culture- time is money, very competitive, result driven".*

Q19: Exit interviews, what is the main reason for people leaving organisation.

Speaker 2: *"Many reason but mainly salary, title and career development. People are happier outside the CSIR, so why should they come and work here".*

Q20: Initiatives that government can take to further develop South African previously disadvantage professionals.

Speaker 1: "*People generally are outspoken in the interview once they are employed people they are keen to do research, not interested in the salary in industry it's easy to get promoted/advance. Years ago, people at the CSIR were moaning about their work, that is why the CSIR took on a flatter structure. The decentralisation of control from people. There is also the need to give recognition to people, some people need that. Some people really do not belong in the CSIR, they would get frustrated. There are opportunities for people but depends on your career aspirations and what you want*".

Q21: Any further comments, suggestions, ideas, shared experiences related to the topic?

Speaker 2: "*We need proper strategy in the CSIR that focuses on both the attraction and the retain of people. This is not available at the moment. Policies and strategies do not always talk to each other, they are disconnected. Human capital development area but the human resource staff drives attraction and retention in the units. Focus is place on the next recruitment and not enough on retention of the people we have already recruited. That is why we not successful in securing the required skills".*

Speaker 3: *"Find a way to attract and retain one of the major challenges in the CSIR. We have induction and orientation programmes, it is to welcome you to the CSIR and then it is over, does not help to retain people, we busy working on lots of ideas at the moment".*

End of Focus Group Discussion