CHAPTER SIX

Becoming a Researcher

The purpose of this study is to explore the professional and personal nature of leadership that enables and stimulates high quality research performance within the context of the research enterprise. The main research instrument used was the interview and data collected in this manner provides a view of the research pathways of ten individual research leaders participating in the study. These are not full life stories, since the main focus was on the research career. These research stories are then reflected against and interspersed with the reported research experiences of a sample of post-graduate mentees who have been supervised and mentored by these researchers. The reporting of the findings and initial analysis have been largely shaped by the definition of research leadership used in the study and hence have been divided into three individual chapters that build an overall portrait of the main tenets of their research leadership. Firstly, in this chapter, the focus is on the research leader's research trajectories and some salient factors of influence on their careers. It includes a summary of their academic qualification history as well as institutional affiliations. Factors that seem to have had an impact on the academic pathways of the researchers are discussed in more detail and within the context of the South African higher education system. This chapter then seeks to provide an answer to research question one: *How have these research leaders emerged i.e. What are the career experiences and academic pathways traversed by these research leaders?*

Chapter 7 will focus on experiences and attributes of leadership roles in the research field and their leadership of the people. This will include a focus on intellectual leadership, personal scholarship and recognition by peers. Chapter 8 will consider the role of research leadership in one of the most important responsibilities of research leadership, namely, the preparation of the next generation of researchers. This chapter will explore the mentees' experiences of the researcher mainly through their postgraduate programmes

and early post PhD experiences in academia. Where possible the chapters focus on providing both the self report of the research leaders and the mirror report of the mentees in efforts to avoid one of the major criticisms of leadership research i.e. that the research data consists mainly of reported leadership stories. Interrogation of data as presented in Chapters 7 and 8 will address the second research question: *What are the attributes and leadership experiences of research leaders in the context of the research enterprise?*

6.1. Research trajectories

The research leaders in this study are all at different life and career stages. The majority of the sample can be considered to be established researchers whose academic identity and leadership roles have been clearly established. For these researchers this study provided an opportunity for 'looking backwards'. The overall career path of each researcher is initially summarised in Table 10 in terms of research qualification and training and current academic positions occupied. This data was obtained from the curriculum vitae of researchers and the discussion of their research pathways that follows will be contextualised within the South African research environment.

Table 10: Career Trajectories: Profile of research leaders

Pseudonym	Citizenship	Undergraduate Studies	PhD	Post – Doctorate Position	NRF Rating History	Current Academic Position	Executive Management /Business Qualification
1. AGRI	Dual South African citizenship	BSC Africa	1989 North America	YES	B (2005)	Director of Research Centre(**2001– present**)	NO
2. BLOOM	South African	BSC South Africa	1983 North America	NO	P(1989) A(1996 - current)	Director of Research Institute(**2001 –current)** and Centre of Excellence **(2004- current**)	YES North America
3. BRIGHT	Dual South African citizenship	B.S. North America	1983 North America	NO	B(2005)	Professor and Director of Research-	YES North America.

						(2009 - current) Previous Head of Department(9 yrs)	
4. FRANKIE	South African	BSC South Africa	1996 South Africa	NO	B1(2001) A (2006–current)	Professor and Chair (2002/2007 to current	NO
5. LIU	South African	BSC South Africa	1989 South Africa	NO	Y P (1995) B A(2004) B	Director of Research Centre(1999-current) and Research Chair (2007-current)	NO
6. LUNGA	Dual South African citizenship	BSC Africa	1982 Europe DVSc (1999)		B(1996) B A(2007)	Professor (immediate previous: Head of Department (xxx -2009)	NO
7. NELWA	South African	B.Eng North America	2001 Europe	YES	P(2001) C(2008)	Executive Dean of Faculty (2008-current) (immediate previous Director of Research Chair	YES North America
8. MARIE	South African	BSC South Africa	1998 North America	NO	C(2004) C(2009)	Professor (2007 – current new institution)	NO
9. SANDY	South African	BA South Africa	1983 South Africa	NO	A (2003) B (2009)	Professor and Chair(1990 – current)	Some coaching experience
10. WAYNE	South African	BA South Africa	1998 South Africa	NO	B (2002) B(2007)	Director of Research Centre (2007 –current)	NO

The youngest researcher to have assumed research leadership positions in this sample is 39 years old and the oldest is 63 years old. The average age of the participants in the sample is 52.4 years. This sample profile seems to support the ageing research profile of the South African science system with many of our senior research leaders (at least 50% of this sample) with strong international research profiles having thoughts about possible retirement strategies. As mentioned in Chapter 2, the concern is further compounded by the fact that "nearly half of our total research output in the country is now produced by scientists over the age of 50 and this remains a major matter of concern (Mouton, 2008:1079). This research productive group referred to by Mouton comprises largely white men over the age of 50 years. This sample however, indicates that a considerable number of our senior black professors and female professors are also productive yet ageing. In this sample of researchers, 60% of the participants fall in the (51-61+ years) age range. All the NRF A-rated researchers in the sample fall in the 50-59-year age range. In terms of both age and gender, the findings reveal that this age group (51+) includes 50% females and 50% males, as well as 50% black researchers and 50% white researchers. Productive researchers at the forefront of their field are critical to developing the next generation of researchers. Their exit from the system would surely leave a considerable vacuum if research leadership succession is not part of the long–term planning of both individuals, and their institutions.

Two of the research leaders were in their late 20s when they were awarded their doctoral degrees. Seven of the researchers obtained their PhDs in their 30s (at average age of 33 years) and this is in line with the findings of the PhD study that stated that the vast majority of doctoral graduates within the South African system are 30 years of age or older. (ASSAF, 2010). One leader from the social sciences and humanities was awarded a PhD at age 45, something that is not uncommon in the field. A statistical profile of South African doctoral students showed that by 2007 young graduates of all races (i.e. less than 30years) made up only 3% of both the social science and humanities cohort of students. In general, in comparison with international

standards, South African doctoral students are relatively mature when eventually awarded a doctoral degree.

Four researchers obtained their PhDs from South African research institutions and all four of these researchers are still employed within their PhD awarding institutions. Within this group of four, the shortest post PhD period within the same institution is 12 years and the longest post PhD period within the same institution is 27 years. Three of these researchers are female (all have been A-rated), one is male and all are white. They all obtained their pre-tertiary and undergraduate education during the South African apartheid era of segregated education with three attending an English medium historically white university and one an Afrikaans medium historically white university. This description by one of the research leaders offers an educational view of that historical educational context:

The high school I went to did not have a science or biology lab, did not have much of a library, but the teachers were good and dedicated. Similarly, at university we had qualified, experienced staff. The labs were well equipped and the classes were small. Thus the education system at secondary and tertiary levels worked reasonably well for a person like me in apartheid South Africa, and so allowed me to become the first person in my family to get a university education. Furthermore, because of funding from industry, I was given a scholarship and so my education basically did not cost either me or my parents anything. After my bachelor's degree I worked and studied part-time for the most part. (White Research Leader)

Their current 'home' institutions are recognised South African research universities with strong research cultures. An example of one professor's research career positions within the same institution is summarised as follows:

Senior Lecturer------ Chair ------- Chairperson of School ------Director of a Centre-----Head of Division-----Director of Centre-----DST/NRF Chair

This long service, however, has been interspersed with visiting fellowships at numerous international universities. The research trajectories of these four researchers thus suggest fairly stable career environments within these

institutions, where the assumption is that they have been institutionally supported to develop as highly rated researchers.

The remaining six researchers obtained their PhDs from overseas institutions- North America (4) and Europe (2). All the black researchers in this sample obtained their PhDs outside of South Africa and of the African continent. When considering this cohort of black researchers, the choice to undertake doctoral degrees outside of the continent related to a number of reasons. For the professors who moved to South Africa from other African countries, there was recognition that there was insufficient research structure or incentive to produce research output in the universities of their home countries. According to the professors in the sample, research was not a high priority within the home universities at the time and access to research funding was limited. Hence the decision was taken to complete their doctoral studies abroad. They then subsequently moved to research posts within the South African universities and science councils where they now occupy senior posts as per summary in Table 10. Internationalisation of higher education has increasingly become an integral part of higher education as developing countries struggle to address national needs while engaging with global developments. South Africa, in order to become increasingly responsive to globalisation challenges, has had to develop human resources that make the country a partner in a globalised world. This has seen the influx of many students and staff from international countries. Further chapters will address the increased regional and continental engagement through the research projects, student mobilisation and international networks of the research leaders.

For professors in the sample who moved from research universities abroad to South African institutions, the feeling was that their research output suffered. One professor mentioned described the initial effects of the career move thus:

The move stunted my career for a while. My research productivity went down as I recognised many obstacles to doing leading edge research in South Africa.

Institutional factors listed as obstacles included the high demands of teaching, lack of research assistants and secretarial support. Most important, the professor(s) found that many colleagues in the department did not have PhDs and some were employed without Master's degrees.

This lack of critical research conversation and access to high quality local conferences where you get feedback and critique created a sense of isolation for me. Many of my colleagues did not seem to be aware of what was happening at the cutting edge of the field.

Admittedly this professor's first appointment on arrival in South Africa was not within any of South Africa's top research-intensive universities and the comments made highlight some common criticisms of research developing contexts. A recent career move has been made to a top research university with the understanding that the move to the new institution has more to do with the fact that she will be focusing on research.

For black South African citizens who had completed their pre-tertiary education in the South African system, the routes to the international PhD were varied and fraught with contradictions, especially since accelerated programmes and the judicious use of external scholarship assistance was a short-term solution in apartheid South Africa (Nkomo, 1990: 232). One researcher completed both his undergraduate degree and his doctoral degree overseas. This was during the period when there was widespread interest within the international community for providing scholarship assistance to black South Africans in particular. Nkomo (1990) explained that in order to deal with the daunting challenges of the present (Bantu education) and equip themselves for the more challenging tasks of a transformed South Africa, black South Africans had to take advantage of these opportunities. The participant was awarded a scholarship to North America by the Educational Opportunities Council (EOC) for his undergraduate degree. This EOC bursary funding (and others like the Fulbright Scholarship) is a significant part of the education history of many black South Africans and is especially pertinent when looking at the early period of research development of many black

researchers in South Africa. An extract from the South African Education Programme (SAEP) website helps to contextualise the role of external funders in providing university opportunities for black South Africans during the apartheid era.

In 1979, the Institute of International Education (IIE) established the South African Education Programme (SAEP), a landmark programme to increase higher educational opportunities for black South Africans. The programme ran from 1979 until 2001 and approximately 1,700 participants completed their educational programmes and returned to South Africa. Areas of study included education, business, law, health administration and engineering with over 1,000 students awarded graduate degrees and over 600 students completing their undergraduate programmes in the United States. In 1979, the Educational Opportunities Council (EOC) was established in South Africa with Nobel Peace Laureate Archbishop Desmond Tutu as its founding chairman. The EOC shared responsibility with IIE for the recruitment and selection of participants to the programme for nearly 20 years (www.saep.org).

Currently many of the alumni of these scholarship programmes hold senior leadership positions within our universities, government and corporate sectors. Another black research leader in the sample completed her undergraduate and Master's degrees at a historically white South African university that was still developing its research capacity at the time of her studies. Her choice to move to North America was based on the lack of a research unit in infectious diseases at master's or doctoral level at her local university. She received a Fulbright scholarship for PhD studies at a North American University that was renowned in her area of research. As she explained:

I did my PhD at (name of university) and decided to learn as much as possible and then to come back to a research position in South Africa. On my return I was the only black female PhD in the Faculty of Science at this institution for a number of years, starting in 1997.

One black and two white researchers (30%) in the sample obtained NRF P-ratings in their immediate post-PhD research careers. They were all from the natural sciences and engineering disciplines, since researchers from the social sciences and humanities only joined the NRF rating system in 2002.

The attainment of the P-rating indicates a concentrated emphasis on early research development and identification of early excellence. The researchers were younger than 35 years at the time and were recognised on the basis of exceptional research performance and output from their doctoral and/or early post-doctoral research careers. According to the rating system, P-rated researchers are "likely to become future international leaders in their field". Two out of these three researchers have since obtained A-ratings where they are "unequivocally recognised by their peers as leading international scholars in their field" (NRF Facts and Figures, 2010). This identification of and support for early excellence reinforces the strategic imperative to develop young researchers continuously, especially during their PhD studies.

The focus on business qualifications for academic leaders is in line with the move towards market orientation and commercialism in higher education and the need for leaders to be effective in multiple roles. Two researchers from the specialisation areas of biological sciences and engineering have obtained formal business qualifications from North American Business Schools within the last five years. These qualifications include the Advanced Management Programme (2008) completed by a 54-year old professor and the Programme for Leadership Executive Education Development (2007) completed by the youngest member of this group. The reference to age at which these qualifications are obtained indicates that the university system is investing in senior leadership development from across the age spectrum. It also suggests that younger, research productive professors may be moving much faster into research management or executive positions within the higher education system. The university pressures of race and gender representation in senior management may also mean that fewer talented researchers stay in academic research careers for extended periods of time. In general where research performing scientists have moved into administrative and managerial positions, the-result has often been the creation of a void in academic leadership, research output and third stream funding. The entrepreneurial university context does present different challenges to the more traditional research team as was pointed out in the

literature review. The non-traditional shifts are illustrated by the leadership challenges facing Professor Liu in her research centre:

The team is splitting and one group is now forming a company. I am going to have a challenging time - an industrial group and a research group together - and I am sitting on both sides. It is going to be interesting to see how we marry the groups and their roles. I am proud we work like this, but there are challenges.

This requirement for executive management qualifications for senior professors has been increasing in some universities and the shift, although accepted, has not always been a smooth adjustment for the discipline-based researchers. The experience of one of the researchers is outlined below:

I went, rather reluctantly, at the request of the university, to do an Executive MBA at (name of institution). I had never done a finance course before. I did not enjoy parts of the course and in fact the two-and-a-half months of the programme was one of the most interesting yet frustrating, infuriating and exhausting experiences of my life. But I learnt a great deal and I am starting to realize the value of some of that stuff now. (Professor Bloom)

However, this increasing importance of the business qualification in university management and leadership has not been equally well received in all quarters and the opinion of one of the research leaders supplied below aligns with some of the more general findings reported earlier with regard to executive management/research tensions within higher education:

These days I think that universities want people with MBAs to be running things. I think that's the trouble, because when MBAs (instead of leaders) are running the university, they don't actually recognize the core values of research and research processes.

These responses tie in with the discussions on research/management tensions and indicate that this is an area of conflict for some researchers and an area of accepted practice for others.

The discussion thus far has drawn from the quantitative data of the sample with regard to age, race and gender profiles and how this aligns with or differs from the prevailing research context outlined in Chapter 2. It also draws on

the qualification history (doctoral and/business) since this forms an important understanding of the overall summary in relation to the context in which this research development has occurred. This chapter will now move on to discuss some detailed, though less quantitatively visible aspects of the research trajectories of the researchers in the sample.

The individual trajectory of each research leader can be drawn up from curriculum vitae data supplied and gives an overview of the education and research career history of the participant at the time of the research study. It also links this education to the scientific outputs and academic awards of the individual, in line with the definition of research leadership used. It does not provide background details about the pathway or provide any reasons for career changes along the trajectory. One research portrait is supplied within the chapter to provide a sense of a research career pathway followed. There is no 'typical' research trajectory that could be drawn from the sum of all ten trajectories, since career stories followed very individual paths. As pointed out by a study that explores and contrasts the academic lives of two professors in the same university, "though the rank of full professor is considered the pinnacle of the normal academic trajectory – and not easily achieved by any person - our paths to this place are dissimilar and our lives in the academy are dissimilar" (Johnson-Bailey and Cervero, 2008:311-312). In this chapter a single portrait will be used to provide a sense of a career trajectory, and will be used as a backdrop to discuss more general issues related to research leadership development. Other more in-depth parts of these trajectories will be detailed as the thesis progresses through the aspects *Fully Engaged Research Leadership* in Chapter 7 and *Preparation of the Next Generation of Research Leaders in* Chapter 8.

RESEARCH PORTRAIT OF PROFESSOR NELWA

EDUCATION AND CAREER POSTS

Professor Nelwa matriculated from a local public school in Limpopo province, South Africa. In his final matriculation year at school, he entered and won the National Youth Science Olympiad, a science based-competition where the top prize was a trip to the United Kingdom to attend the London International Youth Science Forum. His subsequent university education spans a number of countries and institutions. He was awarded a scholarship by the Educational Opportunities Council and obtained his Bachelor's degree (Magna Cum Laude) from a university in North America, his Masters' degree from a local South African university and a PhD from a university in Europe in 2001. He then took a position as a research scientist at a science council in South Africa where he remained for about five years. He subsequently proceeded to a post-doctoral research position in Europe. On his return to South Africa he worked in industry for a short period before returning to a research university appointment as an associate professor. He was appointed Professor Extraordinaire at one of the local South African universities (2003-2005), and has been a visiting fellow and scholar at universities in the United States and Europe. He is a full professor and has been a leader of a DST/NRF South Africa Research Chair with the most recent appointment being that of Executive Dean of Faculty. He has also recently completed a Programme for Leadership Development at a North American University.

SCIENTIFIC OUTPUTS (among others)

Professor Nelwa has made fundamental contributions to his field and has received over 41 awards to date. He has published over 170 articles in refereed international journals, conference proceedings and book chapters and has successfully supervised approximately 30 postgraduate students at Master's and PhD levels and has collaborated with 44 national as well as international researchers. He holds three international patents.

In summary then, the trajectory is that of a research professor who received his primary school education within the public school system of apartheid

South Africa. He attended a local school for black students only and his talent for mathematics and science was discovered at an early age through a national school science competition. Academic capability and access to resources through scholarships allowed him to complete his undergraduate and postgraduate studies at research intensive institutions across three continents, thus offering an international research experience as a platform for career development. His research career in South Africa was developed across experiences in industry, a science council and research–led universities within South Africa, with an NRF–P rating providing further emphasis on and system support for early career excellence. He has built up an impressive publication history, student training record with a strong emphasis on capacity-building and has won a number of international and national awards. He has moved into university executive management at a young age, where time for personal research has now become somewhat limited. His biggest leadership challenge in his current position is to develop and sustain a strong research culture in a merged South African higher education institution with a limited history of quality research. Given this research trajectory of one researcher, what might be some of the factors influencing overall research development of the research leaders in the sample?

6.2. Early influences

In trying to extract more of the personal nature of the research trajectory, one may ask the question: Why research? In the interviews research leaders were asked if there were any early influences or critical incidents that influenced and/or strengthened the decisions to follow a research path. Firstly, there was overwhelming consensus amongst the group that the earliest motivator seemed to be an innate sense of deep curiosity and personal interest in things around them at the time. There was talk of a mind that enquires and a need to explore. Across the career trajectories, this initial curiosity and interest seems to have developed into a deep passion over time and the strong sense of personal commitment and enjoyment came through for most

research leaders that were interviewed. This was expressed variously as illustrated below:

For me it is very personal. This project of human rights is in a sense what my life has come to be defined by. So for me it is almost too absorbing and maybe you can only be so into all of this if you stay focused. It would be very difficult for me to do if it were not something I felt passionate about. (Professor Wayne)

I feel very privileged to be at a space where my enjoyment of my work drives my passion. (Professor Bloom)

People who touch one's life along the way are also very influential, and for the researchers, these influences were received from different people. One of the professors described these crucial people influences as an important chain of informal and formal mentorship all along the career path. Early influences were identified at the family level, with strong role models found in a visionary grandfather or equally science-passionate spouse. In a single case the influence was found in the public school context, where there was a strong work ethic and strong, competitive classmates who turned out to be good role models. As explained by Professor Nelwa:

Many leaders emerged from my school group and over time have occupied various very senior corporate positions throughout the country. It seems that this was a special school that produced very good students who had staying power.

This factor of influence seemingly provides an anomaly of sorts since this school is a local public school in one of the lesser educationally resourced provinces within the South African public school system. In addition, as a country our education system is noted for poor achievement in mathematics and science in international and national assessments (e.g. TIMSS 1995, 1998, National Assessment Tests, 2011). However, this local school is still currently one of the consistently best performing black public schools within the province and this may explain the influence on Professor Nelwa.

One professor felt that her environment was probably the strongest early motivator of her career choices:

My family was poor and I did not like not having things. I used that as a motivation for a better quality of life. The belief was that you must get educated to get a better life and my parents pushed that. I arrived at the decision to follow a research path through my own personal motivation.

Achieving a doctorate is an important achievement in one's personal academic history but it cannot be separated from the broader political and economic structures of a society. This emphasis on the value of education as a means towards a better quality of life is consistent with the findings of Reddy (2000). Her life history study of ten black South African scientists who had gained doctoral qualifications under the extreme constraints of the apartheid system, found that families valued education very highly and there was a strong expectation from parents for their children to have a higher education than themselves.

In many cases however, the main influence on decisions about research careers seems to have come from their own PhD supervisors, or other professors within their early research contexts. As Professor Lunga pointed out:

My PhD supervisor was instrumental in exciting me deeply enough to stay in the research activity. In the beginning he was somebody to guide me and develop my interest in the field. He gave me the freedom to explore and discuss and challenge and debate things with him as much as I possibly could.

This type of experience is common to many of the research leaders in the sample and points to the influential role of the research leader or supervisor in the career development of the emerging new generation of researchers and scholars. South Africa has a situation of limited quality supervisory capacity at doctoral level, and hence the continued concern about the presence of sustainable catalysts for early research career motivation.

6.3. Career moves

Research can offer a very rewarding career in which a researcher embarks on a voyage of discovery, and in which opportunities may arise to develop new and important solutions to challenging problems. But not all careers in research follow a singular pathway. Understanding the institutional climate and being able to function within it are considered important keys to job success. How well do you fit in? What is your place and connection to the institution? (Johnson-Bailey and Cervero, 2008).

As highlighted earlier, four professors in the sample have remained within their PhD awarding institutions for varying periods of up to 27 years. The professors are all productive, NRF-rated and in senior research leadership positions and hence one can assume that they have been able to use their university research context to grow their research careers. Their universities are among the top five research producing institutions in the country. Except for one, researchers did not indicate any major dissatisfaction with their institution and had managed to succeed in spite of any/all institutional changes experienced over time. None of the universities in which these professors reside were affected by the merger context of the early 2000's. Given the historical beginnings of the South African higher education system, it is important to point out that these researchers are all white professors who studied and then were/are employed within the same historically white (English and Afrikaans medium) universities. This trajectory within the same institution(s) for each of the individual researchers may open a space for the concerns raised earlier by Lumby and Coleman (2007) in the literature review i.e. that some of the key concepts in transformational leadership are 'consensus' and 'aligned' which are seen as layers of sameness - can this be unproblematically achieved between individual and institution? Generally research leaders in this group portrayed a strong sense of institutional autonomy at this stage as senior researchers as is illustrated by comments provided:

We see ourselves as semi-autonomous within the university context. We raise all our own funds since the university still does not support us financially. We can be seen as similar to an non-governmental organisation (NGO) if you like. The NGO status gives you your own identity and freedom of expression. But sometimes this may be in conflict with the university. (Research Leader).

And then I got the chair! I was now in a position where I had some money and I had the position to take the leadership role. The biggest plus for me in being awarded a research chair is that it gives me relative independence in that it pays my salary and that creates a sense of making a huge contribution to the well-being of the school (Research Leader).

This contrasts rather strongly with a limited number of research leaders and students in the same sample who at this phase and time in their research careers question their place in and connection to their institution.

I think I am really angry about certain things and by the lack of consultation and support by the university around an issue that was important to my credibility as a researcher. To be honest I have felt alienated from my institution for the past three to four years. I actually feel that unless I work within a narrow framework and with narrow blinkers, then I would feel unrecognised by my institution. (Research Leader).

This feeling of institutional discontent comes through in this research leader's discussion about future options for the career trajectory:

Another institution is an option, but possibly not in this country. I would like to change, possibly need a change. I'd love to go to (name of institution in South Africa) but not in my profession. It would have to be more in a multidisciplinary capacity or a leadership position. I think I have strong leadership capacities.

Hence, although limited, this study indicates that some senior white research leaders may be considering moves from their historically white institutions based on a disconnection between their personal and professional experiences and the changing institutional cultures. It may be that disillusion with management has emerged through contestation around the meaning and content given to institutional transformation. This research did not test whether the institutions were aware of particular cases or whether they had contingency plans in place for the "brain drain" of highly rated researchers.

Thirty percent of the group of research leaders within the study have already moved between higher education institutions in recent years. In all cases the move is reported to have been related to research and their research careers and has occurred between historically white institutions. In most cases career moves mentioned by the researchers are characterised by the practice of 'head-hunting' and research productivity seems to be a factor upon which the decision to approach a person (head-hunt) is made. Potgieter (2002) explored the experiences of black academics who moved between institutions and found that "being head-hunted by institutions within a context of clear indications of institutional change provided a strong inducement to move"(p.22).

…and then another university wanted to build their research productivity and (name) approached me to move to (name of institution). I had a P-rating at the time and we were a highly productive unit.

…in my new role I had to develop some form of research culture, to start changing the profile of the staff. The idea was to bring in new staff that can build research capacity and thus populate the community with researchers. This was achieved by targeted head-hunting of people who had research experience.

In some cases discussions of career moves between institutions illustrates the researchers' opinions about the lack of fit in the departing institution and the apparent connection to the promises of the receiving institution. Two cases, as expressed by senior black researchers who left one historically white institution for another, are illustrated below.

I felt that my previous university was not willing to contribute to my research in the way that I needed them to, in order to reach my particular goals by a certain time. I do not think they understood how important this was for me. University X approached me, offered me a job and made some promises. There was a stronger commitment to the type of research idea I was going to take forward. They have been very supportive in terms of research. However they have not yet delivered on all their promises. (Research Leader)

The workload at my previous institution was enormous. The late nights and weekends were the only times you could draft the research papers. And over long periods of time positions would become vacant and the university would close them down for financial reasons. And the remaining people would take

on the additional workloads. I was putting a lot of pressure on myself as head of school and maintaining an A-rating. So it was a question of deciding whether I want to stay in research or get out. My decision has always been to stay in research. Hence I have now moved to a research position in a different institution, where much of my time will be spent on research and supervising students. This institution expects greater research productivity from me, but with a lighter teaching and management load I don't have any problems with that. (Research Leader)

These types of career moves have characterised the South African research context where the quest to build research capacity, strive for research excellence and grow a representative science workforce has been championed alongside the reality of budget constraints, the increased entrepreneurial nature of higher education management and efforts to address the transformation imperatives of our system. Earlier research on the movement of black academics between institutions (Potgieter 2002) cited one of the main rationalisations for these career moves as a lack of support for their academic development within host institutions. Jansen (2004) is of the opinion that economics, "is as much an explanation for the constant migration of a new class of black academics from one lucrative position to a more enticing position elsewhere, as might be disaffection with a particular institution" (p.10). Results from this study suggest that strong research performing NRF-rated researchers, especially black researchers (male and female), are head-hunted more actively and hence have increased choice over research career moves.

6.4. Complexities of Gender

During the interviews with both male and female research leaders there was no explicit question asked about the role or effect of gender on research pathways. Yet the analysis of the interviews indicated ways in which gender dynamics did affect research trajectories. These gender effects seemed more pronounced in the early parts of the research trajectories where individuals were, either consciously or unconsciously at the time, building research legitimacy for themselves.

The impetus of career direction towards a focus on research (PhD) frequently came from an external source for most women interviewed. This was usually expressed as a sense of surprise that this was an option at the specific point in each of the research careers. De la Rey (1999), in her work with professional women in higher education, referred to this external identification of possibility as 'agency unclaimed'. This is illustrated by comments from the female professors, especially with regard to their decisions to take the all important step in their research pathways i.e. to join a doctoral programme.

I remember finishing my master's work with Professor X and he said "What about a PhD?". I had never even thought about it. I didn't plan a research career and so it seems like I stumbled into it. (Professor Liu)

When I got the MBA I had the option of returning to industry. One of the academics said to me "Have you ever thought about an academic career?" And I said ''No, not really". After teaching on contract for one year he said to me… "If you really want to be an academic, seriously, then you have to go out there and get yourself a PhD". So I thought yeah, maybe. So for me it was important that somebody said "you want to be an academic", although at the time I really didn't understand the research component. (Professor Bright)

I am grateful to have taken this path, almost by default, since I didn't really know what I wanted to do. I had a very positive research experience in my fourth year. The primary driver was Prof XX(male) who served as an incredible mentor for me and one of the finest minds, I believe, in this university. (Professor Sandy)

The female professors in the sample seem to be able to 'pay it forward' as well, in providing the same recognition of talent in their female students:

The mentoring gave me the confidence to pursue a goal I had never considered for myself. She recognized something in me that I could not see in myself. She took me to a level of education I would not have aspired to if she had not been in my life (Professor Bright's mentee).

My relationship with her started off as a mentor-mentee relationship in the research environment. I felt completely free in terms of where I wanted to take my research and it was the first time that I actually thought that I could contribute using my own approach and way of thinking. She enabled and taught me to walk a structured and logical path towards the new and unknown (Professor Liu's mentee).

Marriage and children were also factors that impacted on career decisions, although none of the women presented these as negative influences. In the descriptions of their personal research trajectories these factors were acknowledged as having impact, but largely explained as an accepted, though difficult, part of the experience of being mother, wife and academic. As one of the more senior professors stated about her early career stage: "I didn't feel that gender barriers really affected me then. We even brought our babies back to the office because of the (limited) one month allowable maternity leave at the time". Decisions to move between full-time and part-time studies were largely influenced by the age of children as related by Prof Frankie 'I was married with two kids and couldn't go anywhere else, so I was going to have to do it part-time at (name of institution).'

Post-doctoral positions are an important part of research development, and even here decisions were influenced by family contexts of the married female professors as evidenced by the comment of Professor Liu…

But women have particular challenges. I was married at that stage when a post doc may have been the next stage. Even now, getting an award to go to an overseas university is not easy to take up with the family situation.

At the current research career stage, marked by positions of increasing research leadership status and management responsibilities, this consideration for children is still seen by the strong statement of one of the professors: "So being a mom, I always weigh up what I'm doing with its importance against spending time with my kids. I have actually become quite ruthless about my involvement in different kinds of stuff". During our interview, this professor asked to be able to take a phone call on her cell phone. "It is from my son and I always make every effort to answer since I know that he would not call on a whim. He understands the importance of our work here". She is an internationally recognised researcher working at the cutting edge of her field while still being very clear about creating her own balance between the roles of mother and academic.

Gender complexities within the institutional milieu were presented as a mixed bag of responses, based on varying personal experiences. Some professors found that the universities had generally been good about gender policies and creating enabling environments. However, changes were noted with regard to more recent re-structuring and/or mergers within universities - "it has only been recently, in terms of school structures, that I have felt that there have been gender barriers. This may be because of school headship that is rather complicated. The current head is male". A younger professor's experience of gender differentiation within the institution was however instrumental in a decision to change institutions:

I do not think that (name of institution) understood how important it was for me to reach certain goals at certain time points of my career path. They were asking me to wait for things I was not prepared to wait for, and especially when the males didn't have to wait.

The dilemma of the 'white male' within the South African context was also variously referred to although with different emphases. All three findings presented relate to different aspects of the race and gender transformation agenda as highlighted within the research context descriptors of Chapter 2. In all cases the comments illustrate the general system concerns for sustainable research capacity and leadership.

I feel terribly sorry for white men in this country and I confess to sometime advising (graduate students) to leave. Access up the system and recognition for them is almost impossible. This is a shame, since there is a loss out there (White female professor).

There is this middle group in the university structures, especially white males who have taught a lot but have not done much research. So confidence in that area is low, although their ideas may be interesting. That is the group that needs attention (Black female professor).

We are three white men in charge of the Centre. It is important that we bring in someone different if possible. This would be nice, so I'm looking and even though I am just two years down the line (this is a four-year appointment), I am thinking about the exit strategy, though not in a negative way (White male professor).

The students who were supervised by these research leaders also illustrated struggles with gender complexities that point to the fact that gender issues prevail, despite improved efforts at policy formulation and implementation within higher education. Gender complexities were most evident in black and white female students' responses to the questions about why they embarked on a PhD and any critical incidents that affected that pathway. It is interesting to note that none of the gender statements related to their relationship with or treatment by supervisors. Some remarks below illustrate the ambitions and also the levels of frustration associated with the gender specific complexities of study and family:

I think I wanted to prove to myself that I, as a woman, can do well in an engineering environment and be able to contribute to the knowledge globally.

My PhD was something I did for myself after hours, at times when I could scrape a few moments together. As mentioned, I have a husband and children - one of whom, (my middle child) was born during my second year of registration. Having a baby during the second year slowed down my productivity enormously.

The same student's response to a question about her post-doctoral status (at time of research study) was;

I am currently working full time in my profession, enjoying the status that comes with being able to call myself Dr. Proud that I got through the process with my marriage and family intact.

Many students in the social science and humanities do their PhDs on a part-time basis even though this is not the preferred option of all Professors interviewed in this sample. The female student, working-full time while undertaking doctoral studies, is faced with the tension of roles as described below by a mentee:

I also worked pretty much full-time in my private practice, meaning that I had a full work-load in my professional life as well. Had I been in a different phase of my life, I am sure I would have enjoyed the process more and made more of it. The truth is that I struggled through the four years feeling quite burdened and anxious a lot of the time. My point is that I could have utilised more opportunities, I could have written more articles, I could have submitted more for publication, I could have presented more overseas. But I did not invest

myself too much in that process because I had to balance my academic life with what I consider my real life - my family and work.

These responses find resonance and critique in gender studies on academics found in the literature (Prozesky 2008, de la Rey 1999, Walker 1998). A common finding in these studies is that the academic careers of men follow a much more orderly or at least linear progression, than that evidenced by the responses of the female students above. Women often postpone their PhDs to raise small children and/or interrupt their research and publication momentum because of family related demands on their time and energy (Prozesky, 2008: 61). It appears that the practice (as opposed to policy or implementation) of gender equity still remains a challenge.

An additional point of interest was a 'mothering attribute' revealed through the interview data, but, interestingly, this attribute was not specific to females only. In various instances the research, the institute or even the students were described by the research leaders in terms more commonly associated with family or children. This illustrated a very protective nature over the research enterprise and was usually spoken with much passion. In describing what keeps the team productive, the Professor answered:

I think it is just the joy of research. It is like raising kids in some way. You put them in an environment where they are happy and provide what they need and leave them to it. Expect certain behaviours of them and if they know what is expected they behave that way. (Female research leader)

On looking towards a future scenario, a Professor was at pains to point out that although ageing, he had no plans to leave just yet. He felt a close bond with the institute:

The institute has been like a baby and you love it like a baby and you want to see it do well and become successful because you care about it beyond it being a job (Male research leader).

When describing the roles of the research leader, mentoring of students was often central for all research leaders. There were nurturing descriptors, but always carefully balanced with the need to develop the students as well.

It is to be able to hold them through the terrible periods, because everybody hits the terrible patch. Hold them, but not in a way that creates dependence (Female research leader).

Student responses revealed their own experiences of the parental role of the research leaders:

She acted almost like a mother to us all and yet gave us very firm nudges where we waivered (Professor Farnkie's mentee)

Much as Prof was tough, he was also like a father and knew how to motivate one when the going was tough. This helped me through tough times (Professor Agri's mentee).

The discussions thus far support the notion that within academia our lives are encrypted by our race and our gender. Although all researchers in the sample are judged successful by virtue of research leadership and research productivity, "…the lived contexts in which individuals achieve that success are different." (Johnson-Bailey and Cervero, 2008: 311).

6.5. Management/Research

Bolden et al. (2007) found that there are several competing tensions within academic leadership, each of which can give rise to multiple and conflicting identities that can discourage academics from actively seeking and embracing formal academic roles. One of the interview questions of this study was about whether the researchers experienced any tensions in assuming their leadership roles since there is often a (perceived) tension between the 'administrative burden' of management and leadership roles and the requirement for excellent research performance of both the individual and the research unit. This tension was discussed in the earlier literature review and clearly expressed by a participant as follows:

It is ironic that as you climb a ladder in the university you are expected to assume so many more managerial responsibilities, and although I am good at that, it also takes a great deal of time.

While all participants acknowledged the heavy administrative workload of the senior academic research positions that they occupied, the leaders seemed to express different views and have different ways of coping with this tension. The mixed scenarios presented below illustrate the following:

(a) The level of frustration experienced in some situations;

You lead research, you administer research and you make sure that everything in the centre is still going ok. I am not only an academic, but also an administrator as well. I am busy the whole day shifting papers, as it were, but in my mind I want to write and do my research. When I think of my writing, it certainly has declined since I really became so involved. For me personally it is still important to maintain my personal research on top of this administrative role. This is the ultimate challenge for me and it still frustrates me terribly (Professor Wayne).

A crises situation developed at my institution and because of my business background, I was roped in to a post that was like an MD job in a company. I was dealing with logistics, maintenance, tenders, staffing etc. I was asked to help out for six months. It lasted 18 months in the end. My daily work had nothing to do with research and I was miserable. (Professor Bright)

The research leaders point to the lack of research assistants and insufficient research administration capacity to support and sustain the activities of these highly active research institutes or centres. Thus it would seem that research leaders running successful doctoral programmes and serving wider international research roles need to be provided with adequate support structures and systems to enable them to focus on the research needs rather than the administrative loads of the institutes. The general feeling about the administrative tensions is "…to get the right people to do the job in the first place". But staff costs for the right people at the level at which they are required are thought to be a major barrier. The overall feeling amongst this group of research leaders is that this type of workload is something that one can do for a time because of personal fulfilment, but that it is not certainly sustainable at the current pace and level of research output.

(b) Coping mechanisms used by some leaders to ensure dual academic excellence and leadership roles;

There is no tension for me in these areas. I think that if you are successful in research this lends itself to being a leader in other areas as well (Professor Marie).

I interpret this as you asking whether the only way up the university system is to leave the science behind. It is an issue for many scientists and academics in the system, but it has not been as issue for me. However, for me to operate the institute at its current level of productivity leaves no time for anything else. I have a formula I follow very tightly. This includes 40 hours a week on executive management work and 40 hours a week in the lab or directly related to the research with my students. I feel that the executive work is core work and I enjoy it. It is big picture stuff (Professor Bloom).

(c) Choices to focus on academic excellence without a formal leadership appointment (such as Head of Department).

My own personal experience has been that these two things clash rather than support each other. Now I have research to get my teeth into as opposed to going the management route. I did think about Head of School at various points, because the management route would have been an option. But given this context, I don't think that it's a do-able job for one person and the structure in the university is unlikely to change that (Professor Frankie).

However it (A rating) became an albatross around my neck, something which eventually backfired on me after five years of feeling this incredible pressure to retain my rating while chairing a department and resolving a whole lot of administrative issues. I don't think that anybody could have been able to retain that level of productivity. This (giving up head position) has been a good move and frees one up to concentrate (Professor Sandy).

Only three of the research leaders in the sample have received business qualifications in line with managing the multilayered, complex environment of the 21st century university. Yet all research leaders are faced with the responsibilities of leading research centres or institutes, fundraising, and the administration thereof. In the absence of effective and efficient administrative support services, the administration burden becomes overwhelming and takes a toll on both personal and professional choices and research performance.

6.6 Funding

The world of global science is expensive to join and sustaining participation at increasing levels of excellence is also costly. The 2010/11Times Higher Education World University Rankings uses research income as one of the indicators in the research category (volume, income and reputation worth 30%). The overall ranking of 5.25% is determined by the university's income, scaled against staff numbers and normalised for purchasing power parity (Baty, 2010). As with the overall use of world rankings, there is also some controversy about the use of the income indicator used in this way, since it can be influenced by national policy and economic conditions. According to world rankings officials, "research income is crucial to the development of world-class research, and because much of it is subjected to competition and judged by peer review", it has been included as a valid measure (http://www.timeshighereducation.co.uk.world-university). In addition, the ability to garner research funds is seen as one of the important indicators of the research leadership definition used for this study. The universities in which these participants undertake research differ in context, but funding is still a key variable that universities use to position their research performance and status.

Funding issues are presented as a contextual matter of influence for two main reasons:

(a) It came up in almost all discussions and hence seems to be an important research factor at leadership level;
(b) There is a possible link between research reputation (and hence, intellectual leadership) and the ability to raise funds for research or new students.

When it comes to research funding there seems to be consensus amongst the research leaders in the sample that:

• Research is expensive;
• Funding can be a major constraining factor;

- The university will not provide all the funds required to run high level research institutes;

- Third-stream funding must be raised from external sources;

- Fund-raising is an important, although time-consuming role of the research leader within the current university context.

However, contextual funding differences were apparent across the sample and an overview indicates that the differences related strongly to the disciplinary context of the researchers. Professor Lunga is an A-rated scientist and works in the animal sciences. He describes his research as mainly pure or basic research. At the time of the interview he had two local and two international post-graduate students and he is of the opinion that it is a struggle to get funding for basic research in areas such as his. This is in line with a shift in focus in the second half of the decade from fundamental to applied research, mostly in service of national social and economic goals. According to him "the area of research is interesting at a personal level but does not attract a lot of funding".

The funding situation for those centres working closely on issues directly affecting humanity and quality of life, people rights and matters of environmental management in Africa was contextualised differently. These centres have to raise money to fund their research, but they do not seem to struggle too much to find willing funding partners. The scenario does however create the potential for funding dependence. This is characterised by endless meetings with funders and large administrative workloads in terms of proposal writing and reporting. In these areas funding seems to be sourced mainly from large foundations and international organisations like the European Union (EU). The comments of Professor Agri illustrate the funding context in his centre:

Fortunately we have established a track record and reputation and so we don't have a serious problem with funding. We do actually receive expressions of interest from donors and we have resisted big requests in some cases. We are trying to resist going beyond our optimal size and compromising quality.

Professor Bloom explains his institute's ability to attract students as follows:

Actually we have lots of students and this is driven by reputation and money. You have to have money to fund students but you get money based on reputation. These two are very important levers. We draw very good post docs based on our reputation.

Those disciplines that have practical applications and closer links to industry have yet another funding model. This seems to apply to the engineering and technologies (e.g. biotechnology) sectors. Here funding requirements are huge and there is a drive to raise funds from industry but yet not be controlled by the industry partner. Issues of intellectual property are also crucial in this sector and hence funding can be tied to specific rules and regulations. Professor Liu describes the funding context of their centre of excellence:

Most of the funding we have comes from work we do mainly with overseas companies. It is very much a case of industrial consulting to fund our research. Recently we had to bring in about an additional R15 million per year. Any time we do not do achieve this we have about 40 research students that we cannot pay. We have to raise enough money to pay all in line with industry standards. We had to develop a whole new funding model to ensure that this can happen.

In the interdisciplinary health science areas (esp HIV/AIDS) many research directions of the research communities seem to have been strategic because of the availability of funding in these targeted areas. But the politics of research funding seem to be most visible in these areas as well, as illustrated by the comments of Professor Marie:

It irritates me that a particular group of people can control research money. I think that it is unfair, especially for people coming in with new ideas. With HIV research, it seems like people in (name of province) want to control the type of research that is done, where the money goes, etc. This is unacceptable to me. Research should not be linked to groups of people and what they think is important. Funding should not be there to protect certain ways of doing research.

From the discussions it is clear that funding is seen as a serious threat to the work of the researchers and their research institutes or centres. Funding for student training is a major concern for large research teams that cross-

subsidise their own costs, as well as funding for much needed expensive research equipment and laboratory costs to enable cutting edge research. The concerns of the research leaders and students relate to the broader South African higher education system issues of "general availability of funds, the bureaucratic process of accessing and managing funds and the continuous change in the strategic thinking of the funding agents" (ASSAF, 2010:95).

6.7. Synthesis of chapter

This chapter has provided a biographical overview of the research leaders in the sample, their research trajectories and certain contextual factors that have impacted on their research development. Synthesis of the findings from the quantitative data presented indicate that the research career trajectories of individual research leaders currently within South African universities are as varied as the individuals themselves. The academic positions in research may be 'typical', but the pathways to these positions and the factors of influence along the way have created very individual career portraits. The age profiles support the general system concerns about the ageing science workforce, although the sample also highlights this ageing within the female and black professoriate. Where highly qualified and productive female and black researchers are still in the minority in the South African higher education system, their exit through natural attrition raises further cause for concern.

If the PhD experience and qualification is considered to be the entry level stage of a research career, then the findings illustrate that both national and international doctorates have resulted in research leadership positions in later career stages in South Africa. The varied doctoral experiences and subsequent research development stages (e.g. career moves) have been shaped by the South African social and political influences on higher education, especially with regard to choices about research-led programmes and/or institutional affiliations.

The executive management tensions vis-à-vis traditional research management approaches mirror general findings within the international literature as outlined in Chapter 2.

In this sample, indications are that the NRF rating system has assisted in recognition of early excellence in young researchers (P-rating) and a focus on driving excellence in female researchers (A-rating). Both must be target areas for continued system-wide support in order to drive a transformed higher education human resource base. Even though South Africa is known for the strong focus on matters of gender equity, the findings illustrate that complexities of gender at senior leadership levels still exist, are closely intertwined in the day-to-day fabric of institutional life and are still affecting the career choices and current research trajectories of young female researchers within universities. Funding is seen as a systemic barrier to research performance and the chapter has outlined the challenges research teams face in times of budget constraints. Different disciplinary fields seem to be able to draw from different funding sources in line with their eventual outputs. The social sciences and humanities rely on external donor funds while the more applied fields use industry as the main source of funding. The research reputation of the research leader and the research institute/centre seems to influence the ability to raise external funds directly. However, any program that is supported largely by external funds is in constant threat.

Given some of the system and individual challenges to research development outlined in this chapter, the next chapter will outline the research contributions of scientists and show how they have played a significant part in the advancement of science to the benefit to the country. Chapter 7 will thus look in greater depth at the notion of fully engaged research leadership namely, aspects of intellectual leadership of the discipline or subject matter and leadership of the people