

Chapter 1

The demand for a doctorate: Global, African and South African contexts

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Introduction

Worldwide, in Africa and in South Africa, the importance of the doctorate has increased disproportionately in relation to its share of the overall graduate output over the last decade. This heightened attention has not been predominantly concerned with the traditional role of the PhD, namely the provision of a future supply of academics. Rather, it has focused on the increasingly important role that higher education – particularly high-level skills – is perceived to play in the knowledge economy.

In a literature review on doctoral studies, Louw and Muller (2014) state that it is common knowledge that the 1990s brought an upsurge of interest in the doctorate. This upsurge has become frenzied in recent years. For example, during 2013 alone, *University World News* (UWN) published more than 30 articles on the doctorate, covering the need for more or fewer PhDs, the importance of the doctorate in the knowledge economy, competition for talent, international mobility and changing models of PhD programmes, to mention but a few issues (see Appendix 3). In South Africa, the *National Development Plan* (NDP) (2012) has prioritised an increase in doctoral output from 1 876 in 2012 to 5 000 by 2030. And at a meeting on the doctorate in October 2013, sponsored by the National Research Foundation (NRF) and Carnegie Corporation of New York, there was broad agreement that Africa needs tens of thousands more PhDs in order to renew an ageing professoriate, staff the rapidly expanding higher education field, boost research and generate the high-level skills growing economies need (MacGregor 2013b).

This chapter will provide brief comments on the debates internationally, in Africa, and in South Africa. These comments cover broader policy debates and issues, including the renewed interest in the doctorate. We address international trends first, then recent attempts in Africa to address this issue and, lastly, some South African developments.

Internationally: An increasing number of PhDs?

Probably the most comprehensive global overview of doctoral production to date, 'The PhD factory' was published in *Nature* in 2011 (Cyranoski et al. 2011). Raising debate with the subtitle, 'The world is producing more PhDs than ever before. Is it time to stop?', the article begins by reporting that in Organisation for Economic Co-operation and Development (OECD) countries, the number of science doctorates grew, between 1998 and 2008, by nearly 40% to some 34 000. The authors noted that this growth showed no sign of slowing: most countries are building up their higher education systems because they see educated workers as a key to economic growth.

During the 1990s, there were indications of a correspondence between the acceptance of the notion of the knowledge economy and society, on the one hand, and the rise of the doctorate, on the other. In 1991, as part of his 'university-as-the-engine-of-development' paper delivered at a World Bank seminar in Kuala Lumpur, Manuel Castells (1991) argued that new modes of economic production were increasingly reliant on knowledge and information technology. Knowledge and 'informationalism' had become central to globalisation and development (Castells and Cloete 2011). The sources of productivity and competitiveness were increasingly dependent on knowledge and information being applied to productivity. The increasing generation and accessing of knowledge has led to what is now commonly

referred to as the knowledge society (Castells 1991) or the knowledge economy (Jessop 2007).

On the one hand, some people still question the notion of the knowledge economy; in recent times, Jessop (2007) described it as a fictitious commodity. On the other hand, the OECD, the World Bank and many governments often use it as kind of ideology to promote certain economic and education policies. Nonetheless, there is a substantial body of evidence about the importance of knowledge in economies linked into the global information society.

Econometric studies carried out during the early 1990s started showing a statistical relationship between diffusion of information technology, productivity and competition for countries, regions, industries and firms (Monk 1989; Landau and Rosenberg 1986; Castells 1991). A decade later, a World Bank calculation showed that the knowledge sector added more value than the business process to a product (Serageldin 2000). This position was taken a few steps further by Schwab (2012), founder of the World Economic Forum (WEF), who, reflecting on the 2012 WEF meeting, suggested that ‘talentism’ is the new capitalism.

Confirming the valuing of talent in today’s global economy, the Mercer Talent Survey shows that chief executive officers understand that talent is a primary source of competitive advantage: whether entering a new market, innovating existing processes, developing a product or expanding service lines, it is an essential element of every core business function (Mercer 2013).

If knowledge and information are the new electricity of the economy, then it is a reasonable assumption that the university – as the main knowledge institution in society – will become increasingly important and that its apex training product, the PhD, will appear on the skills radar (*Times Literary Supplement* 2013).

A number of initiatives were launched during the past two decades to examine doctoral education and training more closely, with the aim of reforming it in yet-to-be-determined ways. In Europe, perhaps the best-known policy changes are those instituted via the Bologna Declaration of 1999 (Joint Declaration of the European Ministers of Education 1999), with its harmonisation of the higher education landscape, as well as the Lisbon Strategy of 2000 to create a European Research and Innovation Area (Lisbon European Council 2000). In North America, a number of investigations were launched, such as by the United States Council of Graduate Schools’ PhD Completion Project (Council of Graduate Schools 2008), the Woodrow Wilson National Fellowship Foundation’s Responsive PhD Initiative (Woodrow Wilson National Fellowship Foundation 2005), the Carnegie Initiative on the Doctorate (Golde and Walker 2006) and the Graduate Education Initiative funded by the Andrew W Mellon Foundation (Ehrenberg et al. 2010). Writing in the mid-2000s, Pearson (2005: 119)

described doctoral education as an ‘emergent field of study’ characterised by great vigour and a breadth of interest.

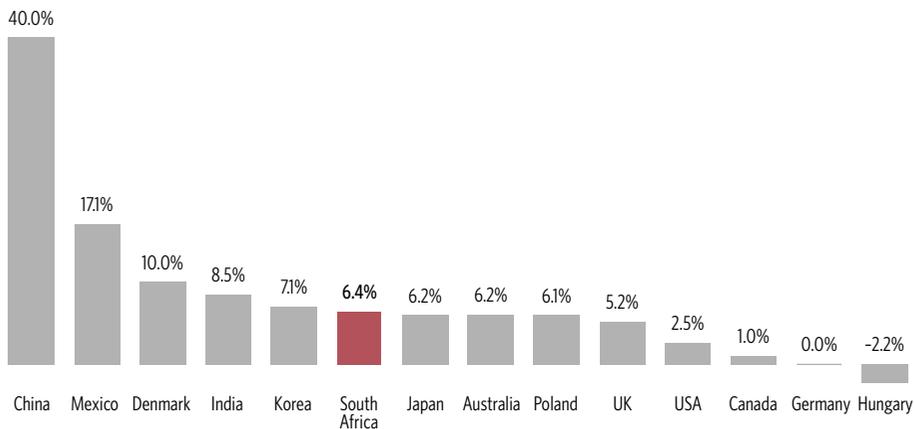
Despite this emerging interest, growth in PhD production is not uniform across the world and there is considerable debate about whether it is an unambiguously positive development. Figure 1.1 tells a differentiated story. Countries that already have high levels of doctorate production (Germany, Canada, the United States and the United Kingdom) have an output that is growing at around 5% or less, while fast-developing countries are growing doctoral output at more than 7%, with Mexico (17%) and China (40%) increasing at astronomical rates. An exception amongst developed countries is Denmark (10%), which adopted a comprehensive knowledge economy development growth path and increased spending on higher education after the 2008 global financial crisis.

Cyranoski et al. (2011) summarise the Chinese phenomenon as follows:

The number of PhD holders in China is going through the roof, with some 50 000 people graduating with doctorates across all disciplines in 2009 – and by some counts it now surpasses all other countries. The main problem is the low quality of many graduates.
(Cyranoski et al. 2011: 1)

It is widely known that China’s policy of developing world-class universities is underpinned by its view that education providing for high-level skills is central to economic growth (Shen 2013). Other countries that are following massive expansion policies are Singapore (‘growth in all directions’), which has experienced a 60% growth over a five-year period, and India

Figure 1.1: The rise of the doctorate: Percentage growth in doctoral output (1998-2006)



Source: Cyranoski et al. 2011

(‘PhDs wanted’), which is planning to grow much faster than the current 8.5% (Cyranoski et al. 2011: 277). Many Asian countries – but particularly Korea, Thailand and Malaysia – are following radical PhD expansion policies.

While the US is now, for the first time since the 1950s, the world’s second-largest producer of PhDs after China, there is considerable debate about continuing growth. Paula Stephan, an economist who studies PhD trends, charges that it is ‘scandalous that US politicians continue to speak of a PhD shortage [...] unless Congress wants to put money into creating jobs for these people rather than just creating supply’ (Stephan 2011, in Cyranoski et al. 2011: 277).

In the US, the proportion of people with science PhDs who get tenured academic positions in the sciences has been dropping steadily and industry does not appear to be fully absorbing the surplus. In 1973, 55% of US doctorates in the biological sciences secured tenure-track positions within six years of completing their PhDs, with only 2% being in a postdoctoral or another untenured academic position. By 2006, this figure had decreased to only 15% holding tenured positions six years after graduating and increasing numbers of PhD graduates taking jobs that did not require a PhD (Stephan 2011, in Cyranoski et al. 2011: 277). Stephan argues that it is a waste of resources to spend money on training students who get jobs for which they are not well matched (Stephan 2011, in Cyranoski et al. 2011).

Hacker and Dreifus (2011) concur that PhD production has far outstripped the demand for university lecturers. They report that while the US produced more than 100 000 PhDs between 2005 and 2009, only 16 000 new professorships became available. Furthermore, the use of PhD students to do much of the undergraduate teaching has reduced the number of full-time academic jobs.

The 2013 Postgraduate Research Experience Survey (Bennett and Turner 2013) covered 122 UK universities and received 4 500 responses and it found that 40% of doctoral students were aiming for an academic career and 27% for a research or professional career outside higher education. The career pathways survey of 2010 graduates showed that 2% were unemployed, 20% were in higher education research occupations, and 25% in higher education teaching and lecturing, with 15% in research not in the higher-education sector and 25% in other doctoral occupations.

The issue is not only oversupply for the academic market but also relevant skills for the non-academic market. *The Economist* (2010) claims that many organisations that pay for doctorates with research skills have realised that significant numbers of PhD graduates find it tough to transfer their skills to the job market. For example, writing lab reports, preparing academic presentations and conducting six-month-long literature reviews do not translate directly into skills required in the business world, where

technical knowledge has to be assimilated quickly and presented in simple terms to a wider audience. In responding to this problem, some universities are offering their PhD students training in soft skills that may be useful in the labour market, such as communication and teamwork. In Britain, a four-year New Route PhD claims to develop such skills in graduates (*The Economist* 2010).

The position that doctoral training is undertaken either for traditional academic purposes or for commercial labour markets does not take into consideration the fact that the process of doctoral training in the US is integral to the global knowledge economy. For example, the PhD arena in the US is no longer a male-dominated enterprise benefiting US citizens alone. In 1966, US-born white males received 71% of science and engineering PhDs, US-born females earned 6% of those degrees and foreign-born students received 23% (Bound et al. 2009). By the year 2000, US-born white males received just 35% of science and engineering PhDs, while 25% of such doctorates were awarded to females and 39% to foreign-born students (Bound et al. 2009). In 2003, doctorate recipients from outside the United States accounted for 50% of PhDs awarded in the physical sciences, 67% in engineering and 68% in economics (Bound et al. 2009). Linked to this, Anna-Lee Saxenian estimates that approximately 35% of all start-up companies in Silicon Valley are owned by East Asian and Eastern European students who came to the California higher-education system for postgraduate studies linked to the Silicon Valley research and innovation ecosystem, which has been a magnet for the 'best and the brightest' from all over the US, and increasingly from abroad, for more than a half a century (Saxenian, in Castells and Himanen 2014).

What percentage of foreign students qualifying in the US return to their home countries? In the areas of science and engineering, the US 1999 cohort remained in the country at a stay rate of 68% two years after graduation and ten years later the stay rate was still relatively stable at 60%. A similar study in 2004 revealed almost exactly the same percentage (66%), which declined over five years to 62% in 2009 (National Science Foundation 2012). There was an increase in foreign students returning to their countries of origin after the 2008 financial crash but by 2011 patterns had returned to pre-2008 levels (National Science Foundation 2012). New York Mayor Bloomberg, joining influential chief executive officers from the Partnership for a New American Economy, said, 'I can't think of any ways to destroy this country quite as direct and impactful as our immigration policy [...] We educate the best and the brightest, and then we don't give them a green card' (Packer 2010: online). Furthermore, a study by the Council of Graduate Schools (2008) showed that foreign students completed their studies at a faster rate than US students. Overall the cumulative ten-year completion rate for foreign students was 67% against

54% for domestic students. In mathematics and physical science, the difference was even bigger at 68% versus 51%.

But the PhD is not just a possible contributor to talent in the knowledge economy – it is also regarded as crucial for improving quality in the university system. In an article entitled ‘The rise and rise of PhDs as standard’, Morgan quotes Wendy Piatt, Director-General of the Russell Group (UK) of larger research-intensive universities:

The vast majority of (our) academics [...] have doctorates. There may be some slight variation according to discipline, but academics without a doctorate would be very much in a tiny minority. This has been the case at Russell Group universities for many years. Providing a first-class teaching and learning experience is vitally important to our universities. (Piatt 2011, in Morgan 2011: 1)

Germany is widely regarded as having one of the best vocational or artisan systems in the world. According to the review in *Nature* (Cyranoski et al. 2011), it is not only Europe’s biggest producer of doctoral graduates, but has also made significant progress in solving the oversupply problem through a major redesign of its doctoral education programmes over the past 20 years. Under the traditional mentorship model, supervisors recruit PhD students and train them to become academics, with little oversight from the university or research institution. The application of this traditional model has changed in Germany in that the institution now plays much more of an active role in student recruitment and development, with many students following structured courses outside the lab, including classes in presenting, report-writing and other transferable skills. Just fewer than 6% of PhD graduates in science eventually go into full-time academic positions, while most will find research jobs in industry. As summed up by Wihelmy, ‘The long way to a professorship in Germany and the relatively low income of German academic staff makes leaving the university after the PhD a good option’ (2011, in Cyranoski et al. 2011: 278).

Latin America has not demonstrated the same urgency as other regions to expand, with the exception of Mexico (see Figure 1.1) and Brazil, which have begun to take the knowledge economy very seriously. In its recent strategy to boost its economy’s scientific base, Brazil offered 75 000 grants in 2011 – to be allocated by the end of 2014 – to science students keen to study abroad (Hennigan 2011). The aim of this Science Without Frontiers programme is to increase the number of Brazilian pre- and post-doctoral students in leading foreign institutions (Hennigan 2011). President Dilma Rousseff stated at the launch of the programme that the objective was ‘not to produce “75 000 Einsteins”’ but instead to build ‘a knowledge base in the country; that these students return and with their capacity and training and

transform the know-how and innovation of the country' (Rousseff 2011, in Hennigan 2011: online).

In addition to the 75 000 publicly funded grants, Brazil's Secretariat of Strategic Affairs aims to raise financing from the private sector for a further 25 000 grants (Hennigan 2011). Of the 100 000 fellowships in the four-year programme, around 10% are earmarked for doctoral studies. Another 10% allocated to postdoctoral fellowships will benefit young Brazilian professors on sabbatical, spending a year in a university abroad (Schwartzman 2013).

The doctoral fellowships described above will be in the format of sandwich programmes in which Brazilian doctoral students go abroad for a year to do some work in a high-capacity foreign university before returning to complete their doctoral programme at home. The time spent abroad is sandwiched between two periods of studying in Brazil (Schwartzman 2013). This approach emphasises a trend to reduce the number of four-year doctoral fellowships and to increase the number of short-term fellowships.

At a convention on the doctorate in November 2013, organised jointly by the Carnegie Corporation of New York and South Africa's NRF, Professor Ribeiro of the University of São Paulo presented the Brazilian experience on expanding doctoral training while putting quality control measures in place to ensure excellence. He reported that Brazil raised its doctoral production from 800 to 10 000 graduates per annum in less than thirty years (1984 to 2010). Current doctoral production stands at 12 000 per annum (Ribeiro, in Namuddu 2014).

Africa needs tens of thousands more PhDs

Africa is certainly not left out of the debate about the importance of the doctorate. During 2012 alone, discussion on doctoral education took place through an International Association of Universities (IAU) and Catalan Association of Public Universities (ACUP) international seminar entitled 'Innovative approaches to doctoral education and research training in sub-Saharan Africa' (IAU and the Catalan Association of Public Universities 2012), the Southern African Regional Universities Association (SARUA) leadership dialogue, 'Doctoral education: Renewing the academy' (SARUA 2012) and the IAU's 'Changing nature of doctoral studies in sub-Saharan Africa' (IAU 2012).

In Africa the zeitgeist is perhaps best summed up by Prof. Is-haq Oloyede who, speaking as chair of the IAU Task Force, highlighted the direct link between doctoral studies and research for the development of Africa (IAU-ACUP 2012). He stressed the importance of supervision and career development for university and national advancement, and called for more synergy and collaboration to broaden the development of doctoral

education in African universities. The importance of doctoral education and its relevance for African higher education institutions (HEIs) was not questioned (IAU-ACUP 2012).

In summing up the challenges in developing and promoting doctoral education, the main issues that the IAU-ACUP report (IAU-ACUP 2012: 6) lists are:

- Shortage of funding (for students and institutions);
- Low institutional capacity;
- Diversity and duplication of programmes;
- Poor quality supervision;
- Inadequate responsiveness to national, social and economic needs;
- Weak links to industry;
- Lack of academic freedom; and
- Lack of international information-sharing.

Interestingly, the report concludes by stating that ‘while the status of the PhD is recognised in Africa, African society does not know how to evaluate the competencies of PhD holders nor the relevance of what they can contribute to society’ (IAU-ACUP 2012: 20).

The IAU-ACUP report is partially informed by an IAU study that looked at six universities: Kenyatta in Kenya, Doula in Cameroon, Ilorin in Nigeria, Science and Technology of Benin (USTB), Gaston Berger (UGB) in Senegal and the National University of Rwanda (NUR). The report provided a broad overview and comparisons of the listed institutions in terms of programmes, enrolments, graduation and funding. The main conclusion of the study was the following:

The project was found to be a valuable experience and an ‘eye opener’ to participating institutional teams and university leadership as well. Indeed if most leaders and main doctoral programme actors thought they knew what was at stake, many reported to have been surprised by what the self-assessment exercise and interim report brought to the fore. Many reported that they thought that their doctoral programmes were doing well and realize that there is considerable space for improvement. (IAU 2012: 43)

In making recommendations to address the doctoral challenges, the conference proposed, amongst others, the following (IAU-ACUP 2012: 19–20):

- *Strategy:* Strong national research strategies, innovative approaches, research and doctoral studies synergies and improved data collection;

- *Quality*: Rethinking access strategies, improved supervision, structured evaluation systems, flagship universities and centres of excellence;
- *Funding*: Increased government support for research and for staff incentives to secure proper supervision;
- *Networking*: Increased sharing of good practices; and
- *Alternative modes of delivery*: Different models of doctoral education, creative mechanisms to attract highly skilled individuals from the diaspora and better employment opportunities.

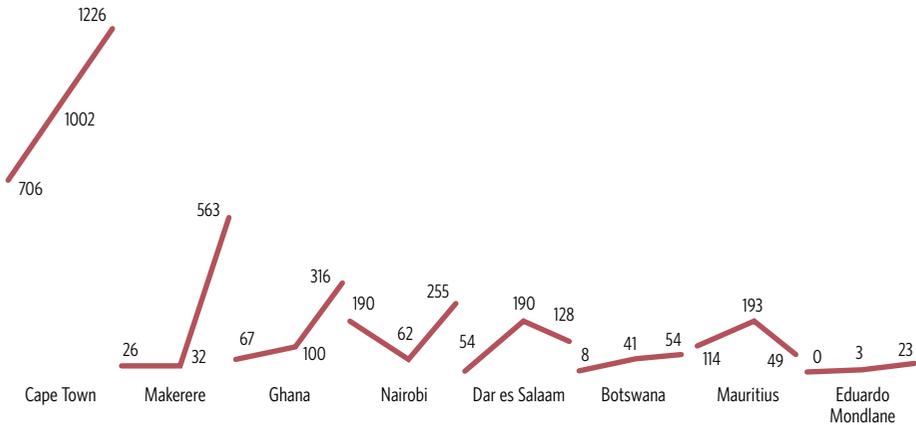
At the aforementioned NRF/Carnegie convention on the doctorate in 2014, the chairperson of the African Union Commission, Dr Nkosazana Dlamini Zuma, said, ‘Your discussions on looking at ways to train thousands more PhD students on the continent, in addition to the ones we send to train elsewhere, is therefore needed now more than ever before’ (Zuma, in Namuddu 2014: 7). Reporting for *University World News*, Karen MacGregor summed up the meeting as follows: ‘There is a conundrum. In order to produce more doctoral graduates, more PhD supervisors are needed: but in order to have more supervisors, more PhDs are needed’ (McGregor (2013b: online).

Africa is littered with anecdotal studies, followed by high-profile conferences with grand declarations and recommendations. Considering the general development-aid funding context, the challenge is to do more systematic, research-informed studies to diagnose problems in a way that avoids hasty prescriptions. The lack of implemented reform in Africa is often lamented as a problem not of good policy but of poor implementation, which is then attributed to a lack of capacity or funds. However, the difficulty actually originates with superficial understandings of the problem, followed by declarations rather than policy, as well as a lack of consensus on what to do. All of this gives rise to inevitable disappointment.

Trends in doctoral enrolment numbers

A bleak picture of doctoral education emerged from an eleven-year study on eight sub-Saharan African universities carried out by the Higher Education Research and Advocacy Network in Africa (HERANA) project at the Centre for Higher Education Trust (CHET) (Bunting et al. 2014). The total doctoral enrolment for eight sub-Saharan African flagship universities in 2011 was only 2 614, with the University of Cape Town (UCT) enrolling 1 226 and the other seven universities in the study only 1 388 collectively (see Figure 1.2). While the University of Botswana, Makerere University and the University of Ghana showed strong growth – albeit from a low base – doctoral enrolments at the University of Mauritius actually declined, and inconsistent performance at midpoints

Figure 1.2: Doctoral enrolments at eight sub-Saharan African universities (2001, 2007, 2011)



Source: Bunting et al. 2014

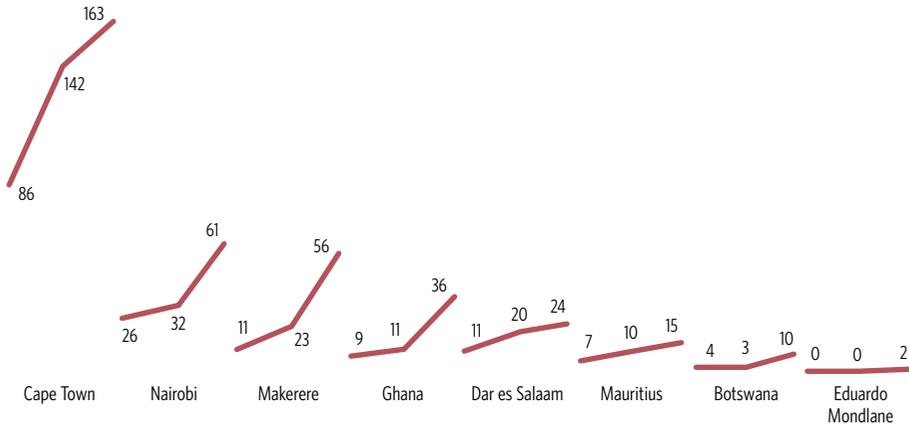
during the period are evident in the doctoral enrolment figures for the Universities of Dar es Salaam and Nairobi (Bunting et al. 2014).

The slow growth in doctoral enrolments illustrated in Figure 1.2 is in sharp contrast to the explosion in masters enrolments at certain universities. At the University of Nairobi, masters enrolments increased by 12% annually (from 3 937 in 2001 to 11 807 in 2011) and at Ghana by 13% (1 198 in 2001 to 4 280 in 2011). While Mauritius and Botswana grew at over 10% per annum, it is of interest to note that UCT and Makerere grew at around 3% (Bunting et al. 2014).

Trends in doctoral graduation numbers

The picture regarding doctoral graduates, as illustrated in Figure 1.3, is even more alarming than that for doctoral enrolments (Bunting et al. 2014). The combined doctoral graduate total at the eight universities increased from 154 in 2001 to 367 in 2011. UCT, Nairobi and Makerere produced 80% of the 2001 doctoral graduate total in 2001, 82% of the total in 2007 and 76% in 2011. Over the same period, the University of Sao Paulo in Brazil produced over 1 000 doctoral graduates, a figure which virtually matches the combined output of all 23 South African universities in 2011 (Badsha and Cloete 2011). The average annual increases at sub-Saharan African universities are also well below 10%, with the exception of institutions such as Ghana, Makerere and Botswana, all of which started from very low bases in 2001 (Bunting et al. 2014).

Figure 1.3: Doctoral graduates at eight sub-Saharan African universities (2001, 2007, 2011)

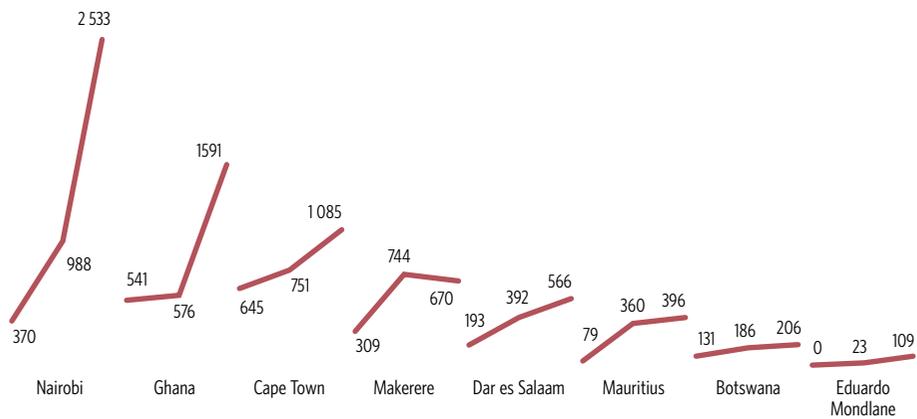


Source: Bunting et al. 2014

Pipeline of graduates against enrolments

Figure 1.4 shows how masters graduate totals increased from 2001 to 2011 (Bunting et al. 2014). The masters graduate total of the eight universities increased at an average annual rate of 12% over the period (from 2 268 in 2001 to 7 156 in 2011). Two universities were responsible for 66% of the overall increase of 4 888 in 2011 compared to 2001: Nairobi, which showed a six-fold increase from 370 in 2001 to 2 533 in 2011, and Ghana, which had a masters graduate total trebling from 541 in 2001 to 1 591 in 2011.

Figure 1.4: Masters graduates at eight sub-Saharan African universities (2001, 2007, 2011)



Source: Bunting et al. 2014

However, a major problem in Africa is the extremely low conversion rate from masters to doctoral enrolment. At UCT and Makerere the ratio was 3:1 in 2011, meaning that for every three masters students there was one doctoral student. However, at Nairobi the ratio was 46:1 in the same year, while at Eduardo Mondlane it was 56:1 (Bunting et al. 2014).

Innovation in doctoral education

In addition to the pipeline problem in Africa, it also appears that there has not been much innovation in forms of doctoral education. Mentz (2013) argues that in response to the emergence of knowledge societies with the concomitant shifting labour-market needs, institutions in developed and developing nations alike have begun to re-engineer their doctoral programmes to address these shifts.

But a review of doctoral programmes undertaken in sub-Saharan Africa by Szanton and Manyika in 2002 revealed that most doctorates take the form of a research dissertation that is guided by one supervisor (Szanton and Manyika 2002). They reported that factors that discourage use of other forms of the doctorate are the limits on supervisor options, the lack of funding for collaborative projects and even restrictions posed by the regulatory environment. This review also showed that these same factors serve to drive African postgraduates to follow funded-scholarship opportunities available at universities on other continents.

The HERANA study (Bunting et al. 2014) looked at factors that affect the production of doctorates in Africa. In addition to a lack of national and institutional policies and funding promoting doctoral education, there are other factors intrinsic to academia in Africa that could have detrimental effects. A PhD study by Langa (2010), linked to the HERANA project, suggested that having a strong academic network link, along with publications, is a key entry point to academics being allocated consultancy contracts. Langa found that it is not that academics choose research and supervision over consultancy; instead, some do a balancing act between research and consultancy, while others seem to gravitate towards and become deeply involved in consultancy and foreign aid networks.

Discussions with interview respondents during the HERANA study indicated that another factor that distracted academics from knowledge production was supplementary teaching. On the one hand, the new method of raising third-stream income – namely, the innovation of private and public students in the same institution, with additional remuneration received for teaching of private students – has resulted in academics taking on heavier teaching loads in order to supplement their incomes. On the other hand, the proliferation of private higher education institutions, some

literally within walking distance of public institutions, means that large numbers of senior academics are triple-teaching.

Within a context where the candidate in all likelihood does not have funds for full-time study and where there are no extrinsic institutional rewards, PhD supervision is a poor competitor for the time of triple-teaching academics. The same applies to the rigorous research required for international peer-reviewed publication: it is much easier and far more rewarding to triple-teach and to carry out consultancies than to engage in intensive research reviewing or doctoral supervision (Cloete et al. 2011).

In a study conducted in 2008 in the SADC region, the Centre for Research on Evaluation, Science and Technology (CREST) broke new ground in generating empirical evidence of the extent of consultancy work by academics at the universities in 14 African countries (Mouton et al. 2008). As far as the extent of consultancy work is concerned, the majority of CREST's survey respondents (62%) indicated that they were involved in consultancy of some kind. The proportion of respondents by country who indicated that they engaged in consultancy ranged from 50% (Lesotho) to 72% (Malawi and Zimbabwe).

On the question of what type of consultancy respondents were involved in, follow-up responses indicated that clients using their services were:

- Governments in their own countries (36%);
- The industry sector in their own countries (30%);
- Academics in their own countries (21%);
- Academics in other African countries (8%);
- Academics in non-African countries (7%);
- Governments of other African countries (8%); and
- Industry in other African countries (4%) (Mouton et al. 2008).

The main reasons that respondents provided for engaging in consultancy were also analysed. In a comparison of South African and other SADC responses, there were some noticeable and statistically significant differences. Two areas in which there seemed to be very little difference were the fact that consultancy was undertaken because the respondent enjoyed the variety of topics that this brought (87% vs 82%) and that consultancy was done because of the demand in the market (32% vs 38%). Other reasons given demonstrate large differences between South African and other respondents:

- Inadequate salary: South Africa (54%) vs SADC (69%);
- Consultancy advanced the respondent's network and career: South Africa (39%) vs SADC (72%);

- Respondents' research interests were not addressed by their own institutions: South Africa (18%) vs SADC (47%); and
- Consultancy improved respondents' knowledge and skills: South Africa (78%) vs SADC (92%) (Mouton et al. 2008).

A further breakdown by scientific field revealed significant field differences, but mostly in the expected direction. Respondents in highly applied fields (where there were close links with industry and also government) such as applied sciences and technologies, earth sciences, engineering, material sciences, as well as social sciences (with policy work) reported high percentages of consultancy engagement. In fields such as mathematical sciences, few consultancy opportunities existed (Mouton et al. 2008).

The implications of the above are that the lack of knowledge production at some of Africa's flagship universities does not simply arise from a lack of capacity and resources, but that there are also complex and contradictory rewards within a resource-scarce environment. These factors contribute to the absence of a strong, output-orientated culture of research and doctoral production at these universities.

South Africa: More PhDs to solve the quality problem

In the 1990s, the dominant debate in higher education in South Africa was about access and equity, particularly how to increase the number of high-school graduates entering universities and how to address racial and gender imbalances. The policy debate leaned sharply towards equity and methods of changing the racial composition of higher education. Access, in this context, was not seen as massification or as part of a development model, but rather as a mechanism for redressing the imbalances of the past by using a model of planned growth. This approach succeeded in increasing the percentage of black¹ students in universities (from 53% in 1996 to 69% in 2011) but it hardly affected the overall gross participation rates of African students, which only increased from 10% to 16% (Cloete 2014b).

Following the publication of the *National Development Plan* (NDP), the focus of the national debate in South Africa shifted from equity to development (National Planning Commission [NPC] 2012). This was motivated by the fact that equity as redress alone was running counter to the demands for economic growth and youth employment. Mounting evidence indicated that the country needed a drastic review of its education policies. The WEF rated the South African education and training system 140th out of 144 countries, declaring that the greatest impediment to doing business in South Africa was an inadequately skilled workforce (WEF 2012: 13).

Using assessments of the South African system by the Harvard panel on ASGISA (Dube et al. 2007), a World Bank project (Fisher and Scott 2011) and CHET's recent work on differentiation (Cloete 2011a), the South African higher-education system can be characterised as 'medium knowledge producing and differentiated; with low participation and high attrition rates; with insufficient capacity for adequate skills production; and with a small, chronically-in-crisis, sub-sector (mainly institutions from the historically disadvantaged universities)' (Badsha and Cloete 2011: 5). The two central issues requiring new approaches and new policies are knowledge production – mainly the production of doctoral graduates and publications listed in the Thomson Reuters Web of Science database – and participation rates (the proportion of those between 18 to 24 years of age who are in tertiary education).

The shift in discourse from equity to development was perhaps most clearly articulated during the South African Planning Ministry's national development planning process and subsequent proposals. Central to a highly productive, globally connected economy are high-level skills and extensive participation in higher education. The first draft of the NDP embraced the knowledge-economy argument (NPC 2011); in fact, it was so enthusiastic about knowledge production that it declared that 'knowledge production is the rationale of higher education' (NPC 2011: 271). This is indeed a radical departure from the traditional rationale of higher education in Africa, being the dissemination, through teaching, of knowledge from elsewhere. As indicated earlier, it is also a significant departure from the post-1994 focus in South Africa, where higher education was seen mainly as an equity instrument providing for mobility of the historically disadvantaged (Cloete et al. 2011).

The NDP draft report (NPC 2011) accepted the characterisation of the South African system as described above (Badsha and Cloete 2011). It proposed a dramatic increase in post-secondary school enrolments, mainly in the further education and training (FET) college sector. It also proposed the strengthening of knowledge production that would entail, amongst other things:

- Improving coordination, especially between the Department of Higher Education and Training (DHET) and Department of Science and Technology (DST);
- Increasing the proportion of postgraduate enrolments, outputs and postdocs; and
- Improving existing and designing new incentive structures, particularly for increasing doctoral output. This is necessary not only for research and development, but also to increase the proportion of academic staff

with doctorates and the increasing demand for ‘professional’ PhDs in the financial and services sectors (Badsha and Cloete 2011).

However, there is a significant shift discernible between the NPC’s draft proposal of November 2011 and its final report in August 2012. In a review comparing the two versions, Muller comments that there is a ‘marked moderation in the Plan [2012] compared to the assertiveness of the Draft [2011]. It is clear that it is the product of multiple suggestions from different stakeholders, and that the drafters have tried to juggle competing priorities’ (Muller 2013: 1). A priority that shifted to the forefront in the writing of the final plan was the target of increasing the percentage of academic staff with a PhD from the 2010 level of 34% to 70% by 2030.

The main reason for this major change between the draft and final plans is the quality ascribed to be at the heart of poor performance in the sector: ‘The most important factor that determines quality is the qualifications of staff’ (NPC 2012: 318). The basic argument underlying the finalised NDP runs as follows: raise the qualifications of staff – in other words, increase the number of academics with PhDs – and the quality of the student outcomes will improve. This will also significantly improve throughput, the capacity to supervise higher degrees and, ultimately, the research productivity of the sector. In short, ‘quality defined as having a PhD is seen by the NDP as being the key that will unlock a virtuous cycle of effects’ (Muller 2013: 2). In Chapter 6 of this book, we provide quotes from supervisors who argue that a major problem is the quality – or under-preparedness – of students and it is not only about increasing the number of academic staff with PhDs (Mouton et al. 2015).

The NDP went further by setting a national target of producing more than 100 doctoral graduates per one million of the population by 2030 (NPC 2012). Roughly speaking, this means that the annual production of doctoral graduates will have to increase from 2 051 per annum (in 2013) to 5 000 per annum in 2030. In reality, it nearly tripled from 5 152 in 1996 to 13 965 in 2012, showing a 6.4% per annum increase, while the number of graduates also nearly tripled, from 685 to 1 879, being a 6.5% per annum increase (DHET 2013a). The more worrisome aspect in South Africa is that the average graduation (completion rate) over three cohorts (2003, 2004 and 2005) is only 35% after five years and 41% after six years. And the 2006 and 2007 cohorts (at 41% and 39% respectively) show essentially the same trend (DHET 2013a).

The NDP acknowledged that there was ‘a shortage of academics’ (NPC 2012: 317), and that just over a third possessed a PhD, which qualified them to supervise a PhD. Where will this extra supervisory capacity come from, let alone the increased number of PhD students? The NDP identifies three new sources:

1. Local institutions with ‘embedded research capacity’ that should, in return for recognition of this niche, assist with supervision at other universities that only ‘focus on teaching and learning’;
2. Partnerships with industry and commerce; and
3. Partnerships and exchanges with international universities (NPC 2012: 319).

Achievement of the target of more than 100 doctoral graduates per million of the population by 2030 will only be met under stringent conditions, including an unlikely local injection of supervisory capacity. Surprisingly, the NDP does not endorse a recommendation by Badsha and Cloete (2011) that proposes extending the retirement age for certain academics or rehiring retirees with a track record of successful supervision. The NDP did not address or make recommendations on how to deal with considerable dropout and non-completion rates. A more detailed analysis of these figures is provided in Chapter 3 of this book.

Preceding the NDP, the Academy of Science of South Africa (ASSAf) conducted an extensive study entitled *The PhD Study: An evidence-based study on how to meet the demands for high-level skills in an emerging economy* (ASSAf 2010). The main conclusion of this report (addressed in detail later in this book) was the following: ‘There is a broad consensus in the science community in South Africa that not enough high-quality PhDs are being produced in relation to the developmental needs of the country’ (ASSAf 2010: 15).

Debates and discourses

The international discourse on the doctorate is largely about the contribution to and place of the PhD graduate in the knowledge economy. There are two strands to this debate. One is about strengthening the university as knowledge producer. In this approach, increasing the number of doctorates is part of the link between high-level research training, disseminating new knowledge through international networks (such as conferences, journals and books) and linking to research and development in different ways through an innovation cycle. In this sense it is both about strengthening the university (and specifically the quality it produces) and contributing to the knowledge economy.

The second aspect is the doctorate as a contributor to ‘talentism’, meaning the global search for talent identification. In this sense, it is concerned with high-level skills, both research and analytical, outside the university, be it within industry or the public sector. The debates, rather ironically, are about whether there are too many doctoral graduates (at least in the USA) and the impact on the higher education system. But

elsewhere, such as in Europe, and particularly as exemplified in Germany, discussion centres around continued competition for doctoral students and the increasing mobility of such graduates. If the lens is focused on the PhD for academic positions primarily, then the debate addresses supply and demand in the academic labour market. However, if the focus is on the knowledge economy outside the university, then there is little concern about labour market absorption since the global market is endless.

Another feature of international debates is the uneven distribution of doctoral students (both enrolment and graduation) across the globe. This can be seen as simply reflecting the different histories of doctoral production in different parts of the world and associated differences in higher education systems. What is striking here is how developing countries are making huge investments in the knowledge economy, with increasing doctoral production being one of the conditions for membership of the knowledge economy. On analysis, two groups emerge: on the one hand, South Korea, Singapore, Taiwan and Mexico, all acknowledged members, if not leaders in the knowledge economy, and all countries where the doctoral output is already high; and then, on the other hand, the BRICS (Brazil, Russia, India, China and South Africa), particularly China, Brazil and India, whose governments are formulating targeted policies and making huge investments in increasing doctoral and research output as part of their effort to improve their positions in the global rankings by catching up within the knowledge economy.

The situation in Africa is very different. Not only do most countries on the continent not have the resources to invest hugely in doctoral production, as China and Brazil are able to, but the acceptance of the notion of the knowledge economy is not self-evident and is even contested in some circles. The HERANA study concluded that:

From interviews and policy documents it was evident that, with the exception of Mauritius, none of the eight countries included in the study had a clearly articulated development model or strategy [... and] the 2020 or 2030 visions were often based on 'best practice' policy borrowing from first world countries.' (Cloete et al. 2011: 18)

An overall conclusion of the study was that, apart from Mauritius, there was no pact about a development model or about the role of the university in the development model. Interestingly, in some countries (such as Ghana and Kenya) the national government seemed more convinced about the importance of the knowledge economy than the academics, while in Uganda and Botswana, the academics were more supportive (Cloete et al. 2011: 19). It could thus be argued that in Africa the call for increasing doctoral production

is without an economic context. It is not part of an agreed-upon role for the university in economic development, and as the IAU-ACUP report concludes, while the status of the PhD is acknowledged, African society does not seem to know how to evaluate its usefulness to development (IAU-ACUP 2012: 20). This raises the question as to whether the demand for more PhDs is not based on a reference to the diaspora and the specific need to produce well-qualified academics to compensate for the brain drain.

Different pressures on PhD production: A framework

Against the background described above, we now turn our attention to the main focus of this book: the production of PhDs in South Africa. Our central thesis, which will be developed in increasing detail over the book's chapters, is that four imperatives intersect in current debates on the production of PhDs in South Africa. These four discourses concern global and national competition (the imperative for growth), efficiency, transformation and quality. Each of these is described in greater detail in the sections below.

Growth

The policy discourse about the doctorate over the past two decades has not always demonstrated a clear focus or agreement on priorities by the different ministries responsible for higher education. A recent example is to be found in the very different 2011 budget speeches of the ministers for the departments responsible for higher education in South Africa: the DHET and DST. A comparative analysis of global and national trends was entirely absent from the speech of the Minister of Higher Education and Training, who made no reference to the knowledge economy, global competitiveness, high-level research skills or knowledge production (Cloete 2011b). This speech focused on training and undergraduates, and was almost entirely inward-looking, with Africa and the rest of world hardly mentioned. In contrast, the Minister of Science and Technology led with the following bold statement emphasising quality:

Funding of science and technology must be improved if we are to realize our ambitious national goal of building a knowledge-based economy. One of the areas that must be addressed is increased support for postgraduate study and for senior researchers plus a more stable funding model for all our research performing institutions. (Pandor 2011: online)

Following the DST, the NDP makes the knowledge economy a fundamental pillar if South Africa is to achieve its ambitious goals of telling a new story

of sustainable development (NPC 2012). Nonetheless, despite commitment pronounced after the acceptance of the final NDP report by both the African National Congress and Parliament, the dominant economic development approach is still firmly based on extraction (through mining) and infrastructure (Cloete and Gillwald, in Castells and Himanen 2014).

Despite the absence of a coordinated policy focus, a strong emphasis on the production of more doctoral graduates emerged in the post-2008 period. For a start, the DST set initial targets for PhD production, as described in its Ten-Year Innovation Plan: ‘To build a knowledge-based economy positioned between developed and developing countries, South Africa will need to increase its PhD production rate by a factor of about five over the next 10 to 20 years’ (DST 2008: 29).

In 2010, the ASSAf study proposed, amongst others, an escalation of the number of graduates, increased funding for full-time doctoral students, targeting specific institutions with capacity to produce more PhDs, and advocating for public support amongst the public for a better understanding of the value of the PhD (ASSAf 2010: 17–18).

The NDP echoes many of ASSAf’s recommendations, but with much more specific targets, such as the aim of producing more than 100 doctoral graduates per one million of the population by 2030. This would translate into 5 000 per annum in 2030 (compared to the latest output of 2 051 in 2013). Both ASSAf and the NPC agree on the need for more doctoral graduates. While ASSAf focuses on proposals on how to improve output, the NDP sets specific targets, albeit without much consideration for how they would be achieved.

Efficiency

The second discourse on doctoral production relates to the imperative of efficiency. Not surprisingly, the government wants higher graduate returns on its subsidy investments in doctoral enrolments (as in other spheres of education). In debates around efficiency, high dropout and low completion rates are regarded as major indicators of inefficiency in the production of doctoral graduates. This is consistent with the macro-economic policy, Growth, Employment and Redistribution (GEAR), which was adopted in 1996 and ostensibly aimed at growth, employment and redistribution after a massive outflow of capital. GEAR’s main effect was tighter fiscal policy measures that were brought about by a cut in government expenditure and attempts at a more cost-effective civil service (Knight 2001).

This led to the development of efficiency indicators and targets in the 2001 National Plan for Higher Education (Ministry of Education 2001). The work of CHET and CREST contributed significantly to the development of these efficiency indicators. However, targets set in the National Plan were unrealistically high: 75% of all students entering doctoral programmes in

universities were expected to graduate (Ministry of Education 2001). When empirical data gathered through the Higher Education Management Information System (HEMIS) began to show that only around 50% of national cohorts entering doctoral programmes would eventually graduate, the target was modified to 65%. This reduced target has been used for national enrolment-planning exercises in recent years, but has also proven to be unattainable.

Transformation

The third policy discourse is around transformation. There have been many reviews of transformation, or the lack thereof, but one of the most comprehensive theoretical and policy reviews was by Badat (2004). Starting with the National Commission on Higher Education (NCHE) in 2000, Badat listed the main areas of transformation as system and structures, equity, quality and responsiveness. He subsequently reduced his focus to two key areas, being institutional restructuring and human resources.

In this book, we will look at institutional restructuring and equity. While equity could be regarded as involving a range of issues, including race, class and gender, in DHET policy terms, it increasingly refers to race, and to Africans in particular. The Equity Index, developed by the newly appointed Transformation Oversight Committee (Qonde 2013), assumes the university to be a mirror image of the demographics of society.

The focus of Chapter 4 is on race, gender and nationality, particularly Africans who are not from South Africa. It excludes socio-economic class because of the absence of reliable statistics.

Quality

The fourth discourse concerns the quality of doctoral production. In the review of the demand for an increase in doctorates earlier in this chapter, the issue of quality is frequently raised, but not directly addressed. The competition for talent and use of the PhD as a talent indicator clearly assumes a degree of quality. The demand for different types of doctoral programmes (*The Economist* 2010) focuses on another aspect of quality, namely appropriate skills. This implies that different types of quality mechanisms or procedures could be required for different types of PhDs.

Morgan's (2011) claim – also implicit in the South African NDP approach – that teachers with doctorates will improve the quality of their teaching, assumes quality of the qualification. Yet consistently underpinning the demand for more doctorates is the concern that 'the main problem is the low quality of many graduates' (Cyranoski et al. 2011: 1).

Although the 1996 NCHE report and the 1997 *Education White Paper* stated that quality throughout the system was important, neither document discussed methods by which the quality of doctoral programmes could be assessed (NCHE 1996; Department of Education 1997). An indirect start to the quality debate was the 2000 Council on Higher Education (CHE 2000) report on the size and shape of the higher education system. The CHE report proposed a differentiation framework that placed institutions into rigid categories. By implication this was a quality control mechanism, since it was intended that these categories would determine whether or not an institution could offer doctoral programmes. Despite the requirement for ministerial approval for programme and qualifications mixes (PQMs), very few of the doctoral programmes offered by South African higher education institutions have thus far undergone detailed quality reviews by the CHE.

Instead, the Higher Education Quality Committee (HEQC) accreditation model (HEQC 2004) located responsibility for higher education programme quality with the institutions themselves and proposed that institutions should maintain in-house quality assurance mechanisms. The HEQC would review the effectiveness of associated quality assurance mechanisms within the universities and validate the institutions' own monitoring information in this regard.

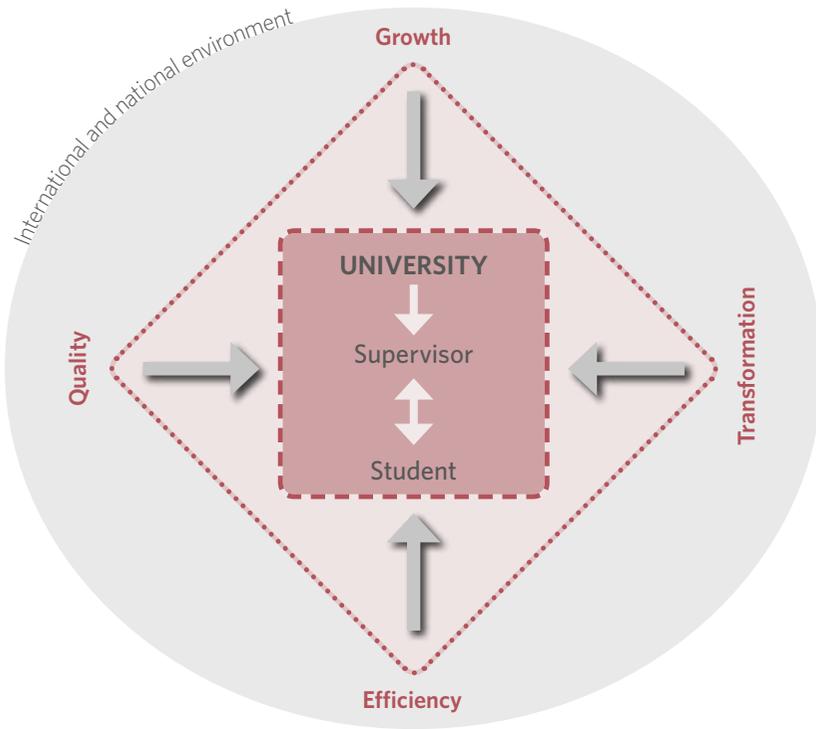
Dynamics of doctorate production

The four discourses as outlined above capture the ecology (the external demand and accountability environment) of doctoral education and training in South Africa today. Figure 1.5 suggests that there are four sets of factors or forces that together create a unique demand and accountability regime that exerts various pressures on the universities, and specifically on their academic staff.

Figure 1.5 also suggests that some of these external demand factors are global and international (such as rankings), while some are more local and internal (such as the role of the DHET funding framework). In general, the factors are mutually reinforcing, which means that the end result is a powerful discourse of demand and accountability at every level of the system.

But the second part of the diagram shifts the perspective to the supply side: the university, and specifically academic staff and supervisors. From this perspective, the demands are often experienced as contradictory and unreasonable. The demand for increased output and production of doctoral students is often considered to happen at the expense of quality. In addition, there has always been a clear tension between the demands for efficiency and equity (transformation) in education discourse in South Africa.

Figure 1.5: Discourses on doctorate production in South Africa



The internal environment depicts the role of a university in doctoral education and training, and specifically the supervisor–student relationship within the university. The shift in focus to the internal environment forces us to look at institutional differences – different histories, missions and resourcing – in doctoral education and how these impact on doctoral production. And at the micro-level, it forces us to look at all the factors that impact on supervisor–student dynamics: matters related to models of doctoral supervision, supervisory styles, quality assurance and support to students.

Figure 1.5 presents two perspectives on doctoral education and training in South Africa: an ‘outsider’ and an ‘insider’ perspective (Becker 1963). The outsider perspective looks at the system and the interacting forces (international and local) that co-produce a set of demand imperatives related to quantity, quality, efficiency and transformation. The insider perspective looks at doctoral education from the perspective of the main

actors: the supervisor (embedded in a university) in relationship with a doctoral candidate.

How do universities and supervisors (and, by implication, students) experience these external demands and how do they respond? We will argue in the book – at least with regard to the demands of quantity, transformation and efficiency – that South African universities have on the whole responded positively to these demands. Most of the trends related to output, throughput and transformation are positive.

However, we will also present qualitative data demonstrating that supervisors increasingly experience supervision as a burden. The demands for increased output and throughput rates are viewed by many supervisors as compromising the quality of doctoral theses. There is also some evidence that this demand regime – which is of course embedded within the much larger, new, public-management discourse on accountability and performance monitoring – is infringing on basic academic freedoms: the supervisor's choice of student (and hence the right to reject a student), along with other areas of decision-making traditionally associated with the individual supervisor.

The structure of this book

Following this chapter that has sketched the global, the African and the South African contexts for the demand for more doctorates, Chapters 2 to 5 focus on the history, policies and particularly on the statistics (data) of doctoral production in South Africa, organised around the four main discourses of quantity, efficiency, transformation and quality. The data for this component are drawn mainly from the Department on Higher Education and Training's Higher Education Management Information System (HEMIS) as well as from CHET and CREST.

Chapter 6 analyses a qualitative study of 25 'doctoral productive' departments in the social sciences and humanities at 13 South African universities. This information is enriched by a national survey of 330 'research productive' supervisors in the South African system. This provided instructive data and insights on the initiatives, good practices and experiences within universities as they pertain to current doctoral education and training programmes, again addressing the same four discourses.

Drawing on the analyses and conclusions of the previous chapters, Chapter 7 presents an integrated synthesis of our argument and proceeds to suggest ways of strengthening the current model of doctoral education in South Africa. Our main thesis is that a paradigm shift is required in order to respond to the demands of all four imperatives/discourses and the realities of doing doctoral study and supervision in the country.

We conclude the book by raising three different (but related) policy issues. Our intention is not to be prescriptive, but to highlight and further articulate the key policy issues and challenges that will have to be addressed at the continental, national and institutional levels.

Notes

- 1 We use the terms 'African', 'coloured', 'Indian' and 'white' as designators of race in the book. We use the term 'black' as an umbrella term to include 'African', 'coloured' and 'Indian'.