

Chapter 7

Incremental change and a paradigm shift

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Imperatives as social constructs

We began this book with a statement of our central thesis, namely that four imperatives intersect in current debates on the production of PhDs in South Africa. We argued in the first and subsequent chapters that these imperatives are embedded in various policy and strategy documents produced by the South African government over the past two decades. We do not assume that these ‘imperatives’ are necessarily independent or objective forces that generated specific actions in any direct and linear fashion. The ‘system’ in which they operate – the doctoral education system – is a complex system in which unilineal causality is the exception rather than the rule. Imperatives are social constructs in at least three senses:

1. As authors we have selected and interpreted these four imperatives as influential discourses that have shaped and influenced doctoral production in the recent past (and continue to do so). Although we would argue that these four discourses are the most dominant as far as the doctorate is concerned, there are conceivably other ways to interpret these imperatives. Also, it is not inconceivable that one could identify other imperatives that have also shaped doctoral production in the country. Indeed, we argue that the demand for transformation has been confounded in recent years with another imperative – the demand for internationalisation – and that this could be seen as an additional imperative that is embedded in the discourse of globalisation and internationalisation.
2. These imperatives are also not static and unchanging. We have shown ample evidence of how, for example, the demand for transformation has shifted (and understood to be so) from an initial focus on addressing inequity to an increasing focus on transformation as development.
3. The four notions of ‘growth’, ‘efficiency’, ‘transformation’ and ‘quality’ are also obviously constructs in the generally accepted epistemological sense of the word. They are ‘theoretical notions’ that are complex in nature. For the purpose of measurement and analysis, they need to be further unpacked (or ‘operationally defined’) for one to achieve some degree of consensus of what they mean in reality. We have argued in each of the preceding chapters for a range of operational measures for each construct in order to make analysis possible. But we have also emphasised that there is no general consensus about the ways of measuring each of the notions.

Imperatives as normative statements

An imperative is defined as a rule or principle that requires or compels certain actions. It has both a normative and compelling force, and is usually embedded in a higher-order goal. Arguably the most famous ‘imperative’ in philosophy, was the categorical imperative defined by Immanuel Kant. According to Kant, human beings occupy a special place in creation, and morality can be summed up in an imperative, or ultimate commandment of reason, from which all duties and obligations derive. He defined an imperative as any proposition declaring a certain action (or inaction) to be necessary. He contrasted his categorical imperative with hypothetical imperatives (which is simply when an individual wishes to attain certain ends). A categorical imperative, on the other hand, denotes an absolute, unconditional requirement that must be obeyed in all circumstances and is justified as an end in itself. It is best known in its first formulation: *Act only according to that maxim whereby you can; at the same time, will that it should*

become a universal law. The important point here is that categorical imperatives are seen as morally binding principles that require or demand certain actions.

We used the term ‘imperative’ in this book in this stronger Kantian sense denoting principles that require or demand certain actions. So, although we have argued above that they are constructs, this does not mean that enactment of these imperatives does not have material consequences.

At this point it is important to introduce a further distinction. The four imperatives identified and discussed in this book differ in an important respect – the degree to which they presuppose some notion of normativity. Stated differently: to what extent do these imperatives already imply some notion of what is intrinsically desirable?

At the one extreme it seems obvious that the notions of ‘quality’ and ‘efficiency’ already, in themselves, contain some notion of what is normatively desirable. They are – stated differently – most often seen as ends in themselves (and not a means to and end). For example, we defend the quality of the doctorate as an intrinsically worthwhile pursuit. We equally commit ourselves to efficiency in doctoral production (as in most fields) because ‘efficiency’ is regarded by most people as being a virtue.

At the other extreme, the notion of ‘growth’ evidently does not in itself contain a specific normative goal. It is indifferent, even neutral, unless the anticipated outcome is specified. Is it growth to become more competitive? Or, is it growth to meet the growing or changing demands of the (knowledge) economy?

The imperative of transformation is interestingly poised between these two extremes. In the most basic sense of referring to any form of change, the imperative to transform by itself is ethically neutral, and hence needs to be further explicated: change to what purpose? A higher-order discourse (equity, redress, innovation, competitiveness, etc.) is required to clarify the normative intent behind transformation. However, it is fair to say – as we argued in Chapter 4 – that within the South African political discourse, transformation has acquired a *de facto* normative meaning. Transformation is assumed to be good and hence an end in itself. It is justified on the ground of achieving greater equity by redressing inequalities of the past. Against this background we would contend that the imperatives of quality and efficiency do not require further (moral or otherwise) justification, whereas the imperatives of growth and transformation do need to be shown to be embedded in or derived from higher-order discourses. Within the context of the doctorate, these discourses typically speak to the question of the purpose, function and even value of the doctorate in a country.

After this short context we return to the relationship between imperatives and discourses as they pertain to the doctorate in South Africa.

Imperatives and discourses

The knowledge economy discourse

We showed in Chapter 1 that 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 a 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 in different ways to research and development 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. In this sense, doctoral education is concerned with the provision of high-level skills, both research and analytical, for careers outside the university, be it within industry or the public sector. The debates, rather ironically, are also about whether there are too many doctoral graduates (at least in the USA) and the impact on the higher-education system.

Important questions for countries are: What kind of knowledge economy? And, which high-value skills would be required? Such questions in turn pose a more strategic set of questions about how many PhD graduates a country needs and in which fields. This would also confront South Africa with the dilemma that it cannot reach its doctoral targets without the substantial recruitment of students and academics from the rest of Africa.

The developmental discourse

In developing countries, particularly East Asia, Latin America and even in South Africa (the *National Development Plan 2030*), the PhD is regarded as being integral to the development project – even if it is not clear whether PhDs are a driver of growth, or if this necessarily follows from the knowledge economy viewpoint. Most of the commentators (see Appendix 2) express some unease about how the PhD actually contributes to economic development, why in certain countries there are unemployed PhDs, and whether the PhD ‘factories’ will lead to poor quality, thus undermining the essence of the skills embedded in the traditional PhD, namely independent thinking and writing. Unease is also expressed as to whether too direct a link to development will privilege the sciences, engineering, and business at the expense of the humanities and social sciences and whether a

predominantly economic-development orientation will not undermine the ideal of contributing to a better society. However, all seemed to agree, in different ways, that the driving force for doctoral education has gone well beyond ‘just’ training the next generation of academics.

More relevant for Africa, the continent on which the AU Commissioner Dr Nkosazana Dlamini-Zuma is calling for thousands more PhDs, is that many countries, like South Africa, proclaim to be pursuing a knowledge-economy model, but are in fact practising a more industrial-age, extractive economy, with a very thin layer of research and development and large numbers of lower-skilled workers. But even the modern extractive-economy model is not without high-knowledge skills. Calderon and Castells (2014) show that Chile has become globally competitive in high-tech farming (wine and salmon) and mining by massifying higher education and adopting advanced information (knowledge) farming and mining technologies. An important question for countries is ‘What kind of knowledge economy and what high-value skills are required?’

In South Africa, where the National Planning Commission (NPC) and the Department of Science and Technology (DST) are firmly located within a knowledge-economy discourse, part of the argument for tripling the number of doctoral graduates annually is driven by an intention to increase the capacity in the system – by increasing the percentage of academics with PhDs from 35% to 75%. Thus it does seem that even if there is not agreement on the role or contribution of the PhD to the knowledge economy, or on what kind of knowledge economy Africa is striving for, or whether Africa needs more PhDs to improve academic quality, there is tacit consensus that there is a need to increase and improve doctoral training and output.

The redress discourse

Within the South African context, the dominant discourse (especially in the 1990s) around the doctorate was embedded in the notions of equity, race and gender and how to address the imbalances of the past. In post-apartheid South Africa, a common South African practice is to use transformation as a euphemism for racial issues, despite its many interpretations and meanings. Govinder et al. (2014: 1) illustrate this well in the following quote:

In the South African context, transformation refers more specifically to change that addresses the imbalances of the past (apartheid) era. It has many facets, including demographic and systemic change. However, regardless of the different components and qualitative measures for transformation, the ultimate (and most important) indicator is that of demographics.

In summary then, the question remains: Is the doctorate seen as a 'means' to address the higher-order goals of:

- A knowledge economy (with the concomitant focus on knowledge production, international competitiveness and innovation);
- A developing economy (with the demand for more highly skilled labour to drive economic growth and wealth creation); or
- A redress agenda with the demand for more black (and recently more African) and female graduates?

We have argued that none of these discourses on their own is unproblematic. Within the South African context a case could be made for adopting any one of these discourses as the dominant one. Taken together, the picture becomes even more complex. It is not obvious that these discourses are easily reconciled or integrated as the underlying premises are very different, and perhaps even contradictory.

Intersecting imperatives: In tension or contradictory?

In 1977 Thomas Kuhn published a book with the intriguing title *The Essential Tension*. This text, which followed his seminal work on the role of paradigms in science (*The Structure of Scientific Revolutions*), argues that in science, tradition and innovation are in tension, but that this tension is essential for science to progress. The notion (or even ideal) of tradition is captured in the notion of a paradigm that provides guidance and direction, and hence stability, to research within 'normal' periods of scientific inquiry. However, 'innovation' is equally important and necessary to ensure that science grows, and that space is created for new theories and ideas. Although there is a tension between tradition and innovation (change), the history of science has shown that this tension is an essential and productive one.

Can one make the same claim for the four imperatives of growth, efficiency, transformation and quality? Do they co-exist (in harmony) and hence co-produce the kind of doctoral-educational system that the country needs? Some arguments have been made that transformation (especially when understood as leading to more diversity) at least contributes to (or may even be an essential condition for) improved quality. In the same vein, one could argue that greater efficiency in the processes of doctoral supervision could be instrumental in achieving higher-quality doctoral graduates. However, it is equally obvious that the demand for growth can be interpreted to be in direct tension with the demands of efficiency and, especially, quality. If current trends in doctoral enrolments continue to increase, it will put even more strain on the current supervisory capacity in the system, which in turn is likely to affect the quality of the doctorate. In

fact, an argument could be made that the imperatives for growth and quality are not only in tension but that they are contradictory. Achieving the one (continuous growth) undermines the achievement of the other (maintaining standards of quality), especially in a system where there are serious constraints on resources.

In an insightful overview of the origins of the doctorate in South Africa, André du Toit (Du Toit 2012: 3) cautioned against the effects of the demands of growth on quality:

Current higher-education policy imperatives calling for a drastic increase in the overall production of the number of PhDs in South Africa will be dangerously misconceived unless serious prior consideration is given to the nature and function of the PhD degree. A substantial increase in the number of current South African PhDs by research dissertation only will most certainly not satisfy either the urgent needs for upgrading the 'academic' sector itself or the demands of the economy and society for an increased number of advanced graduates with a 'general' knowledge base and transferable intellectual skills. Instead, the most likely consequence of a substantive increase of the number of PhDs based on the current higher degrees structure is both a significant slump in academic standards as well as a probable backlash against the universities from different sectors of the economy and society: a substantial number of the new PhDs will be unable to find appropriate employment while outside institutions will remain frustrated when looking to these PhDs to satisfy their specific and general needs.

In this regard Manuel Castells, in his paper 'Universities as dynamic systems of contradictory functions' (Castells 2001), made two important observations. Firstly, he argued that because universities are social systems and historically produced institutions, they undertake different functions simultaneously within the same structure, although with different emphases at different historical moments. One critical element of the structure and dynamics of university systems is combining and making compatible seemingly contradictory functions. In this, the challenge for university systems is to develop institutions that are strong and dynamic enough to withstand the tensions inherent in these contradictory functions. The second observation is that a single university cannot manage the contradictory/competing functions; rather, this has to happen within a higher-education system because all the contradictory functions of a system cannot be resolved within a single university (Castells 2001).

One obvious way in which the 'tension' between some of these imperatives has manifested itself in the South African university system, is

reflected in the differential responses to these imperatives by the different universities. We have given ample evidence of the fact that the 'response' to these demands has been very different for different universities and university groupings. The most positive changes in growth rates, efficiency and transformation are confined to a small group of eight to ten universities: the same universities that perform better on knowledge production indicators. The less productive universities in the system simply do not have the resources to respond to these imperatives.

Our qualitative study (Chapter 6) of the very productive departments found that academics are quite aware of the different policy imperatives, and, on the whole, experience or view them as contradictory demands. However, the interviewees were struck by how positive the responses to these conflicting policy discourses generally were.

During workshops on supervision facilitated by the second author over the past ten years, an issue of concern often raised is that it has become the norm for universities and departments to set targets and benchmarks for quicker throughput rates. In a system where universities compete for doctoral candidates as an additional source of revenue, this is not surprising. However, it adds to the burden of supervision, and supervisors are under huge pressure to complete the doctoral study process as quickly as possible. This translates into a high degree of monitoring and surveillance of students and, in some cases, intervening to help students to write parts of their theses. When the major lament of academics regarding the under-preparedness of many of the candidates is added to the pressure to improve completion rates, plus demands for constant monitoring and accountability, then the 'burden' of supervision translates into the 'stress' of supervision'.

It could be argued that the sharp increase in research output (5 585 research publication units in 2000 to 14 000 units in 2013) is a product of more direct incentives than those for producing doctoral graduates. A number of respondents mentioned that while the national government subsidy for a doctoral student is substantial, the academics did not know what happened to this money within the university budget; in other words, unlike research subsidies, this seldom trickles down to the faculty or the department. What is also clear is that there are widely different policies and practices between different universities, including a range of incentive structures, as well as 'perverse' incentives. It has, for example, become common practice for some university departments to insource doctoral supervisors who are not necessarily expert or experienced in the specific subject area of the department simply to be able to supervise the growing numbers of doctoral candidates.

We would argue that these four imperatives do not necessarily co-exist comfortably. There are inherent tensions and even contradictions between

them. This, we believe, is one of the main reasons why any initiative to effect further change in the current system of the doctorate in the country will only result in small and incremental changes. Within a complex system whether there are counteracting (and even mutually undermining) forces at work, it is difficult to achieve anything more than small gains in efficiency or quality. We will argue in the final section that the structure of the system in itself would have to change if far-reaching and substantial changes are to be expected.

The evidence

The main body of this book has been devoted to present the best available evidence on patterns and trends on growth, efficiency, transformation and quality of the doctorate in South Africa. Even if one disputes the ‘appropriateness’ of these headings as imperatives, we have found it useful to organise and present the results of different studies that we have conducted over the past ten years under these headings. So what have we found?

The evidence for growth

The public higher-education system in South Africa has witnessed significant growth in the production of doctorates. Doctoral enrolments and graduations increased by an average annual rate of 6.4% between 1996 and 2012/13 – a rate higher than any other degree level. Universities as a group have also been more successful in achieving the aim of increasing the number of doctoral graduates in specific fields. The proportions of doctoral graduates in science, engineering and technology, and in the business, economic and management sciences have increased considerably over the period from 1996 to 2012. For example, the percentage of graduates in natural sciences, engineering and technology (SET) increased from 45% in 1996 to 53% in 2012. We have also highlighted the fact that the introduction of the new funding framework in 2005 started to impact on the system by 2008, when the growth in doctoral enrolments and graduations accelerated even more.

But when comparing South Africa’s yield of PhDs to that of other countries worldwide, the data reiterates the finding of the ASSAf (2010) PhD study that the country’s production of PhD graduates is too low, and that South Africa is near the bottom of the list of PhD-producing countries worldwide. In summary, when compared to OECD countries, South Africa not only fares poorly against countries with a similar population size and GDP ranking, but even does so when compared to much smaller countries with lower GDP rankings, and fares considerably worse when compared to top-ranked GDP countries.

The evidence for efficiency

Our analysis of efficiency in doctoral production employed four measures:

1. The ratio of graduations to enrolments;
2. Cohort analyses of graduating students;
3. Progression and completion rates of doctoral students; and
4. The ratio of PhD students to academic staff with doctorates.

As to the first measure (*ratio of graduations to enrolments*), South African universities displayed a marginal improvement in efficiency, with an average annual increase in graduates of 6.5% compared to 6.4% in enrolments between 1996 and 2012.

The results of the *cohort analyses* for the 2003, 2004 and 2005 cohorts showed that the average graduation rate of 35% after five years increased to 42% after seven years. The 2006 cohort had a 43% completion rate after six years, while the 2007 cohort showed a 45% completion rate after the same period of time. The percentage of new entrants who graduated after five years grew from 36% for the 2003 cohort to 38% in 2007. The percentage of new entrants who graduated after six years increased slightly more from 41% for the 2003 cohort to 45% for the 2007 cohort. Although the percentage of doctoral cohorts who graduate is still low, these increases show improvements in doctoral graduation rates.

The main finding from our analysis of the *progression and completion rates* relates to the effect of part-time studying on progression and completion rates. The fact that more than 60% of South African students – across all scientific disciplines – study while they work has far-reaching effects on all aspects of doctoral production. This is especially clear when we compare students in the natural sciences (where larger proportions study full-time) with students in other fields. For the former, progression and completion rates are significantly higher: students in these fields (where higher proportions of students are able to study full-time) progress faster from honours to masters to doctoral studies *and* complete their studies at each level in shorter times. We also found clear evidence of the effect of socio-economic realities on these rates. Black students (and especially African students) have much fewer resources to support their postgraduate studies. This also translates into longer progression and completion times for this subgroup.

Our final measure (*ratio of PhDs supervised per academic staff with doctorates*) shows that there has been an increase in the overall efficiency in the system in the recent past. We again found evidence of huge institutional differences, with the best-performing institutions demonstrating significantly higher

ratios of PhDs supervised per academic staff with doctorates. These ratios have also increased steadily in the recent past.

Our analyses of the efficiency of doctoral education have produced a mixed picture. The analysis of the doctoral pipeline in Chapter 3 revealed low progression rates. For example, only 24% of bachelors students enrolled for a honours degree, just over 20% of honours graduates enrolled for a masters and only 16% of masters graduates enrolled for doctoral study within five years. The end result is that the pipeline is not only a leaky one, but also very long. From a systems perspective this is indicative of a very inefficient system. We lose too many students between the bachelors and doctoral level and those who do manage to afford to stay in the system, take too long to progress from bachelors to doctoral studies. We have argued that the major cause of this state of affairs is the lack of sufficient funding (especially for black students) to study full-time and hence to complete their studies within much shorter periods of time.

But there is also another side to the efficiency argument. Despite the lack of sufficient funding for doctoral studies, regular interruptions of studies for work- and employment-related reasons and hence an older-than-average doctoral cohort (compared to the age of students completing in Europe and North America), completion rates compare favourably with international benchmarks. Despite high teaching loads and the increasing 'burden of supervision', academic staff at the top South African universities have increased their PhD output in recent years. All of this evidence suggests that South African universities and supervisors are quite efficient in the production of graduates who are in the system. Thus, university support to and supervision of doctoral students is not the major problem in the system. These structures and mechanisms are in themselves quite effective and efficient. This is particularly evident when we focus on the throughput and completion rates of the top research universities.

The efficiency challenge is quite obvious: we need to ensure that larger proportions of postgraduate students are able to study full-time (with sufficient funding) and not interrupt their studies.

The evidence for transformation

When transformation is understood solely within a discourse on equity and redress, and the focus is on changing the demographics of race and gender, the evidence shows significant transformation. Whether one looks at absolute increases in the number of black and female students or annual growth rates, the results are the same. As far as enrolments are concerned, African doctoral students increased their share from 13% in 1996 to 32% in 2004, and to 48% in 2012. Similarly, the share of coloured doctoral

enrolments increased from 4% to 6%, and the share of Indian doctoral students from 5% to 8%. By contrast, the proportion of white doctoral enrolments dropped from 78% in 1996 to 38% in 2012. The same trends apply to doctoral graduations where the proportion of African doctoral graduates increased from 8% to 44%, while the proportion of whites declined from 86% to 43% between 1996 and 2012. Similar shifts were recorded as far as gender is concerned. By 2012, 42% of all doctoral graduates were female, compared to 35% in 1996.

However, the discussion about transformation in terms of a racial definition becomes more problematic when we introduce 'nationality' into the equation. As discussed in Chapter 2, the increases in African male and female students (enrolments and graduates) in particular were the result of the influx of students from the rest of Africa. We have offered some explanations of why this happened and continues to happen – a combination of supply and demand factors. But the reality is that the South African doctorate would not have changed (transformed) to the extent that it has, without the injection of large numbers of students from the rest of the continent. And, of course, it raises the question whether this constitutes 'transformation' as it was (originally) intended by policy-makers and government. Or are we simply confusing two very different notions of 'African': a 'racial' definition with a 'geographical' one?

One way to clarify the issues is to focus on South African students only and the shifts in their *participation* rates as opposed to *growth* rates. And then the transformation question needs to be reformulated: Are larger proportions of South African African students participating in doctoral studies today than 13 years ago? The evidence presented shows that the rate for South African African students (male and female) increased from 0.84 to 3.61 students per 100 000 of the age-relevant population group. This constitutes a fourfold increase in participation rates. But this substantial increase must be seen in relation to the same statistics for white students: whereas the share of white enrolments declined over the same period, their participation rates increased from 45 to 63 per 100 000 of the age-relevant population. In fact, the participation rate for white students compares well with populations of developed countries.

The rate of participation must be assessed in terms of the size of the overall system and in relation to population changes. South Africa's overall higher-education participation rate is low – around 20%. With regard to population growth, the white population for enrolments in the 20-to-24-year age cohort declined from 349 102 in 1996 to 316 000 in 2012 – an overall decline of 9%. In contrast, the African population for enrolments in this age cohort increased by 974 918 (31%), from 3 153 082 to 4 128 000. All of this means that for (South African) African students to equal the

participation rates of their white counterparts, a total of 5 688 African doctoral graduates would have been required in 2012, which is 17.5 times more than the 325 African doctorate graduates for that year!

The evidence for quality

Our discussion of quality in doctoral education and the challenges in measuring quality has been limited to those 'dimensions' for which there are available data. We have presented evidence that shows that:

- There are fairly stringent policies and rules in place to ensure proper accreditation of doctoral programmes.
- The HEQC has ensured – to a large extent – that universities conform to standard practices in quality assurance of doctoral education (including registration, supervision and examination processes). However, what the HEQC has not done is produce any indicators, or even proxy indicators, for quality.
- The fact that the majority of doctoral students work while they study impacts on their levels of preparedness for doctoral studies. Various studies confirm that doctoral candidates typically require a large degree of support in coping with the demands of doctoral education. This has also meant that universities – at least in most cases – are screening and selecting potential doctoral candidates more stringently and rigorously in order to ensure that the best pool of talent is accessed for doctoral studies. However, we would maintain that the part-time nature of doctoral studies for many students poses one of the major challenges to maintaining high standards of doctoral education in the country.
- We have some evidence in Chapter 5 that suggests that the quality of doctoral supervisors and supervision is generally good. Again, however, the increasing burden of supervision (which is linked to the demands for growth and efficiency) is cause for concern (for many supervisors), and an additional factor that may compromise the quality of doctoral education. Increasingly supervisors have to take in larger numbers of students, as well as, in many cases, students in areas that fall outside their own expertise.
- Doctoral tracer studies show that South African doctoral graduates do not find it difficult to find employment (keeping in mind that about 60% are already employed at the time they commence their PhD). These studies as well as employer studies also indicate that there is a reasonable fit between the demands of the labour market and the knowledge and skills presented by the doctoral graduate.

Discourse, imperatives and practices

The evidence produced here shows that there have been exceptional rates of growth in doctoral enrolments and graduates, substantial shifts in transformation (understood primarily in demographic terms), and indications of an adequately efficient system of doctoral education, but with a very inefficient postgraduate progression rate. We have discussed the data in terms of four imperatives that have shaped the doctorate in South Africa over the past ten years. However, our thesis is not that the changes that have been recorded are simply to be understood in terms of institutional (or even individual) responses to these imperatives (and their underlying discourses).

Although there is general awareness and knowledge of these imperatives in the system (perhaps best illustrated in the general knowledge of the incentives to increase doctoral output since 2005), the changes in growth and transformation especially are clearly the result of complex interplay of demand-side factors (new demands from the labour market; the demand created by the increase in students from other African countries who choose South Africa as a destination for postgraduate students), as well as supply-side factors (new masters and PhD programme offerings, increased supervisory capacity at most universities, increased funding for doctoral studies, as well as the effect of the new incentive and reward strategies of universities).

In fact, one should be cautious not to attribute too much agency to the university sector in the face of the four imperatives. Although it is appropriate to speak of a response of the universities to some of these imperatives, this would be more applicable where the imperatives have been translated into specific funding instruments and incentives (or their counter side of penalties and sanctions). These incentives (and sanctions) operate both at the system level and the institutional level. But some of the changes that we have analysed and discussed – such as the three-fold increase in doctoral students from the rest of Africa – were probably unforeseen 15 years ago.

At the system level the introduction of the new funding framework by the DHET in 2005, which recognised the production of research masters and PhD students for additional research subsidy, has indeed elicited a clear and unequivocal ‘response’ from the universities. One of the reasons for this has been the fact that most universities have internalised the same incentive principles in their internal process of reward and promotion. Similarly, the NRF and other funding agencies have set very clear targets for doctoral production – especially in the case of transformation targets – that influence the research awards and grants made by the organisation. Again these principles have been appropriated by the universities (down to

faculty and departmental levels) and hence have shaped individual supervisory behaviour.

But these imperatives also led to institutions adopting their own standard practices. However, these were not necessarily all in response to national imperatives. For example, most universities have established structures and initiatives to strengthen doctoral supervision (in some cases supervision training has been made compulsory) and the level of preparedness of doctoral candidates (multiple mechanisms to improve screening and selection as well as institutional support). Many universities have embarked on innovative ways to expand their supervisory capacity (changed retirement ages of staff, re-appointed productive academics, insourced external experts to act as supervisors, and so on). In general, quality assurance of the doctoral process (including examination processes) has been strengthened (in some cases this was a response to the HEQC audits of the mid-2000s), but in other cases these initiatives have gone beyond the explicit requirements of the HEQC.

The general point being made is that national discourses and imperatives do not by themselves necessarily produce change. The changes in a wide variety of practices for which we have presented evidence are also the end result of the complex interplay between regional and geopolitical forces on the African continent and beyond, demand-side changes in the South African economy, as well as institutional actions – some of which are clearly responding to these imperatives, while others are self-initiated.

Our story of the doctorate in South Africa would not, of course, be complete without addressing the challenges that flow from the dominant mode of doctoral supervision (education in more general terms) in the country. We have alluded to the fact that the predominant model of doctoral education remains that of one-on-one supervision. We have also already commented in some detail on the fact that the typical doctoral candidate in South Africa currently studies while working; all evidence points to the fact that about 60% of all doctoral students study part-time. We return to these issues in the next section.

The dominant model and practice of doctoral education in South Africa

The traditional research-based model of producing PhDs is still the dominant route in South African universities. A small – but increasing – number of departments also award PhDs on the basis of publications. Very few departments currently offer what is known as the ‘American model’, a PhD by coursework and thesis.

The increase in numbers and diversity of PhD students has already led to changes in pedagogy. Many departments have recognised the need for some coursework for their PhD students, and many have made arrangements

for this by way of more structured programmes, summer-school programmes and intensive weekend training programmes.

Departments in the past decade have shifted towards more active management of doctoral education. The quality of management systems and procedures (such as continuous monitoring of doctoral performance), supervisory practices, examination processes, and formal and informal support to PhD candidates, have all come under scrutiny. As we noted above, admission to doctoral education ranges from the strongly regulated to the informal. Nevertheless, there is a strong tendency for more structured and rigorous selection and screening procedures. Despite this, many departments still struggle to make their eligibility and selection criteria and admission procedures transparent to prospective applicants. Supervisory practices are changing slowly, from the informal and unregulated features of the widely followed apprenticeship model to practices that give more direction to students. One notable consequence of these changes is that the doctoral research proposal is becoming a much more managed and structured process to enable departments and supervisors to judge the quality of the applicants.

As far as the doctoral candidate is concerned, the greatest challenge that students face is in securing funding to do their studies full-time. A number of universities have introduced incentives for this, such as waiving fees, but these are mostly aimed at short-term efficiency gains rather than a wholesale shift towards more full-time students.

It is perhaps good to remind ourselves of the basic facts: the typical doctoral candidate in South Africa today studies while he or she is working, is about 35 years old when enrolling for the doctoral degree and 41 years old when he or she graduates. As we have pointed out, this means that the typical student would have interrupted his or her studies a number of times since being awarded a bachelors degree. These interruptions between the bachelors and honours, and between the honours and masters and ultimately between the masters and doctorate, have significant consequences for the degree of academic preparedness of the typical student. This usually means being reintroduced to an academic culture (that has changed significantly in many respects), learning new technologies that are essential for doctoral studies (such as searching electronic databases) and very often re-learning basic methodology and statistical skills and competencies.

All of this is true of the average student, but even truer of black students. Because of deep-seated socio-economic realities, the average black postgraduate student in this country has access to fewer financial resources and less social capital (such as family wealth), and hence is more reliant on his or her own resources. This translates – on average – into longer progression and completion rates on the road to getting a doctorate. One can even speak of the ‘double dilemma’ that the typical black postgraduate

student candidate faces. Upon graduating from their first degree, there are often family expectations to earn money and contribute, not to mention the need to repay previous support. In addition, with affirmative action policies in government and the private sector, there is a strong search for ‘black talent’. This means that there are huge pull factors for black students to pursue employment rather than to consider full-time masters or doctoral studies. Can one expect the most talented to remain in higher education?

It is important to understand the interdependence between the dominant model of doctoral education (one-on-one supervision, additional coursework and preparation and an increasing investment in student support) and the biography/demography of the average doctoral candidate (studying part-time, without adequate financial resources, an interrupted study trajectory and hence a low level of academic preparedness).

There are, of course, still significant numbers of doctoral students (about 40%) who are able to study full-time, who have shorter postgraduate trajectories and are able to complete in shorter periods of time and also graduate at a much younger age. These students tend to be white, come from more affluent backgrounds, are more likely to enrol for the natural sciences and have had good schooling. The stark contrast between these different groupings points to the real challenges that face doctoral education in this country. What are our options? Is it possible for the system to attain the target of producing 5 000 doctorates by 2030 and sustain current levels of quality and efficiency? Our discussion in the next chapter presents a detailed analysis of the 2030 target and the most likely scenarios in which it can be achieved.

In conclusion

Based on the evidence presented in this book about recent growth paths, efficiency and quality levels, and transformation shifts, what would be the best strategies to pursue over the next 15 to 20 years for reaching the NDP target without compromising the quality of the doctoral graduate? Strategies operate at different levels – from the national to the institutional and individual (supervisor–student) levels.

A first response to the question above is that strategies that have been shown to be successful in the past for improving efficiency and quality should of course continue to be pursued. Many of these have led to incremental changes and improvements in the organisation and management of the doctorate, and have done so mostly by addressing the traditional research-based (supervisor–candidate) model for mainly part-time students. However, we will also propose that consideration is given to a more radical strategy that addresses the deep structure of doctoral education in the country.

Incremental change

The core and determining feature of doctoral education in South Africa is the fact that 60% of all students enrol for their studies while they work. For the humanities this proportion is 75%; for the natural sciences it is 55%. We have argued that this is the most important reason why the majority of students take five years on average to complete, why progression rates from bachelors to doctoral studies are so protracted, and why our cohort of doctoral students is so much older than its counterparts in Europe. Because of this, supervisors are forced to resort to innovative ways of ‘managing’ their students: one-on-one supervision remains the rule rather than the exception, a huge amount of supervision is virtual (rather than face to face) and the low levels of academic readiness require additional measures of screening, selection and support.

We believe that this situation is not likely to change fundamentally over the next 15 years. Even if we manage to effect a significant shift (see below) towards much larger numbers of students studying full-time, we will still have large cohorts of students studying part-time. This implies that most of the current strategies that are in place to optimise efficiency and quality in doctoral production will remain relevant. More innovative strategies – some of which could involve better use of learning technologies – are likely to be designed and implemented. But on the whole, all of these strategies will at best only effect incremental improvements in the current system.

National strategies

At the national level we assume that the current funding incentives for the production of PhD students will remain in place. We also assume that the NRF and other funding agencies will expand their scholarship support for doctoral students. Current scholarships for full-time doctoral studies are insufficient alone to enable large numbers of students to study. Access to additional (financial) support is vital. In some cases, universities augment the scholarship, but under certain strict conditions. We would hope that the NRF would consider bringing back a scholarship scheme that combines a masters and doctoral scholarship for students who meet certain performance requirements and that the lack of financial support at the honours level will be addressed. We also assume that grants to university academics who are nearing completion of their doctoral studies will be extended (sabbatical or time-off grants). A current investigation into creating more equitable access to electronic research databases at South African universities holds the promise that all post-graduate students in the country will in future be able to search and find the literature they need for their studies. Students at some universities still do not have the kind of access to electronic knowledge

resources that are currently required to do a PhD of quality. We assume that this will become a reality soon and provide further support to doctoral students.

Institutional strategies

At the institutional level, many universities have invested in training their staff in good supervisory practices. It is conceivable that universities will increasingly make such training compulsory for novice supervisors. Existing support infrastructures (writing centres and graduate schools that provide support in the development of doctoral proposals and research methodology as well as editorial services) will continue to play a crucial role in doctoral education. With expected increases in enrolments, these services will undoubtedly have to be expanded.

Departmental and supervisory strategies

Perhaps the outstanding finding that emerged from our study of productive departments is the variety of strategies they employ to respond to the demand for producing more PhDs. The interviews showed that these departments introduced strategies to improve performance at each step in the PhD process: in selection, orientation, administration and funding. This is not surprising as there is little evidence of there being a single solution to enhance either productivity or quality in earlier large-scale studies of PhD education. Departments tried a number of strategies without evidence that these would work. Strategies identified here as efforts to improve performance are similar to what the PhD Completion Project (Council of Graduate Schools 2004) called *promising practices*. Since there is no silver bullet or single pathway to success, none of these strategies can be eliminated. It thus makes sense for departments to focus on one or more of them. From the interview data, it appears that most of these strategies worked at least partially, and that no department reported interventions that had really failed.

What is clear from our scenario exercise is that demands on universities and doctoral supervisors will only continue to grow. If one assumes current levels of growth in student enrolments and academic capacity, the average supervisor will have to supervise four to six doctoral students per year by 2030 in order to produce a graduate every third year (in addition to huge numbers of masters students to supervise).

For these reasons we believe that the strategies that are currently being employed – even if they become more structured and internalised in the productive universities – will at best ensure that current efficiency rates and quality levels are maintained. In fact, one could argue that with the growth in numbers across the whole pipeline (from bachelors to masters to doctoral students) and subsequent higher ratios of students to supervisor, it is more

likely that the efficiency ratio of 0.4 (which is required to produce more than 5 000 graduates) will not be achieved. It is also possible that the quality of doctoral education may begin to deteriorate under such conditions. There is already anecdotal evidence that many supervisors find it difficult to maintain the required quality standards of supervision and examination with the current burden of supervision. In addition to the current strategies, we therefore propose that consideration be given to a more radical strategy that will change the dominant model of doctoral education in the country.

Radical change

The second proposal could be called a paradigm shift in which we argue for establishing cohorts of full-time doctoral students who would be 'employed' as junior staff members at South African universities. The proposal is that we aim to reverse the current full-time to part-time ratio of 40:60 to 60% full-time and 40% part-time. In real numbers this would mean that about 9 600 of the current cohort of doctoral students would be able to study full-time (compared to about 6 400) – an increase of about 3 000.

A model of doctoral education in which the majority of students study full-time would enable experimentation with different models of doctorate management, such as graduate schools, and with possibly more coursework, more integration and group/laboratory approaches.

In terms of management and structures, it is clear that the traditional research-based, one-supervisor-with-one-candidate model is still dominant, particularly in the social sciences and humanities, but that a range of other models are emerging and spreading. These models range from taught PhDs (or at least a significant taught component of the degree), integrated programmes (coursework, additional training workshops or seminars, and a dissertation), professional and or practice-based PhDs, PhD by publication and a research group/laboratory approach. In addition to different models, there are initiatives such as graduate schools, for which there are also numerous models of organisation – some are discipline-based but more prevalent are interdisciplinary 'schools'. Common to most, are the aims of creating a critical mass of students, providing a wider and better coordinated offering of courses, and student and supervisor support, and providing a more coordinated organisational structure for doctorate education.

There is overwhelming international evidence that students who study full-time complete their degrees in shorter periods. A South African example in the humanities is the Graduate School in the Faculty of Arts and Social Sciences at Stellenbosch University. Since 2010, the Graduate School has given scholarships for social science doctoral candidates to study full-

time with the intention of completing within three years. In 2013 the average time to degree of Graduate School graduates was 3.35 years (compared to the university average of 5.06 years). In 2014 this improved further to 2.84 years (compared to the university average of 5.73 years). Although this is a small sample (about 80 students) it suggests that the doctoral students in the social sciences and humanities can achieve the same time to completion of their degrees than their counterparts in the natural sciences if they are able to study full-time.

What underpins many of the new arrangements and models, both in the US and Europe, is the changed funding model. In many European countries, particularly those in Scandinavia, students are employed as full-time junior staff for periods of three to four years. The full-time study model allows for much more dedicated and regular supervisory engagement, more intensive coursework, supplementary training in methodology and writing skills, and pursuing team or group supervision. Examples of how appointing students on a full-time basis also allows for different models of doctoral education, are provided by the commentators in Appendix 2.

Although it is difficult to provide empirical evidence that students who study full-time also produce higher-quality theses, it is not difficult to see how such a model would generate better 'outputs'. The proposed model would lead to shorter progression trajectories from honours to masters to doctoral studies, which also implies more accumulative learning and retention of knowledge. Fewer interruptions of study should translate into better prepared students. Instead of supervisors focusing on 'remedial' teaching to address an interrupted study career, they can focus on deepening knowledge acquisition and especially training in more advanced methodologies. The full-time model provides for more peer-group learning and feedback as well. And it is assumed that 'junior staff' status and a salary, rather than a scholarship, would attract more black and women candidates.

If South Africa follows the example of countries where doctoral candidates are appointed at universities who study for four years and then teach for one year, it also means that they would contribute to expanding the pool of academics.

The counter arguments, we suspect, may concern the cost of implementing such a model. At a first glance the costs may seem prohibitive. If one were to start modestly and appoint approximately 2 000 doctoral candidates at an average of a junior lecturer's salary in 2015 (ZAR 400 000 [USD 30 800]) this would require an additional injection of about ZAR 800 million (USD 61.5 million) per year into the sector. However, if one keeps in mind that this would enable these candidates to complete within three to four years (which is an improvement of 20% to 30% on current completion rates) and will result in cohorts that are generally younger when they

graduate (early 30s rather than early 40s), the gains begin to offset the costs. And in addition, we are likely to produce more high-quality graduates and research.

Our discussion in this chapter focused on four national imperatives (growth, efficiency, transformation and quality) and the way in which they have influenced doctoral education in South Africa over the past two decades. We have summarised the evidence presented in the preceding chapters with regard to each of these. We argued that the interplay between these four imperatives (and their associated discourses) is a complex one and sometimes even appears contradictory. We have also argued that these imperatives – although social constructs – have been very influential in ‘guiding’ practices in doctoral education within the universities (the way in which they have responded to these imperatives) as well as the nature of supervision.

And finally, we argued that the major challenge that we face in this country is to generate sufficient funding to support more postgraduate students to study full-time, which will also stimulate the introduction of different models of doctoral education, and that this may encourage or incentivise more black students to engage in doctoral education. This is a plea for a radical change to the current approach to doctoral education that will enable the system to respond more innovatively to all four imperatives.

In the final chapter we address three related policy options that are based on our analysis in this book.