

CHAPTER 2

RESEARCH UNIVERSITIES IN AFRICA: AN EMPIRICAL OVERVIEW OF EIGHT FLAGSHIP UNIVERSITIES

Nico Cloete, Ian Bunting and Peter Maassen

The development role of universities in Africa

Following independence during the 1950s and early 1960s, Africa's new national universities were expected to be the key contributors to the high-level human resource needs of the country, particularly in providing personpower for the professions and the bureaucracy. This was to redress the acute shortages in these areas as a result of the gross underdevelopment of universities during colonialism and the departure of colonial administrators following independence. By the early 1970s the focus had shifted, as was reflected in the Association of African Universities Declaration at the end of the Accra Conference, with the conclusion that all universities must be development universities (Yesufu 1973). Despite the development university rhetoric, during the next two decades African governments did little to promote the development role of the university, partly because governments did not have a coherent model on how to do this, and partly because of broader political and socio-economic struggles that were often fuelled by Cold War and funding agencies' agendas, with the World Bank playing a particularly pernicious role (Samoff & Carrol 2004).

In the post-2000 period, development returned to the agenda. Kofi Annan, the then Secretary General of the United Nations, declared: 'The university must become a primary tool for Africa's development in the new century' (quoted in Bloom et al. 2006: 2). This was endorsed by a group of African Ministers of Education at the preparatory meeting for the UNESCO World Conference on Higher Education in 2009 (MacGregor 2009). While these statements expressed support for higher education to contribute to development, they did little to clarify the role of either the government or the university.

Closer examination of the different calls for a developmental role for universities reveals

two somewhat contradictory notions: a direct instrumentalist (or service role), and an ‘engine of development’ role which is based on strengthening knowledge production and innovation (Maassen & Cloete 2010). The instrumentalist role is arguably the more dominant and is, in addition to governments, strongly driven by foreign donors and multilateral agencies such as UNESCO, the United Kingdom’s Department for International Development and the Norwegian Agency for Development Cooperation. The underpinning assumption seems to be that universities have a concentration – even a surplus – of expertise which should be applied to solving pressing social and health problems. Not only is this direct service role inimical to the mission of the university, it is quite ironic that many of the development agencies and foundations operate from countries (such as the United States, the UK, Norway and the Netherlands) where the higher education system is located within a knowledge economy policy framework, while at the same time – particularly through the influence of Foreign Affairs departments – they drive a more direct instrumentalist approach in Africa (ibid.). In an extensive study of bilateral country investments and foundation partnerships to support higher education in Africa, Maassen and Cloete (ibid.: 268) concluded that ‘none of the donor countries involved subscribes to the engine of development approach in their development cooperation policies with respect to higher education’.

The engine of development notion embedded in Annan’s development tool has since become the dominant discourse for many advanced OECD countries (Olsson & Cooke 2013) and has been embraced enthusiastically by numerous developing countries, particularly the leading BRICS¹ countries such as China, Brazil and India (Carnoy et al. 2013; Cloete & Mouton forthcoming). Castells (2009: 3) argues that:

In the current condition of the global knowledge economy, knowledge production and technological innovation become the most important productive forces. So, without at least some level of a national research system, which is composed of universities, the private sector and public research centres, no country, even the smallest country, can really participate in the global knowledge economy.

The need for research universities in Africa

Internationally, there is growing consensus among national policy-makers and other central socio-economic actors that the university is a driver for economic growth and development. This has to do with the role of the university in producing a highly skilled and competent labour force and in producing new knowledge. Both contributions are essential to the creation of innovation and the development of a national economy that is globally competitive. This is well summed up by Olsson and Cooke (2013: 18) in an OECD/IHERD report:

¹ Brazil, Russia, India, China and South Africa.

Top research universities in industrialised countries (often referred to as the Super RUs) usually dominate the global ranking tables. In contrast, their counterparts in middle and low-income countries have, if anything, more important missions because they are the engines of local and regional knowledge development and natural leaders of their own evolving academic systems. As these systems become increasingly complex and the need to nurture knowledge networks for research grows ever more essential, the success of these institutions becomes even more crucial for national development policy.

Echoing these sentiments, Altbach (2013) states that while research universities in the developing world have not yet achieved the top levels of global rankings, they are extraordinarily important in their countries and regions, and are steadily improving their reputations and competitiveness on the international stage. A key point is that research universities around the world are part of an active community of institutions which share values, foci and missions. However, not all universities are research universities. Research universities are a relatively small percentage of the higher education sector. In the US, the ratio is about 5% (220 research universities in a system of more than 4 000 post-secondary institutions); in the UK 25% (25 research universities among 100 universities); and in China 3% (100 research universities out of more than 3 000 institutions countrywide). In many smaller developing countries there is often only one research university and many countries have none (ibid.).

A clearly differentiated academic system is needed for research universities to flourish. For that, developing countries need to differentiate the missions of institutions in the post-secondary system and to organise institutions in a rational way. But, according to Altbach (ibid.: 328):

The fact is that few if any developing countries have a differentiated academic system in place; and this central organisational requirement remains a key task ... These institutions must be clearly identified and supported. There must be arrangements so that the number of research universities will be sufficiently limited so that funding is available for them and that other resources, such as well-qualified academics, are not spread too thinly.

Does Africa have research universities?

Implying that Africa is not doing well in terms of research universities, Altbach and Balán (2007) did not include Africa in their discussion on transformations of research universities in Asia and Latin America in their book *World Class Worldwide*. They justified the exclusion of Africa on the grounds that the continent's academic challenges are sufficiently different from those of Latin America and Asia (ibid.: vii), but they did not provide any empirical evidence to support this claim.

In the current context of world class and rankings, an inevitable starting point is to consider how Africa is doing in the global rankings. A recent review by Mohamedbhai (2012), former Secretary General of the Association of African Universities, shows that in the Shanghai Jiao Tong Ranking there are three African universities in the top 500: Cape Town (201–300), Witwatersrand (301–400) and KwaZulu-Natal (401–500). The *Times Higher Education* places the University of Cape Town at 103, Stellenbosch University in the range 251–275, Witwatersrand University at 251–275 and Alexandria University (Egypt) at 301–400. As can be seen, of the five African universities in the top 500 in these two main ranking systems, four are from South Africa.

Evidence about Africa's performance on the global research and science stage is not encouraging. Zeleza (2014: 1), in a broad-ranging review of Africa's performance in science, technology, engineering and mathematics shows that Africa remains at the bottom of the global science, technology and innovation league tables, and lags behind on key indicators such as the gross domestic expenditure on research and development, number of researchers and share of scientific publications and patents. While Africa is at the bottom of every indicator, a positive is that the growth of publications in Africa increased from 11 776 in 2002 to 19 650 in 2008, a growth rate of 66.9% in comparison to the world growth of 34.5%. Africa's world share of publications increased from 1.6% to 2%, Latin America from 3.8% to 4.9% and Asia from 24.2% to 30.7% (Zeleza 2014). But in terms of share of researchers by region, between 2002 and 2007, the US's share fell from 25.2% to 22.7%, Asia's increased from 35.2% to 38.2% and Latin America from 3% to 3.8%, while Africa's fell from 2.2% to 2.1% (ibid.).

A slightly more favourable picture emerges from the latest assessment of the state of science in the African Union. Using the Scopus database for peer-reviewed publications, the African Observatory for Science, Technology and Innovation (2013) reports that over the period 2008–2010, African Union publication output grew by 43% compared to the world average of 18%. If the African Union were considered a country, it would, in the BRICS context, be just behind India, China and Brazil, but ahead of Russia in publication output (ibid.).

Zeleza (2014) argues that there is a considerable literature, by both national and international agencies and scholars, on the capacity constraints and challenges facing African countries in building robust research systems. Four key issues are highlighted (ibid.: 7):

- Basing science policy on the technological and industrial needs of the particular society and integrating it into national development plans, with adequate and stable funding for implementation;
- Significantly expanding the size of and support for the higher education sector;
- Incentivising the business sector to invest in research and development by itself and through industry-university collaborations; and
- Promoting scientific literacy as a critical means of popularising science, technology and innovation in society.

However, the underlying assumption of Zeleza's (2014) synthesis is 'more for everybody' because, in Africa, no government or university sector wants openly to promote differentiation. At the same time, in all countries there are national, first post-independence universities which are much better resourced and have much higher status than most other public and private universities. Research by the Centre for Higher Education Transformation (CHET) shows that, in South Africa, the sector is differentiated into clearly distinguishable clusters or groups in terms of a wide range of performance indicators (Bunting 2013).

The approach in Africa: World-class or flagship universities?

The differentiation debate raises the question about whether Africa should have world-class or flagship universities. John Douglass (2014) reviews the distinctions between the use of these terms by arguing that a world-class university should have highly ranked research output, a culture of excellence, great facilities and a brand name which transcends national borders. Importantly, the world-class university must be rated in the upper echelons of world rankings generated each year by non-profit and for-profit entities. A research-intensive flagship university can be described as an academic institution committed to the creation and dissemination of knowledge in a range of disciplines and fields, and featuring the appropriate laboratories, libraries and other infrastructure which permit teaching and research at the highest possible level. Worldwide, such universities play complex roles in the academic system, including delivering on the core mission of research production and training of students to engage in research (Altbach 2013). Flagship universities de-emphasise rankings and are research-intensive (or in the process of becoming so) but have wider recognised goals (Douglass 2014: 1–2). This view is supported by Berdahl (2014) who argues that the American flagship public universities, which compete for talent with the nation's best private universities, are an essential component of the US research enterprise. These universities serve the nation as well as their respective states.

Is Africa likely to have a world-class university in the foreseeable future? According to Frans van Vught, former Director of the Centre for Higher Education Policy Studies at the University of Twente in the Netherlands and a high-level expert on innovation, research and higher education at the European Commission, the answer is 'no' (Muller 2014). A recent international gathering of 200 university presidents in Chicago foresaw the following global picture (ibid. 2014):

- A first layer of highly prestigious, highly resourced and very productive universities (35–60 in number);
- A second layer of 200–250 universities in consortia – sharing resources, offering joint and mutually accredited programmes and, therefore, able to compete internationally;
- A third tier of about 200 institutions comprising a range of niche players, focused on three or four fields at most;

- A large fourth tier of mainly national and regional teaching institutions, about 24 000 in number; and
- A small group of hi-tech Massive Open Online Courses (MOOCS).

According to the scenario emerging from the global gathering of university presidents, if Africa manages a handful of second- and third-tier places, it will be doing very well indeed.

Research on flagship universities in Africa: The HERANA study

The Higher Education Research and Advocacy Network in Africa (HERANA) project started, in Phase 1 (2009), with the collection of data at the eight African universities included in the study.² These universities were selected because each had been the most prominent national university in its country since independence, and because each had broad flagship goals built into its vision and mission statements. It should be noted here that in the HERANA project we use the terms ‘flagship’ and ‘research-intensive’ or ‘research-led’ university interchangeably: while some of the HERANA members prefer the term ‘flagship’ and others ‘research university’, both are associated with differentiation with a focus on strengthening knowledge production. According to Cloete et al. (2011), each of the eight universities aimed to:

- Have a high academic rating which would make it a world-class university or at least a leading or premier university in Africa;
- Be a centre for academic excellence;
- Engage in high-quality research and scholarship; and
- Deliver knowledge products which would enhance both national and regional development.

At the time of the first data collection (2009–2010), some universities could not extract the required data because they did not have appropriate or functional electronic student and staff databases. Sometimes the data were only available in summarised tables in print format. There were also gaps in the data on electronic databases; inaccurate classifications and incomplete graduate sets; and the grades used to indicate student success in specific courses were not comprehensively captured. Some institutions did not have a central management information office in which complete data sets were stored. A consequence of this decentralisation was that different versions of students and staff data were held in different operational units. Another major problem was that the concepts of full-time equivalent (FTE) students and staff were not widely used. The HERANA data task team resolved initial data problems in a number of different ways, including copying available electronic student unit records and subjecting these

2 The universities of Botswana, Cape Town, Dar es Salaam, Eduardo Mondlane, Ghana, Mauritius, Makerere and Nairobi.

to detailed analyses, as well as using printed and internet copies of institutional annual and planning reports to verify or correct data that had been submitted by participating universities (Cloete et al. 2011).

Following groundwork on performance indicators with the participating universities laid during the first phase of the HERANA project, institutions were encouraged during the second phase (2011–2014) to further develop both their data management systems and human resource capacity for the collection of institutional data. To support this process, a manual on the collection and analysis of HERANA data was developed and distributed to institutions. The manual covered the conceptual definitions and steps required to produce the data, as well as examples of the use of this data for institutional planning. By March 2013, all of the data sets were complete (see Bunting et al. 2014a). It was clear from the interactions between the task team and the universities that the capacity of the universities to collect and prepare data had improved significantly over the period of engagement. The outcome of the revised process was that it was possible to compile the final analyses of student and staff data for 2008–2011 around six months after starting the process, compared to the almost two years taken for the collection of data for 2001–2007.

In its analyses of research outputs for 2001–2007, the HERANA project, in collaboration with the Centre for Research on Evaluation, Science and Technology at Stellenbosch University, extracted (from the Inter-Services Intelligence's [ISI's] arts and humanities, social science and science-expanded citation indexes – now called the Web of Science³) all papers which contained at least one author whose address was that of one of the eight flagship universities. If the authors of a research publication recorded on a citation index were employed by different universities, then full publication units were assigned to each of the universities concerned. This methodology was applied again to the collection of research output data for 2008–2011 (Bunting et al. 2014b).

To ensure maximum accuracy, the data that had been collected, systematised and analysed were returned to each institution's planning department in three stages for verification. The publication emerging from this research, *An Empirical Overview of Eight Flagship Universities in Africa* (ibid.), was also reviewed by each of the participating institutions before finalisation. A database which is unique to the African context was developed during this process, and contains ten years of comparable data across these eight flagship universities (see Bunting et al. 2014a).⁴

In its analyses of performance indicators, the HERANA project followed the OECD guidelines in taking the primary high-level knowledge inputs of universities to be doctoral enrolments and academic staff, and their high-level knowledge outputs to be doctoral graduates and research publications. For the purposes of these analyses, staff members were defined as persons who were on the payroll of a university in either a full-time or part-time

3 Web of Science website: <http://thomsonreuters.com/thomson-reuters-web-of-science/>.

4 The data are available on the CHET website: <http://chet.org.za/data/african-he-opendata>.

capacity. They were classified as permanent if they held a full-time contract of more than three years, and as temporary if they did not have such a contract. The staff employed by universities were placed into three broad categories: academic (more than 50% of time on duty on research or instruction); administrative (including executive management, deans and other senior administrative positions spending less than 50% of their time on teaching/research); and service (mainly lower-skilled, such as cleaning and gardening employees).

A key component in the analyses of performance was the link between knowledge outputs and high-level academic staff inputs of universities, which were taken to include their permanent academic staff with doctoral qualifications, and their senior academic staff who hold ranks of (full) professor or associate professor. These two sets of permanent academics do not necessarily overlap: some staff with doctorates may hold the rank of lecturer or senior lecturer, while some professors and associate professors may not have doctoral qualifications. The key issue is that a university's permanent academic staff in the two groupings should be its research leaders.

Results emerging from the HERANA study

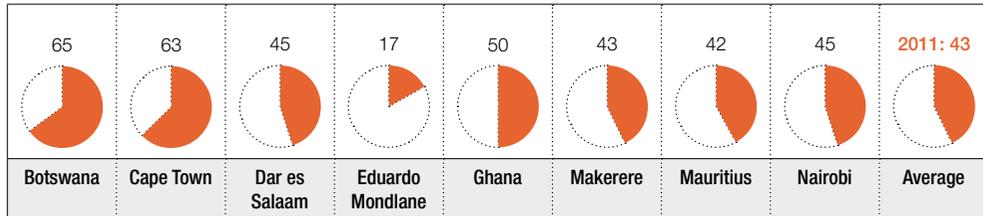
In terms of qualifications, Figure 2.1 shows which proportions of the permanent academic staff across the eight universities held doctoral degrees in 2011. The focus was on academic staff members with doctoral degrees because they play an essential role in the production of research. Permanent academic staff in the qualifications category should be the major producers of research outputs and (at input level) the main supervisors of doctoral students. Based on work across South Africa, the HERANA project proposed that a target of academic staff with doctoral qualifications should be at least 50% of permanent staff, given that all eight universities aimed to be active producers of high-level research. The data in Figure 2.1 show that only three of the eight universities (Botswana, Cape Town and Ghana) had proportions of 50% or above of permanent academic staff with doctorates in 2011. The overall average for the eight universities improved from 40% in 2007 to 43% in 2011. Only Eduardo Mondlane (17%) continued to have an average well below 40% in that year.

In terms of seniority of staff, senior academics were regarded as those in the categories of professors and associate professors, and junior academics to be those in the categories of lecturer and junior lecturer and below. The senior academics category is important because research leaders, particularly those leading research groups, should ideally be either professors or associate professors. The junior academics category can provide a sense of what proportion of the permanent academic staff of a university might not be sufficiently qualified to become research leaders. Staff from this group would typically be pursuing personal research agendas designed to improve qualifications, such as doctoral programmes.

Figure 2.2 shows that in 2011, 40% of the staff at the University of Cape Town was in the senior category (meaning professors or associate professors). Apart from Cape Town, only

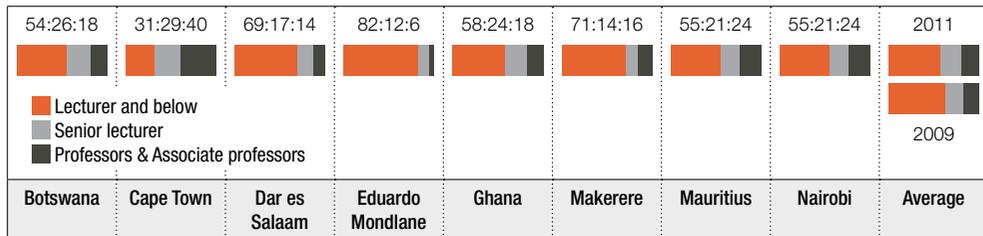
Mauritius (24%) and Nairobi (24%) were above 20% in this category. At the opposite end, and with the exception of Cape Town (31%), junior staff (lecturers and below) exceeded 50%, with Eduardo Mondlane at 82%, Makerere at 71% and Dar es Salaam at 69%. Dar es Salaam, Eduardo Mondlane and Makerere also had very low percentages of senior lecturers (below 20%).

Figure 2.1 Proportion of FTE academics with doctoral degrees (2011) (%)



Source: Bunting et. al (2014b)

Figure 2.2 Academic staff by seniority (2011) (%)

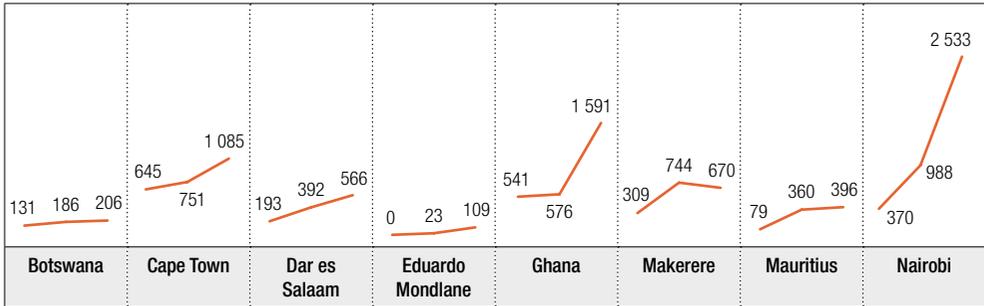


Source: Bunting et. al (2014b)

In terms of postgraduate knowledge outputs, Figure 2.3 shows that the masters graduate total of the eight universities increased from 2 268 in 2001 to 7 156 in 2011, at an average annual rate of 12% over the period. Two universities were responsible for 66% of the overall increase of 4 888 in 2011 compared to 2001: they were Nairobi, where the masters graduate total increased almost sevenfold from 370 in 2001 to 2 533 in 2011, and Ghana, where the masters graduate total almost trebled from 541 in 2001 to 1 591 in 2011.

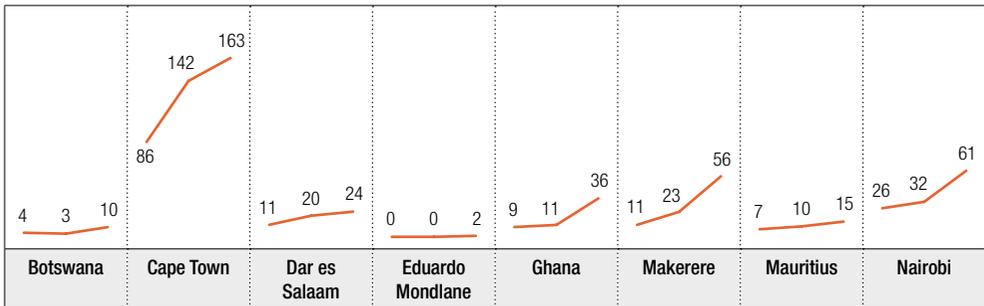
Figure 2.4 summarises the number of doctoral graduates in 2001, 2007 and 2011. The doctoral graduate total across the eight universities increased from 154 in 2001 to 367 in 2011. Collectively, Cape Town, Nairobi and Makerere produced 80% of the doctoral graduate total in 2001, 82% in 2007 and 76% in 2011.

Figure 2.3 Masters graduates (2001, 2007, 2011)



Source: Bunting et. al (2014b)

Figure 2.4 Doctoral graduates (2001, 2007, 2011)

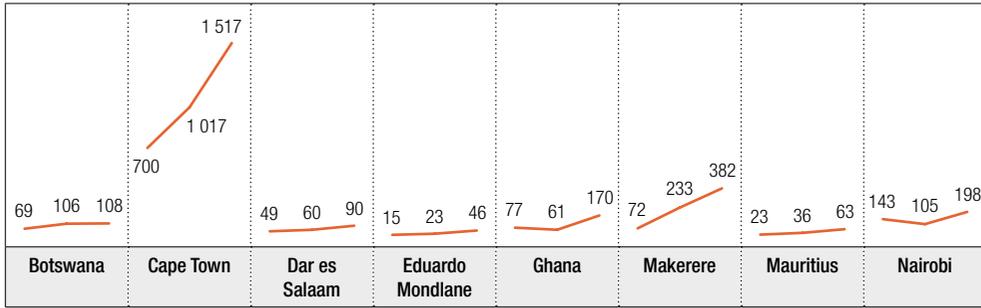


Source: Bunting et. al (2014b)

Figure 2.5 summarises the number of research articles produced by the eight universities. It shows that the combined output doubled from 1 148 research articles in 2001 to 2 574 in 2011.

Figure 2.5 also shows that, as in the case of doctoral graduates, the output of research articles was dominated by Cape Town, Nairobi and Makerere. These three universities produced 80% of the overall research article total in 2001 and 81% in 2011. In 2011, Cape Town produced 1 517 ISI peer-reviewed articles, while the other seven institutions combined produced 1 057. Nonetheless, Cape Town is not very productive in international terms; for example, the most productive university in Latin America, the University of Sao Paulo in Brazil, produced 8 200 ISI publications in 2010 (Badsha & Cloete 2011).

Figure 2.5 Research articles (2001, 2007, 2011)

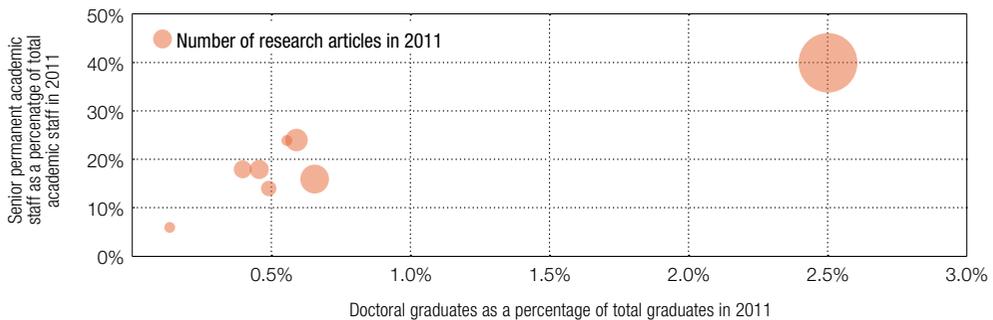


Source: Bunting et. al (2014b)

The combination of low proportions of senior academic staff (as indicated at six institutions being below 20%) with having fewer than 50% of staff with doctorates (as shown for six of the eight universities) can be expected to have a negative effect on knowledge production. Figure 2.6 shows how, at certain universities, a low percentage of senior academic staff (y-axis) combined with a low percentage of doctoral graduates (x-axis) was associated with low knowledge output in the form of research articles.

Figure 2.6 Senior academic staff and doctoral graduates as predictors of publication output

University	2011		
	Doctoral graduates as % of total graduates	Senior academic staff as % of total staff	Research articles
Botswana	0.40%	18%	125
Cape Town	2.51%	40%	1,402
Dar es Salam	0.49%	14%	91
Eduardo Mondlane	0.13%	6%	45
Ghana	0.45%	18%	141
Makerere	0.65%	16%	318
Mauritius	0.56%	24%	47
Mairobi	0.59%	24%	186



Source: Bunting et. al (2014b)

Analysis shows that the groups of staff who would be expected to be active in research (those with doctorates and those at senior levels) were generally unproductive as far as high-level knowledge outputs were concerned. This raises the issues of whether the universities have structures in place for the management of research and whether they have been able to introduce incentives designed to improve the research activities of academic staff members. A lack of incentives (such as research funding or promotion prospects) may affect the output of staff who have doctorates but who are at levels of senior lecturer and below. The administrative and teaching workloads of senior academics, along with a lack of research funding, may contribute to low productivity amongst senior academics at six of the eight universities. This is an area requiring further research.

Conclusion

A review of the mission statements of the eight HERANA universities shows that two of the flagship goals were to engage in high-quality research and scholarship, and to deliver knowledge products which would enhance national and regional development. The results presented above suggest that Cape Town is the only university in this group which clearly satisfies these goals, and that Makerere is the university which comes closest to Cape Town.

Some key problems which emerge from this study are that, relative to their undergraduate student bodies, the institutions enrol low proportions of postgraduate students at masters and doctoral levels. In 2011, 88% of all enrolments across the eight universities were undergraduates, with only Cape Town under 70%. Furthermore, masters programmes overall seem to be focused on professional capping degrees, rather than on training for high-level research. This results in low numbers of masters graduates moving on to doctoral studies. Additionally, the staff complements of seven universities (excluding Cape Town) consist of high proportions of junior, underqualified academics, resulting in low numbers of potential research leaders. Many of the senior, well-qualified staff appear to be promoted to administrative rather than research positions. There is clearly a need for more senior (professorial) positions and research leaders with PhDs in the African flagship universities.

The university remains, despite sometimes strident claims to the contrary, the best and, in most contexts, the only producer of self-renewing, knowledge-producing capacity, meaning research-based PhDs (Gibbons et al. 1994). The adjunct institutions of the knowledge economy are dependent upon a vibrant university sector from which they draw their self-renewable, knowledge-generative capacity (i.e. new PhDs) without which they cannot produce new knowledge. Currently, a vibrant secondary knowledge production landscape only occurs successfully in countries that have a stable PhD-producing university sector – and these countries are mostly in the developed North. In general, the African universities are not strengthening their self-generative capacity and are thus struggling to make a substantial contribution to either new knowledge generation or the application thereof.

Building on the statements of Kofi Annan and the declaration by African Union Ministers of Education at the UNESCO World Conference, the Chairperson of the African Union Commission, Dr Nkosazana Dlamini-Zuma, declared at the 20th anniversary of South Africa's transition to democracy and the 50th anniversary of the African Union that these contexts provide an environment in which discussions on how Africa can propel its future development could take place. She also asserted that universities – and particularly research universities – will enable Africa to grow its prosperity for the next 50 years (Makoni 2014). Moving beyond statements of intent, which in themselves are a major step forward in the African context, it is necessary to gain a much better research-based understanding of the characteristics of research universities, particularly in a developing country context, while simultaneously working on building the infrastructure and the academic environment needed to support emerging research universities in Africa.

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