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# Knowledge Production and Contradictory Functions in African Higher Education

Edited by Nico Cloete, Peter Maassen and Tracy Bailey

**AFRICAN  
MINDS**

*A NOTE ABOUT THE PEER REVIEW PROCESS*

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## CHAPTER 3

# ASSESSING THE PERFORMANCE OF AFRICAN FLAGSHIP UNIVERSITIES

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### **The academic core**

In the preceding chapter on research universities (Chapter 2), it was argued that Africa needs universities that can produce both highly-skilled labour forces and new knowledge. Both products are essential to the creation of national economies that are globally competitive. The chapter argued further that these African universities would not need to be world-class research universities. It made the following main points about applications of the notion of ‘world-class research universities’:

- Research universities are relatively small proportions of most university systems. For example, in China 3% of universities are classified as research universities, and in the United States the proportion is 5%. Many smaller developing countries have only a single research university.
- The linking of world-class to major international ranking systems stimulated a fascination with prestige/status that was completely beyond the realities of most African universities. Only five African universities (four of them in South Africa) were placed in the top 500 by these ranking systems.
- An important consequence of discussions on ‘world-class research universities’ has been an increased awareness of performance and the measurement of performance, particularly in the area of knowledge production.

While a consequence of rankings has been an increased awareness of performance, particularly with regard to knowledge production, the global rankings (and especially the Academic

Ranking of World Universities)<sup>1</sup> offer no useful methodology or indicators for institutional improvement. Instead, these rankings – and particularly those at the top end – seem to solidify existing performance and status.<sup>2</sup>

As such, the Higher Education Research and Advocacy Network in Africa (HERANA) project elected to explore the ‘academic core’ notion referred to in Chapter 2. The university’s unique contribution to development is via knowledge – either transmitting knowledge (teaching) to individuals who will go out into the world and contribute to society in a variety of ways, or producing and disseminating knowledge (research, engagement) that can be applied to the problems of society and economy. Part of our conceptual framework for understanding what impacts on a university’s ability to make a sustainable contribution to development focused on the nature and strength of its knowledge-producing activities. According to Burton Clark (1998), when an enterprising university evolves a stronger steering core and develops an outreach structure, its heartland is still in the traditional academic departments, formed around disciplines and some interdisciplinary fields. The heartland is where traditional academic values and activities such as teaching, research and training of the next generation of academics occur. Instead of ‘heartland’, we use the concept ‘academic core’. According to our analytical assumption, it is this core that needs to be strengthened if a university, as a key knowledge institution, is to contribute to development (Cloete 2012). While most universities also engage in knowledge activities in the area of community service or outreach, our contention is that the backbone or the foundation of the university’s business is its academic core; that is, its teaching via academic degree programmes, its research output, and the production of doctorates (those individuals who, in the future, will be responsible for carrying out the core knowledge activities).

In Chapter 2, Cloete et al. use the term ‘flagship’ to describe the eight African universities included in the HERANA study.<sup>3</sup> The first reason for the choice of the term ‘flagship’ was that all of these institutions (except for Cape Town) are each the ‘mother university’ of a newly independent country. The University of Cape Town is South Africa’s oldest university and is also the highest-ranked university in the country and in Africa.<sup>4</sup> The second reason for classifying these eight universities as flagships is that they took themselves to be leading knowledge-producing institutions, and at the same time to be institutions making major contributions to research and development in their countries. But, as was pointed out in Chapter 2, some of the HERANA participants also use the term ‘research universities’.

The self-perceptions or aspirations of the eight universities are contained in their vision and mission statements, which indicate that each aims to be a centre of academic excellence that is engaged in high-quality research and scholarship, and a producer of high-level knowledge

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1 Academic Ranking of World Universities website: <http://www.shanghairanking.com/ARWU2014.html>.

2 In a chapter in a forthcoming (2015) book by John Douglass (*Exploring the Flagship University Model: Altering the paradigm from ranking to relevancy*, Palgrave Macmillan), the issue of ranking versus relevance will be addressed in greater detail.

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

4 Academic Ranking of World Universities: <http://www.shanghairanking.com/ARWU2014.html>.

that will satisfy national and regional development needs. These vision and mission statements are more than just expressions of institutional aspiration. The aims built into the statements determine the academic core of each university; that is, the combination of their teaching and research programmes, their academic staffing resources, and their research and doctoral graduate outputs. For the purposes of this chapter, the academic core of a flagship university will be taken to consist of the following elements, which are related to the broad aims summarised above:

- The inputs required for it to achieve the goal of being a centre of academic excellence;
- The student graduate outputs expected of a centre of academic excellence; and
- The high-level knowledge outputs (doctoral graduates and research publications) expected of a centre of academic excellence.

The references to requirements and expectations again raise a point made earlier about the measurement of performance playing an increasingly important role in discussions about flagship universities: it is not sufficient simply to lay down the key aims of flagship universities; some attempt must be made to assess the performance of the universities relative to these aims.

The main purpose of this chapter is that of describing and explaining the steps that the HERANA project has taken in developing a methodology for assessing the performance of the eight flagship universities. This developing methodology will make use of both the aims built into the academic cores of these universities and the empirical data presented in the previous chapter.

### **First attempts to link academic core and institutional assessment**

The HERANA project raised the issue of using the academic core as a basis for institutional assessment in a paper entitled *The Academic Core, Data and Indicators* (Bunting 2011). This paper had been offered at a workshop which the Centre for Higher Education Transformation (CHET) organised in Stellenbosch, South Africa in October 2011. The paper discussed the collecting of common sets of data, the construction of academic cores, and the possibility of making cross-national assessments of universities in Africa. The paper included analyses of the eight flagship universities, to which reference is made in Chapter 2 of this book on research universities. This paper took as given these two principles:

- Any assessment of performance must be relative to a set of goals and targets that a university is expected to achieve; and
- A cross-national performance measurement system must be based on common goals and on a common set of quantitative targets linked to these goals.

It maintained that the development of these two principles should begin with examinations of the aspirations of the universities, as these appear in their publicly available vision and mission statements. These aspirations, the paper argued, can be unpacked into sets of input and output goals that are essential components of their academic cores. Table 3.1 lists the input and output goals and the related targets that were used in 2011.

**Table 3.1** 2011 proposals on goals and targets for flagship universities

Academic core goals	Targets related to goals
Input goal 1: Strong enrolments in SET	40% of student enrolments to be in SET programmes
Input goal 2: Strong postgraduate enrolments	15% of student enrolments to be in masters and doctoral programmes
Input goal 3: Favourable student-to-academic staff ratios	Ratio of FTE students-to-FTE academics to be below 20
Input goal 4: High proportion of academic staff with doctoral degrees	50% of permanently-appointed academics to have doctoral degrees
Input goal 5: High levels of research funding	Research funding per permanent academic to be 20 000 purchasing power parity dollars
Output goal 6: High outputs of graduates in SET fields	20% of total SET enrolments in any given year should graduate
Output goal 7: High outputs of doctoral graduates	15% of total doctoral enrolments in any given year should graduate
Output goal 8: High levels of new knowledge production	Ratio of peer-reviewed research articles per permanent academic to be 0.50 per annum

The paper used empirical data for 2001–2007 that had been collected during 2010 to relate institutional performance to the targets listed in Table 3.1 above. Examples of the results of this linking of data to targets can be seen in Table 3.2, which uses the following three-point scale in assessing performance relative to target: 3 = strong; 2 = medium; 1 = weak.

The representatives of the flagship universities present at the October 2011 workshop expressed concerns about the use of the above three-point scale. Their views were that measurements of performance relative to goals and targets should not result in value judgements of the kind contained in the assessment columns of Table 3.2. Performance reviews, they insisted, should at best be institutional self-assessments in which a university first compares its data averages with those of a group of universities which it has itself selected, and then decides what, if any, internal action is needed.

This phase of the cross-national project was summed up in the book *Cross National Performance Indicators: A case study of eight African universities* (Bunting & Cloete 2012). This book dropped Table 3.2 and gave detailed examples of how universities could compare

themselves to other selected groups of flagship universities. An example of this book's institutional-level analyses appears as Table A3.1 in the Appendix. As can be seen, Table A3.1 does not offer any evaluations of Botswana's performance relative to the goals and targets of a flagship university. The table is, within the framework of the cross-national performance indicator project, an unsatisfactory one. It simply compares Botswana to a number of other small flagship universities and allows supposedly non-evaluative comments of the following kind to be made:

- Goal 1: Botswana's proportion of SET enrolments is about half of the target and half of the scores of the other three small universities;
- Goal 2: Botswana's proportions of masters and doctoral enrolments are below target, but consistent with two of the other three small universities; and
- Goals 7 and 8: Botswana's high-level knowledge output rates are, like those of the other three small universities, below the target levels.

**Table 3.2** Assessing two universities on 2011 goals and targets

GOALS	Target	Cape Town		Makerere	
		Data average: 2001–2007	Assessment	Data average: 2001–2007	Assessment
Goal 1: Proportion of enrolments in SET	40%	41%	3 = Strong	24%	1 = Weak
Goal 2: Masters + doctors enrolments as % of total enrolments	15%	19%	3 = Strong	5%	1 = Weak
Goal 3: Student-to-academic staff ratios	Below 20	13	3 = Strong	16	3 = Strong
Goal 4: Academic staff with doctoral degrees	50%	48%	3 = Strong	32%	1 = Weak
Goal 5: Research funding per academic in purchasing power parity dollars	20 000	47 700 (2007 only)	3 = Strong	4 900 (2007 only)	1 = Weak
Goal 6: Ratio of graduates to enrolments in SET fields	20%	21%	3 = Strong	20%	3 = Strong
Goal 7: Doctoral graduates per permanent academic	0.15	0.15	3 = Strong	0.02	1 = Weak
Goal 8: Research publications per permanent academic	0.50	0.95	3 = Strong	0.09	1 = Weak
Average assessment		3 = Strong		1.5 = Medium/weak	

In November 2012, CHET held a further workshop with the eight flagship universities in Cape Town. The main aims of this workshop were to highlight the improved quality of the data produced by the flagship universities for the academic years 2009–2011, and to show that the new data sets would permit changes to be made to the flagship goals and targets listed in

Table 3.1. One of the papers at the workshop, *Developing Academic Core Indicators* (Bunting 2012), proposed that Goal 5 of Table 3.1 should be deleted because of problems experienced in collecting consistent data on research funding. It proposed further that two new input goals should be added to raise the total of flagship goals to nine. The paper proposed finally that the number of targets related to the flagship goals should increase from the eight targets in Table 3.1 to 16.

This proposed expansion of goals and targets in the academic core of flagship universities was not accepted by the November 2012 workshop. The main concern expressed was that the result of adding additional goals and targets to the academic cores of these universities could only result in more complex versions of Table A3.1 being produced. Table A3.2 in the Appendix, a shortened version of the full November 2012 table, offers an example of this. All that this truncated table succeeds in doing is to show, for the three selected universities, which targets were met and which were not. No individual or overall assessment of the performances of the universities is offered in the table. It thus became clear after this November 2012 workshop that merely adding new goals and targets to the academic core of the flagship universities would not be an acceptable methodology for a study of cross-national performance indicators. A return would have to be made to the basic methodology of Table 3.2, which had used a rating scale when evaluating a university's actual performance relative to targets set. The rating scale used in Table 3.2 would, however, have to be re-examined, as would the actual goals and targets of the academic core.

In the sections that follow, a methodology-based revised Table 3.2-type is outlined. This approach makes use of academic core models that have become embedded in policies adopted by government for the South African university system.

## **Flagship universities as traditional universities**

After a series of mergers between 2002 and 2007, South Africa was forced to revise its policies on the structure of the higher education system. In 2002, this higher education system consisted of a total of 36 institutions, with 21 described as universities and 15 as technikons. The mergers involved university-university, university-technikon and technikon-technikon amalgamations, and had the effect of reducing the higher education total to 23 institutions. This total became 25 in 2014 with the opening of two new, but small, universities. Three policy outcomes flowed from the mergers: the description 'technikon' was dropped, and all higher education institutions were described as 'universities' but had then to be placed into different academic core categories. The categories currently employed in South Africa's higher education system are these:

- Traditional universities, whose focus must be on general formative academic programmes (e.g. humanities, life and physical sciences, mathematical sciences) and on professional academic programmes that prepare graduates for entry into a profession



- (e.g. medicine, law, accounting, engineering);
- Universities of technology, whose focus must be on vocational programmes which prepare students for careers at levels below those of the professions; and
- Comprehensive universities, which must offer a mix of the programmes offered by traditional universities and the universities of technology.

This requirement that the three categories of university must have different academic core requirements was discussed in a paper offered at a CHET workshop on institutional differentiation, held in Stellenbosch in October 2014. The paper, *Academic Core Indicators as Mechanisms for Differentiation* (Bunting 2014), used the following basic arguments:

- The academic cores of South African universities can be expressed as mandates that prescribe what a university is empowered by government to do and which outputs government expects it to deliver;
- These mandates and expected outputs can be expressed as a limited number of goals that can be linked to quantitative targets;
- Quantitative measures can be made of the extent to which individual institutions comply with their category's quantitative goals and targets; and
- The performance of individual institutions can be measured relative to the extent to which they achieve the targets that have been set.

Appendix Table A3.3 sets out an account, in a form similar to the listing of academic core goals and targets in Table 3.1, of what the mandates and targets should be of South Africa's 11 traditional universities. These mandates have been derived primarily from the 2013 *White Paper for Post-School Education and Training* (DHET 2013). Table A3.4 in the Appendix sets out, again in a form similar to Table 3.1, the output targets which South Africa's traditional universities are expected to achieve. These targets have been derived from various government policy and funding documents.

The mandates and output targets of South Africa's category of traditional university can be readily adapted for use in performance assessments of the flagship universities. The data submitted by the flagship universities for 2009–2011 generate a table that misses only the first mandate target on academic programmes in Table A3.3 in the Appendix, and the undergraduate success rate targets that appear in Table A3.4. These two targets rely on detailed extracts from the South African national Higher Education Management Information System, which could not be replicated in the data collections from the flagship universities.

The goals and targets that have been extracted from Tables A3.3 and A3.4 in the Appendix for use in the assessment of flagship universities are listed in Table 3.3.

Appendix Table A3.5 sets out, for the three-year period 2009–2011, the flagship universities' data averages for the 13 targets listed in Table 3.3. The principle of relating data averages to targets, which was used in Table 3.2, can be applied here. The simple three-point

scale employed in 2011 will not, however, be used again because it had no direct link to institutional data averages; it was in effect a value judgement based on a perceived distance between the data averages and their related numerical targets. The new methodology requires mechanical calculations to be made, and these must lead to the data averages in Table A3.5 for each university and the averages for all eight being converted to positions on a four-point scale. The calculations must be based on this formula: (data average  $\times$  4) divided by (target for traditional university).

**Table 3.3** Goals and targets for flagship universities

Goals	Targets
Student enrolments must be primarily in major fields of study in SET	(1) Science and technology enrolment proportion to be at least 40%
Student enrolments must be primarily in undergraduate programmes, but with strong proportions in masters and doctoral programmes	(2) Masters + doctors enrolment proportion to be at least 20%
	(3) Doctors enrolment proportion to be at least 5%
A high proportion of permanent academic staff members must be in senior rank categories	(4) At least 60% of permanent academic staff to be in ranks of professor, associate professor or senior lecturer
Permanent academic staff members must be well-qualified	(5) At least 50% of permanent academic staff to have doctoral degrees
Student-to-academic staff ratios must be favourable and able to support the institution's teaching/learning activities	(6) Ratios of FTE students-to-FTE academics in science and technology to be at most 20:1
	(7) Ratios of FTE students-to-FTE academics in all other fields to be at most 25:1
High outputs of total graduates and of graduates in SET fields	(8) Total graduates in given year to be at least 25% of total enrolments in that year
	(9) SET graduates as % of total graduates to match SET enrolments as % of total enrolments
High outputs of masters and doctoral graduates	(10) Total masters graduates in given year to be at least 25% of masters head count enrolments in that year
	(11) Total doctoral graduates in given year to be at least 15% of doctoral head count enrolments in that year
High levels of new knowledge production by academic staff	(12) Ratio of research publications to permanent academic staff to be at least 1.0
	(13) Ratio of doctoral graduates to permanent academic staff to be at least 0.20

Table 3.4 sums up the results of calculations that apply the above formula to the data averages in Table A3.5. It should be noted that the maximum score allocated to a university or to an average is 4.0, even if the calculation yields a result above 4.0. For example, the application of the formula converts the University of Cape Town's average of 63% for permanent academics with doctorates (against the target of 50%) to 5.04, which is rounded down to 4.0. Makerere University's average of 31% for permanent academics with doctorates results in a score of 2.5 on this four-point scale.

The numerical values in Table 3.4 can be read in these broad ways:

- Score of 4 = has met target for specific goal;
- Score of between 3.0 and 3.9 = close to target;
- Score between 2.0 and 2.9 = performance below target; and
- Score below 2 = well below target.

**Table 3.4** Indicator scores: Relating data averages to targets on a four-point scale

	Botswana	Cape Town	Dar es Salaam	Eduardo Mondlane	Ghana	Makerere	Mauritius	Nairobi	Average for eight flagships
F1: SET enrolments as % of total enrolments	2.2	4.0	1.9	4.0	2.3	3.6	4.0	2.8	<b>3.3</b>
F2: Masters + doctoral students as % of total enrolment	1.7	4.0	2.2	1.0	1.8	1.2	1.9	3.8	<b>2.2</b>
F3: Doctoral students as % of total enrolments	0.3	4.0	0.4	0.1	0.5	1.1	0.4	0.3	<b>0.9</b>
F4: Senior academics as % of total permanent academics	2.9	4.0	2.3	1.2	4.0	2.0	3.1	3.2	<b>3.1</b>
F5: % academics with doctoral degrees	4.0	4.0	3.9	1.1	4.0	2.5	3.3	3.6	<b>3.6</b>
F6: Ratio of SET FTE students to SET academics	4.0	4.0	4.0	4.0	4.0	4.0	3.9	4.0	<b>4.0</b>
F7: Ratio of other FTE students to other academics	4.0	4.0	4.0	4.0	1.7	2.3	3.9	1.4	<b>2.8</b>
F8: Average ratio of total graduates to total enrolments	2.9	4.0	4.0	1.1	3.2	4.0	3.9	2.6	<b>3.5</b>
F9: % SET graduates to = % SET enrolments	2.9	3.3	3.5	2.0	3.8	3.9	3.5	3.4	<b>3.2</b>
F10: Ratio of masters graduates to total masters enrolments	2.3	3.9	4.0	1.0	4.0	4.0	4.0	2.2	<b>4.0</b>
F11: Ratio of doctoral graduates to total doctoral enrolments	3.8	4.0	4.0	1.0	2.6	2.7	4.0	4.0	<b>3.9</b>
F12: Ratio of research publications per academic	0.6	4.0	0.4	0.1	0.6	1.1	0.7	0.6	<b>1.2</b>
F13: Ratio of doctoral graduates per academic	0.2	3.5	0.4	0.0	0.5	0.8	0.9	0.6	<b>0.9</b>

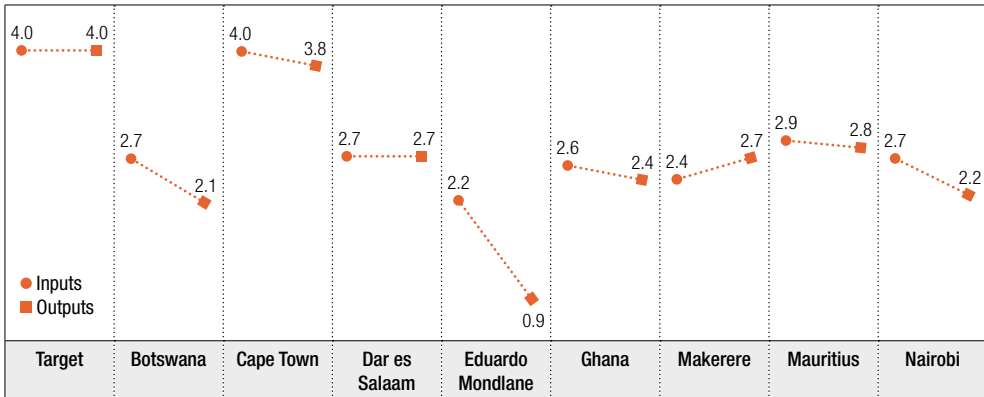
Compiled by Ian Bunting

Figure 3.1 summarises the indicator scores in Table 3.4 in terms of averages for input targets (F1 to F7) and averages for the output targets (F8 to F13). These scores reflect the impact of taking the eight flagship universities to be traditional universities in the South African sense.

The graph suggests that only Cape Town was able to meet the flagship targets that had been adapted from those for South African traditional universities. The averages for the other seven universities were all below the targets set for flagship universities. The output averages do, however, suggest that the eight universities could be divided into the following four clusters:

- Meets the targets: Cape Town;
- Close to targets: Mauritius, Dar es Salaam, Makerere;
- Below targets: Ghana, Nairobi, Botswana; and
- Well below targets: Eduardo Mondlane.

**Figure 3.1** Performance against targets: Input and output averages for the flagship universities



Compiled by Ian Bunting

The data averages offered in Figure 3.1 are too broad to indicate what the actual strengths and weaknesses of the universities are within these four clusters; in other words, this graph cannot function as a diagnostic tool. A different and more detailed set of graphs is needed to reflect institutional performances in relation to all 13 of the flagship targets.

A further point that must be noted is that the four clusters depend on the averages for the three-year period 2009–2011 which appear in Table A3.5 in the Appendix. These averages obviously cannot reflect changes that may have occurred in the data of a university over a period of time. To enable a picture to be offered of changes in data over time, a set of eight tables (Tables A3.6 to A3.13) have been included in the Appendix. The data in these tables cover the five-year period 2007–2011 and deal with:

- Masters student enrolments and graduates;
- Doctoral student enrolments and graduates;
- Totals of permanent academic staff members employed;
- Numbers and proportions of academic staff members with doctoral degrees; and
- Totals of research articles published.

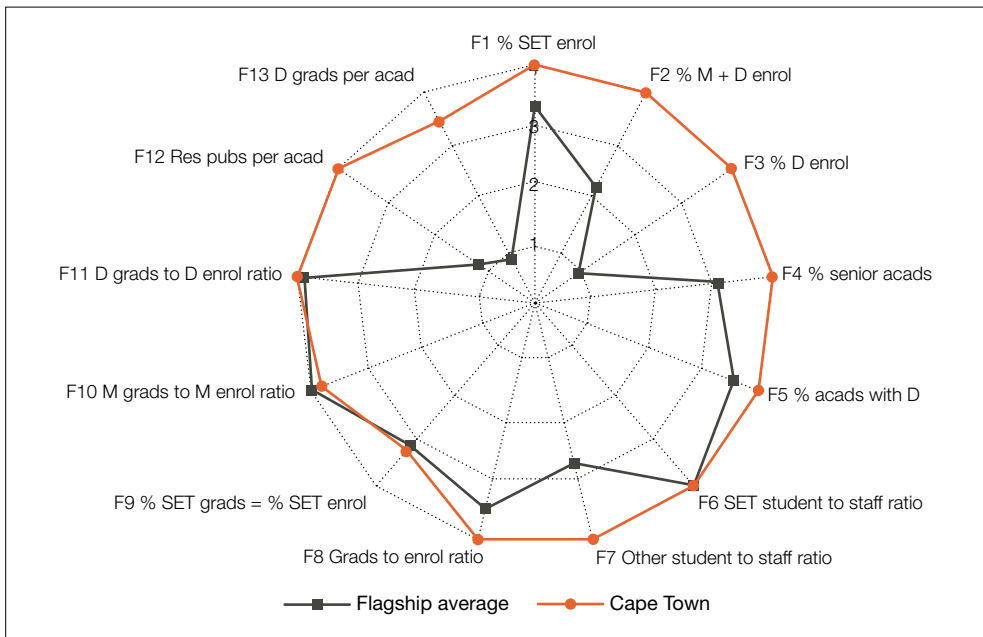
References to these data tables will be made in the notes to the discussions in the next section on the radar graphs for each of the flagship universities.

### Radar graphs as diagnostic tools

The indicator scores in Table 3.4 can be represented as radar graphs that show the extent to which each flagship university has met the target in the final column of this table, and at the same time show how that performance compares to the average for all eight flagship universities. These graphs can serve as diagnostic tools for institutional planners and information specialists. The radar graphs of the eight flagship universities, together with notes, comments and references to tables in the Appendix, are presented below.

Figure 3.2 shows that, during the three-year period 2009–2011, Cape Town met 11 of the 13 flagship targets and performed consistently above the averages of the eight flagship universities. The two possible weaknesses in Cape Town’s performance were in its throughputs of SET graduates (target F9) and of doctoral graduates (target F13). In the case of target F9, SET graduates as a proportion of total graduates did not match SET’s proportion of total enrolments. In the case of target F13, Cape Town’s throughput of doctoral graduates reflected possible inefficiencies in its throughput rates. The data in Tables A3.8 and A3.9 in the Appendix show that Cape Town’s growth in doctoral enrolment was slightly higher than its growth in doctoral graduates.

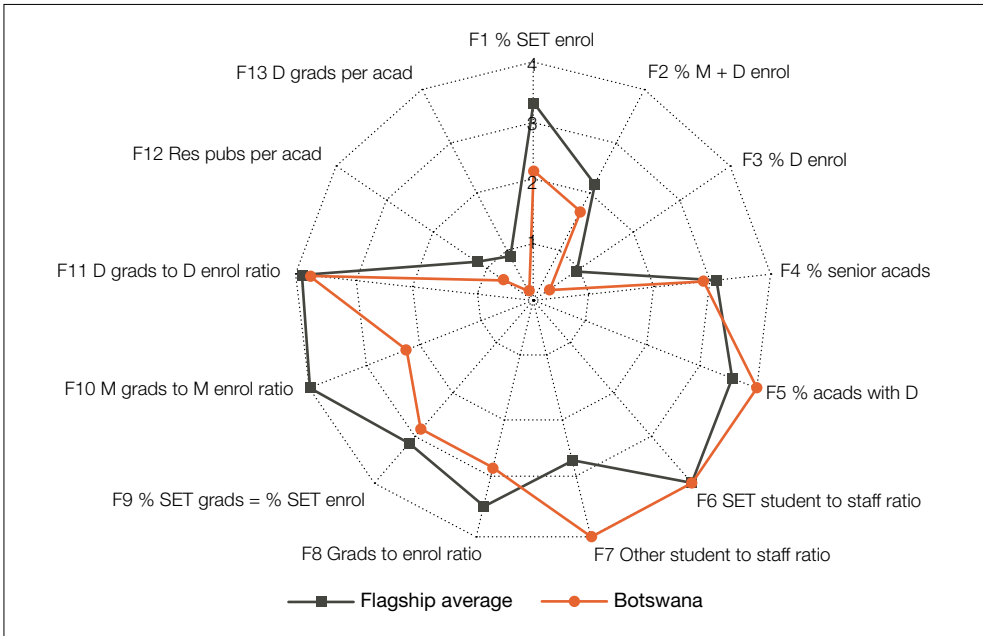
**Figure 3.2** University of Cape Town (2009–2011)



Compiled by Ian Bunting

Figure 3.3 shows that Botswana met four of the 13 flagship targets. These related to its high proportion of academics with doctoral qualifications (target F5); its favourable ratios of FTE student-to-academic staff (targets F5 and F6); and its throughput rate of doctoral graduates (F11).

**Figure 3.3** University of Botswana (2009–2011)



Compiled by Ian Bunting

Botswana had eight major weaknesses over the period. On the input side, its proportions of SET student enrolments (target F1), of masters plus doctoral students (target F2) and of doctoral students (target F3) were below the flagship target as well as below the average for the eight flagship universities. On the output side, its weaknesses, which resulted in scores below the flagship targets as well as the flagship averages, were its throughputs of total graduates (target F8), of SET graduates (target F9), of masters graduates (target F10), as well as its outputs per academic of research publications (target F12) and of doctoral graduates (target F13).

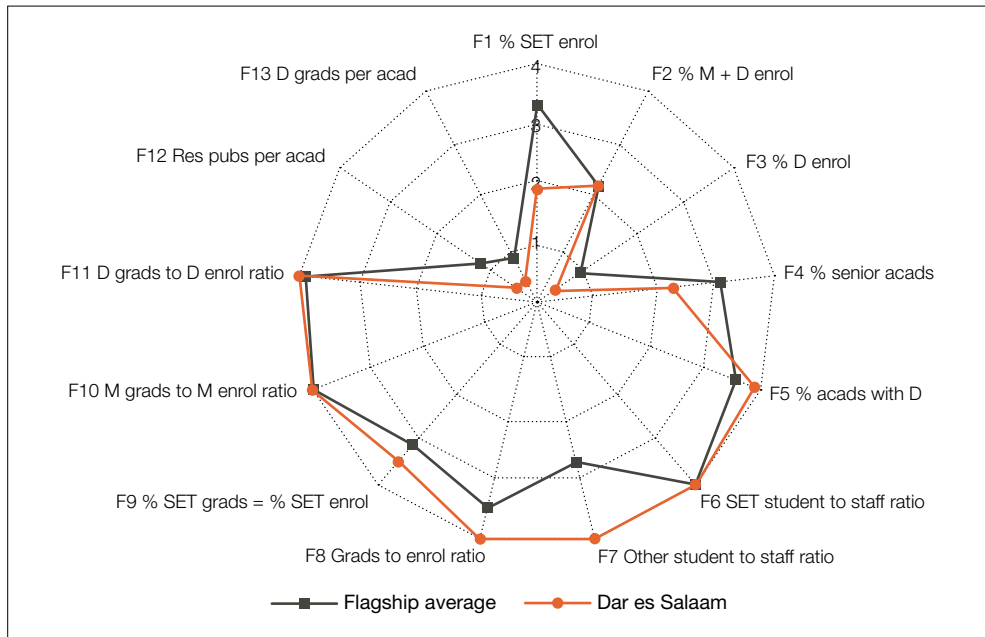
The Appendix Tables set the five-year context (2007–2011) for some of the areas in which Botswana has appeared to be weak:

- Growth in enrolments at masters as well as doctoral levels was moderate. Masters enrolments grew from 951 in 2007 to 1 254 in 2011 (an increase of 303 or 185%). Doctoral enrolments grew from 41 in 2007 to 54 in 2011 (an increase of 13 or 32%) (Tables A3.6 and A3.8).

- The total of permanent academics fell from 767 in 2007 to 744 in 2011 (a drop of 23 or 3%). The total of academics with doctorates did however increase from 299 in 2007 to 484 in 2011 (an increase of 184 or 62%).
- Doctoral graduate totals were low and increased from 3 in 2007 to 10 in 2011 (Table A3.9).
- Research publication totals also remained low, relative to the numbers of academic staff employed, and increased from only 106 in 2007 to 108 in 2011 (Table A3.13).

Figure 3.4 shows that Dar es Salaam met six of the 13 flagship targets. These related to its proportion of academics with doctorates (target F5); to its favourable FTE student-to-academic staff ratios (targets F6 and F7); and to its throughput rates of total graduates and of masters and doctoral graduates (targets F8, F10 and F11).

**Figure 3.4** University of Dar es Salaam (2009–2011)



Compiled by Ian Bunting

Over the period, Dar es Salaam had six main weaknesses, which had the effect of pulling down the averages reflected in Figure 3.1. It had four main input weaknesses. Its proportions of SET students (target F1), of doctoral students (target F3), and of senior academics (target F4) were below the flagship target and below the average for the eight flagship universities. Its input of masters plus doctoral students (target F2) was below the target but matched the average for the flagship universities. Dar es Salaam had two major output weaknesses that were both related

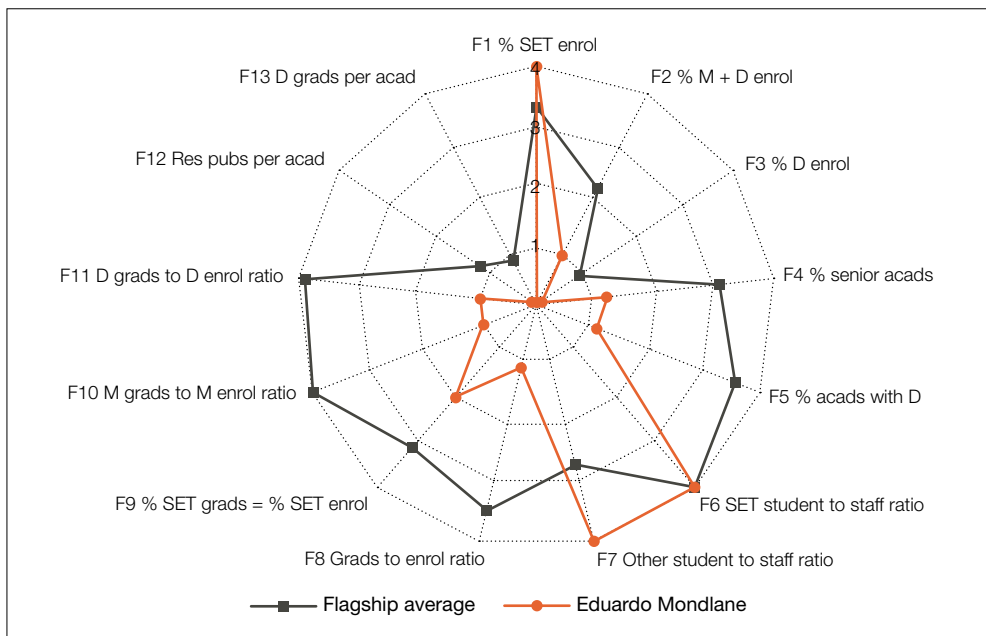
to academic staff outputs. Its outputs of research publications per academic (target F12) and of doctoral graduates per academic (target F13) were both below the flagship target and the averages for the eight flagship universities.

The Appendix Tables set the five-year context (2007–2011) for some of the areas in which Dar es Salaam has appeared to be weak:

- Growth in enrolments at masters was high (44% in 2011 compared to 2007), but enrolments at doctoral level dropped from 190 in 2007 to 128 in 2011 (Tables A3.6 and A3.8).
- The total of permanent academics remained flat (900 in 2007 and 906 in 2011), but the total of academics with doctorates fell by 62 (or 33%) between 2007 and 2011 (Tables A3.10 and A3.11).
- Doctoral graduate totals increased between 2007 and 2011, but remained low at only 24 in 2011 (Table A3.9).
- Research publication totals remained low relative to the numbers of academic staff employed, but did increase from 60 in 2007 to 90 in 2011 (Table A3.13).

Figure 3.5 shows that Eduardo Mondlane met three of the 13 flagship targets. These related to its high proportion of SET enrolments (target F1), and to its favourable ratios of FTE student-to-academic staff (targets F6 and F7).

**Figure 3.5** Eduardo Mondlane University (2009–2011)



Compiled by Ian Bunting



Eduardo Mondlane had ten major weaknesses over the period. On the input side, its proportions of masters plus doctoral students (target F2), of doctoral students (target F3), of senior academics (target F4), and of academics with doctorates (target F5) were well below the flagship target and the average for the eight flagship universities. On the output side, its throughputs of total graduates (target F8), of SET graduates (target F9), of masters graduates (target F10), and of doctoral graduates (target F11) were far below the flagship targets and the flagship averages. Its outputs of research publications per academic (target F12) and of doctoral graduates per academic (target F13) were particularly poor, and were the main reasons why Eduardo Mondlane had, in Figure 3.1, an output average below 1.

The Appendix Tables set the five-year context (2007–2011) for some of the areas in which Eduardo Mondlane has appeared to be weak:

- Growth in enrolments at the masters level was high. Masters enrolments grew from 420 in 2007 to 1 295 in 2011 (an increase of 875 or 208%). Doctoral enrolments remained low, growing from 3 in 2007 to 23 in 2011 (Tables A3.6 and A3.8).
- The total of permanent academics grew rapidly from 514 in 2007 to 1 333 in 2011 (an increase of 819 or 159%). The total of academics with doctorates also increased sharply, from 98 in 2007 to 227 in 2011 (an increase of 129 or 132%).
- Doctoral graduate totals were low, with only two being produced in 2011 (Table A3.9).
- Research publication totals also remained low, relative to the numbers of academic staff employed, but did double from only 23 in 2007 to 46 in 2011 (Table A3.13).

Figure 3.6 shows that Ghana met four of the 13 flagship targets. These related to its high proportion of senior academic staff (target F4); its high proportion of academics with doctoral qualifications (target F5); its favourable ratio of FTE student-to-academic staff in SET programmes (target F6); and its throughput rate of masters graduates (target F10).

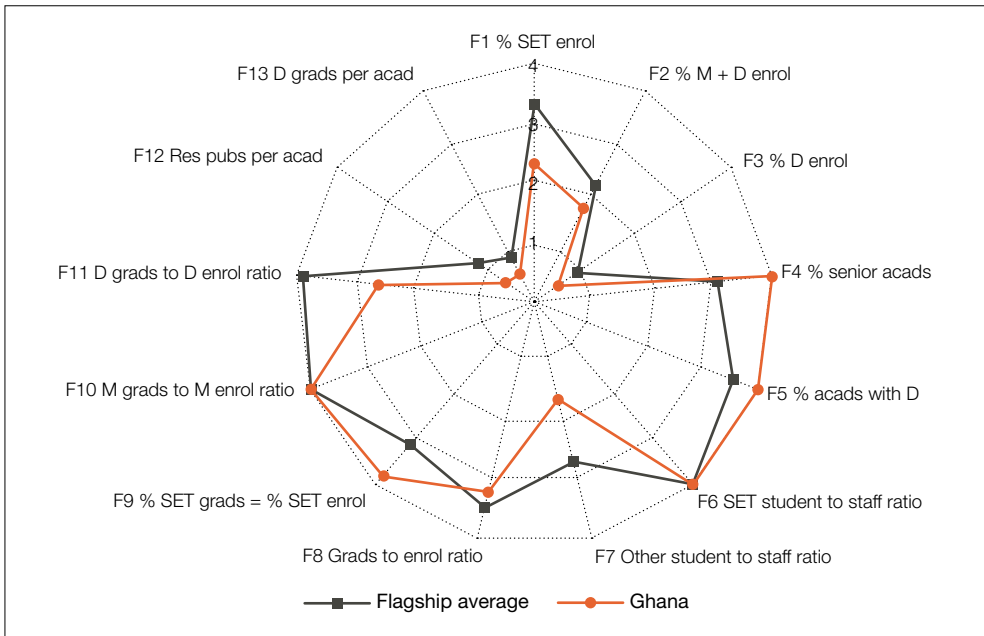
Ghana had six main weaknesses over the period. Its proportions of SET student enrolments (target F1), of masters plus doctoral students (target F2), and of doctoral students (target F3) were below the flagship target and below the average for the eight flagship universities. Other weaknesses that resulted in scores below the flagship targets and the flagship averages were its student-to-staff ratio in programmes other than SET (target F7), its throughput of doctoral graduates (target F11), and its outputs per academic of research publications (target F12) and of doctoral graduates (target F13).

The Appendix Tables set the five-year context (2007–2011) for some of the areas in which Ghana has appeared to be weak:

- Growth in enrolments at both masters and doctoral levels was very high. Masters enrolments grew from 1 503 in 2007 to 4 280 in 2011 (an increase of 2 777 or 185%). Doctoral enrolments grew from 110 in 2007 to 316 in 2011 (an increase of 206 or 187%) (Tables A3.6 and A3.8).

- The total of permanent academics grew from 767 in 2007 to 1 058 in 2011 (an increase of 291 or 38%). The total of academics with doctorates grew from 360 in 2007 to 529 in 2011 (an increase of 169 or 38%).
- Doctoral graduate totals increased between 2007 and 2011, but remained low at only 36 in 2011 (Table A3.9).
- Research publication totals also remained low, relative to the numbers of academic staff employed, but did increase from 61 in 2007 to 170 in 2011 (Table A3.13).

**Figure 3.6** University of Ghana (2009–2011)



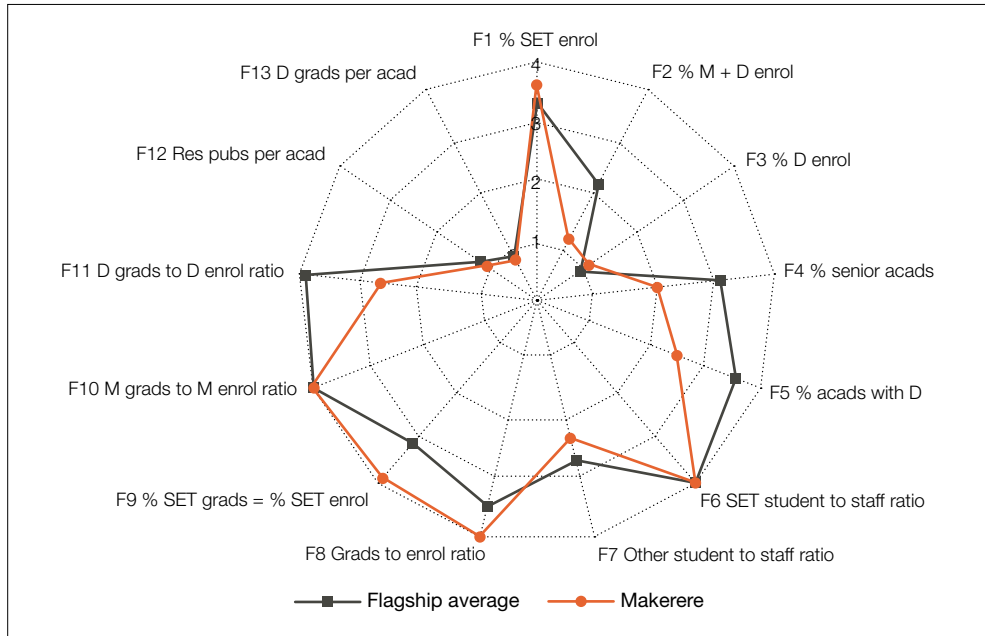
Compiled by Ian Bunting

Figure 3.7 shows that Makerere met four of the 13 flagship targets. These related to its favourable ratio of FTE student-to-academic staff in SET programmes (target F6); its throughput rate of total graduates (target F8); its throughput rate of SET graduates (target F9); and its throughput rate of masters graduates (target F10).

Over the period, Makerere had eight main weaknesses. Its proportions of masters plus doctoral students (target F2) and of doctoral students (target F3) were below the flagship target, and in the case of masters plus doctoral enrolments, below the average for the eight flagship universities. Its performance fell below the flagship target and the average for the eight flagship universities in the cases of the provision of senior academics (target F4) and of academics with doctorates (target F5). Other weaknesses that resulted in scores below the flagship target and

flagship average were its student-to-staff ratio in programmes other than SET (target F7), its throughput of doctoral graduates (target F11), and its outputs per academic of research publications (target F12) and of doctoral graduates (target F13).

**Figure 3.7** Makerere University (2009–2011)



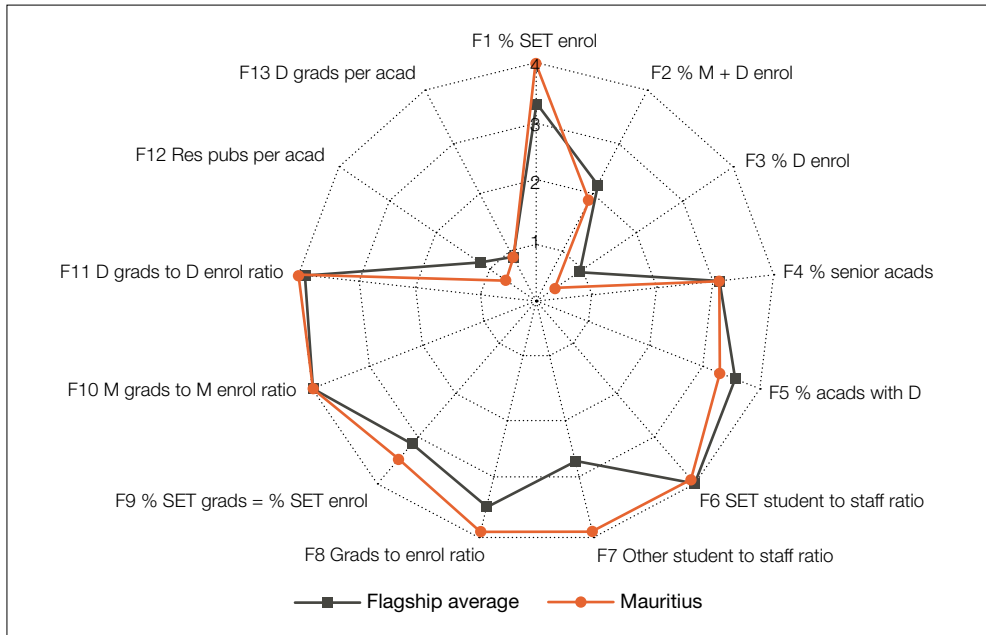
Compiled by Ian Bunting

The Appendix Tables set the five-year context (2007–2011) for some of the areas in which Makerere has appeared to be weak:

- Growth in enrolments at both masters and doctoral levels was very high. Masters enrolments at Makerere grew from 763 in 2007 to 1 705 in 2011 (an increase of 123%). Doctoral enrolments grew from 32 in 2007 to 563 (1 659%) in 2011 (Tables A3.6 and A3.8).
- The total of permanent academics remained flat (1 179 in 2007 and 1 209 in 2011), as did the total of academics with doctorates 365 in 2007 and 375 in 2011 (Tables A3.10 and A3.11).
- Doctoral graduate totals more than doubled from 23 in 2007 to 56 in 2011.
- Research publication totals have remained low, relative to the numbers of academic staff employed, but did increase from 233 in 2007 to 382 in 2011 (an increase of 149 or 64%) (Table A3.13).

Figure 3.8 shows that Mauritius met three of the 13 flagship targets. These related to its proportion of students in SET (target F1), and to its throughput rates of masters and doctoral graduates (targets F10 and F11). Mauritius came close to meeting three other goals with scores of 3.9 out of 4.0. These were its favourable FTE student-to-academic staff ratios (targets F6 and F7) and its throughput rate of total graduates (target F8).

**Figure 3.8** University of Mauritius (2009–2011)



Compiled by Ian Bunting

Over the period, the University of Mauritius had four main weaknesses. The university's proportions of masters plus doctoral students (target F2) and of doctoral students (target F3) were both below the flagship target and below the average for the eight flagship universities. Other weaknesses, which resulted in scores below the flagship targets as well as the flagship averages, were its student-to-staff ratio in programmes other than SET (target F7), and its outputs per academic of research publications (target F12) and of doctoral graduates (target F13).

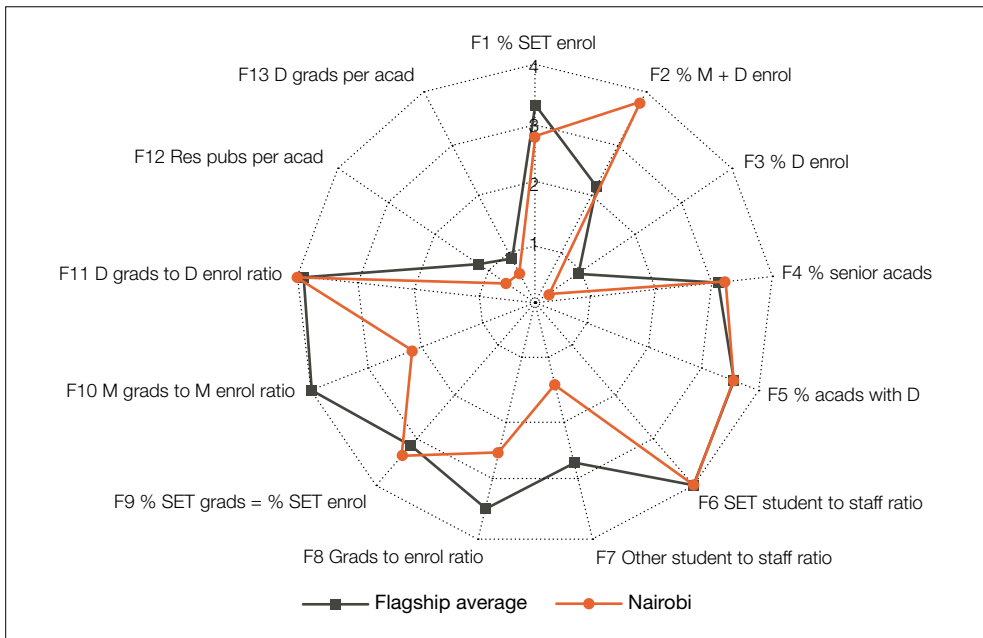
The Appendix Tables set the five-year context (2007–2011) for the areas in which Mauritius has appeared to be weak:

- Growth in enrolments at masters level has been slow (only 12% in 2011 compared to 2007) and growth at doctoral levels has been flat (Tables A3.6 and A3.8).

- The total of permanent academics increased by 40% and the total of academics with doctorates by 33% between 2007 and 2011 (Tables A3.10 and A3.11).
- Doctoral graduate totals increased between 2007 and 2011, but remained low at only 15 in 2011 (Table A3.9).
- Research publication totals remained low relative to the numbers of academic staff employed, but did increase from 36 in 2007 to 63 in 2011 (Table A3.13).

Finally, Figure 3.9 shows that Nairobi met only two of the 13 flagship targets. These related to its favourable ratio of FTE student-to-academic staff in SET programmes (target F6); and to its throughput rate of doctoral graduates (target F11). Nairobi came close to meeting two other goals with scores of 3.8 and 3.6 out of 4. These were its proportion of masters plus doctoral students (target F2), and its favourable FTE student-to-academic staff ratio in SET programmes (target F6).

**Figure 3.9** University of Nairobi (2009–2011)



Compiled by Ian Bunting

Over the period, Nairobi had six main weaknesses. Its proportion of doctoral students (target F3) and its student-to-staff ratio in programmes other than SET (target F7) were both below the flagship targets and the averages for the eight flagship universities. Other weaknesses, that resulted in scores below the flagship targets and flagship averages, were its throughput of total

graduates (target F7), its throughput of masters graduates (target F10), its outputs of research publications per academic (target F12) and its outputs of doctoral graduates per academic (target F13). The Appendix Tables set the five-year context (2007–2011) for some of the areas in which Nairobi has appeared to be weak:

- Growth in enrolments at both masters and doctoral levels was very high. Masters enrolments grew from 6 145 in 2007 to 11 807 in 2011 (an increase of 5 662 or 92%). Doctoral enrolments were low relative to the size of Nairobi, but did grow from 62 in 2007 to 255 in 2011 (an increase of 193 or 311%) (Tables A3.6 and A3.8).
- The total of permanent academics remained flat (1 292 in 2007 and 1 382 in 2011), as did the total of academics with doctorates (581 in 2007 and 636 in 2011) (Tables A3.10 and A3.11).
- Doctoral graduate totals increased between 2007 and 2011, but remained low at only 61 in 2011 (Table A3.9).
- Research publication totals also remained low, relative to the numbers of academic staff employed, but did increase from 105 in 2007 to 198 in 2011 (Table A3.13).

## Concluding notes

The main purpose of this chapter has been that of describing and explaining the steps that the HERANA project has taken in developing a methodology for assessing the performance of the eight flagship universities. The methodology adopted has made use of the academic cores of these universities as well as the empirical data that the HERANA project collected from them for the years 2009–2011. The methodology also made use of the South African policy account of a traditional university, in determining appropriate input and output goals and targets for these eight universities.

It must be stressed that the eight radar graphs presented in the previous section rely on the application of the two principles quoted at the start of this chapter:

- Any assessment of performance must be relative to a set of goals and targets that a university is expected to achieve; and
- A cross-national performance measurement system must be based on common goals and on a common set of quantitative targets linked to these goals.

The effects of assuming that these goals and quantitative targets are those of South Africa's category of traditional universities can be seen in Figures 3.2 to 3.9. What the graphs demonstrate is that only Cape Town has performed well *relative to this specific set of goals and targets*. On a different set of goals and targets, Cape Town's performance could appear to be weaker, and those of the other universities could become stronger.

These possibilities raise these main questions:

- Should the HERANA flagship universities be assessed on the assumption that they are subject to the mandates and output targets of South Africa's category of traditional universities? Should they be placed in some other categories of university?
- Should the input goals and targets for the flagship universities be adjusted? If so, what could these goals and targets be?
- The HERANA project has, in the case of the South African categories of comprehensive university and university of technology, proposed two different sets of mandates and of output targets. Should something similar be done for the flagship universities?

It is important to note that those comments, which have been based on five-year data for the eight flagship universities, reflect growing flagship strength in a number of key high-level knowledge areas. Examples are these include the following:

- Masters enrolments in the eight universities nearly doubled over this five-year period, increasing from 14 099 in 2007 to 26 052 in 2011. Exceptional growth in masters enrolments were recorded by Nairobi, which was up by 5 662 (or 92%) in 2011 compared to 2007, and Ghana, which was up by 2 777 (or 185%) over the same period.
- Doctoral enrolments grew by 76% in 2011 compared to 2007. High growth occurred at Makerere, which was up by 531 (or 1 659%) in 2011 compared to 2007; Ghana, which was up by 206 (or 187%); and Nairobi, which was up by 193 (or 311%) over the same period.
- The masters graduate total for the eight universities increased from 4 020 in 2007 to 7 156 in 2011. Substantial growth occurred at Nairobi, which was up by 1 545 (or 156%) in 2011 compared to 2007, and Ghana, which was up by 1 015 (or 176%) over the same period.
- Doctoral graduate totals grew, although not to the same extent as masters graduates. The doctoral graduate total for the eight universities increased from 241 in 2007 to 367 in 2011, which was an increase of 126 (or 52%) over this period.
- Research publication outputs increased at the same level as doctoral graduates. The largest increases were at Cape Town, which was up by 500 (or 49%) in 2011 compared to 2007; at Makerere, which was up by 149 (or 64%); and Ghana, which was up by 109 (or 179%) over the same period.

The data in Appendix Tables A3.10, A3.11 and A3.12 suggest that the provision of academic staff may be one of the limiting factors that the flagship universities will face in their attempts to improve their production of high-level knowledge. Points to note about changes in academic staff totals reflected in the three tables are as follows:

- The total growth in permanent academics at the eight universities was 1 465 (or 23%) in 2011 compared to 2007. This growth in academic staff should be compared to the total head count enrolment of the eight universities, which increased from 179 300 in 2007 to 251 400, an increase of 72 100 (or 40%) over this period. It should be noted that more than half of this growth in permanent academics occurred at Eduardo Mondlane, which was up by 819 (or 159%) in 2011 compared to 2007.
- The total growth of academics with doctoral qualifications at the eight universities was 682 (or 25%) in 2011 compared to 2007. The total of doctoral students requiring supervision increased by 1 125 (or 76%) over this period. It should be noted again that Eduardo Mondlane's increase was 129 (or 132%) and that Botswana's increase was 184 (or 62%).
- The overall average proportion for the eight universities of academic staff with doctorates was 42% in 2007 and 43% in 2011. This has to be read together with the overall proportion of senior academic staff (professors, associate professors and senior lecturers) at the flagship universities. This proportion was 46% in 2009 (data for 2007 were not available) and declined to 44% in 2011. These flagships may, taken together, have a permanent academic staff that is underqualified and too junior for the rigorous requirements of high-level knowledge production.

Some of the implications of this analysis will be addressed in Chapter 12.

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## Appendix tables

### Examples of early HERANA analyses

**Table A3.1** University of Botswana: Academic core and comparative university scores

Goals	Targets	Botswana averages: 2001–2007	Averages for 2001–2007: Universities with student enrolments less than 20 000
Goal 1: Proportion of enrolments in SET	40%	22%	Eduardo Mondlane Mauritius Dar es Salaam 49% 43% 38%
Goal 2: Masters + doctors enrolments as % of total enrolments	15%	8%	Dar es Salaam Mauritius Eduardo Mondlane 12% 10% 3%
Goal 3: Student-to-academic staff ratios	Below 20	15	Eduardo Mondlane Dar es Salaam Mauritius 11 15 24
Goal 4: Academic staff with doctoral degrees	50%	51%	Dar es Salaam Mauritius Eduardo 50% 45% 19%
Goal 5: Research funding per academic in purchasing power parity dollars	20 000	ppp dollars 2 000 (2007 only)	Dar es Salaam Mauritius Eduardo Mondlane 6 400 3 000 2 000
Goal 6: Ratio of graduates to enrolments in SET fields	20%	18%	Mauritius Dar es Salaam Eduardo Mondlane 26% 22% 8%
Goal 7: Doctoral graduates per permanent academic	15%	1%	Mauritius Dar es Salaam Eduardo Mondlane 2% 2% 0%
Goal 8: Research publications: per permanent academic	0.50	0.13	Mauritius Dar es Salaam Eduardo Mondlane 0.13 0.07 0.03

Compiled by Ian Bunting

**Table A3.2** Example of application of extended academic core goals and targets

Goals	Targets	Data averages for 2009–2011		
		Cape Town	Ghana	Makerere
Goal 1: Strong enrolments in science and technology	1a: 40% of total enrolments to be in SET	43%	21%	37%
	1b: 50% of masters + doctoral enrolments to be in SET	59%	25%	57%
Goal 2: Strong postgraduate enrolments	2a: At least 15% of total enrolments masters + doctoral enrolments	20%	8%	7%
	2b: Ratios of masters to doctoral enrolments to be no more than 5:1	3	13	3
Goal 4a: High proportion of academic staff with doctoral degrees	4a: 50% of permanent academic staff to have doctoral degrees	62%	50%	31%
Goal 4b: (new) High proportion of academic staff to be in senior ranks	4b: 50% of permanent academic staff to hold ranks of professor, associate professor or senior lecturer	67%	76%	28%
Goal 8: High levels of new knowledge production	8a: Ratio in SET of research publications to permanent academic staff to be 1.0	2.50	0.23	0.48
	8b: Ratio in other fields of research publications to permanent academic staff to be 0.50	0.61	0.06	0.06

Compiled by Ian Bunting

Note: A highlighted cell indicates that the university has met the target set for that specific goal.

## South African traditional universities

**Table A3.3** Mandates for South African traditional universities

Mandate goals	Mandate targets
Student enrolments must be primarily in general formative and professional academic programmes	Target 1U: Professional plus general formative enrolment proportion to be at least 80%
Student enrolments must be primarily in major fields of study in SET and in humanities	Target 2U: Science and technology enrolment proportion to be at least 40%
Student enrolments must be primarily in undergraduate programmes, but with strong proportions in masters and doctoral programmes	Target 3U: Masters + doctoral enrolment proportion to be at least 20%.
	Target 4U: Doctoral enrolment proportion to be at least 5%
A high proportion of permanent academic staff members must be in senior rank categories	Target 5U: At least 60% of permanent academic staff to be in ranks of professor, associate professor or senior lecturer.
Permanent academic staff members must be well qualified	Target 6U: At least 50% of permanent academic staff to have doctoral degrees
Student-to-academic staff ratios must be favourable and able to support the institution's teaching/learning activities	Target 7U: Ratios of FTE students to FTE academics in science and technology to be at most 20:1
	Target 8U: Ratios of FTE students to FTE academics in all other fields to be at most 25:1

Compiled by Ian Bunting

**Table A3.4** Output goals and targets for South African traditional universities

Output goals for traditional universities	Output targets for traditional universities
High undergraduate pass rates	Target 9U: Average pass rate of 80% in SET undergraduate courses
	Target 10U: Average pass rate of 80% in other undergraduate courses
High outputs of total graduates and of graduates in SET fields	Target 11U: Total graduates in given year to be at least 25% of total enrolments in that year
	Target 12U: SET graduates as % of total graduates to match SET enrolments as % of total enrolments
High outputs of masters and doctoral graduates	Target 13U: Total masters graduates in given year to be at least 25% of masters head count enrolments in that year
	Target 14U: Total doctoral graduates in given year to be at least 15% of doctoral head count enrolments in that year
High levels of new knowledge production by academic staff	Target 15U: Ratio of research publications to permanent academic staff to be at least 1.0
	Target 16U: Ratio of doctoral graduates to permanent academic staff to be at least 0.20

Compiled by Ian Bunting

## Flagship universities

**Table A3.5** Data averages for 2009–2011 for flagship universities

	Flagship targets	Botswana	Cape Town	Dar es Salaam	Eduardo Mondlane	Ghana	Makerere	Mauritius	Nairobi	Average for 8 flagships
SET enrolments as % of total enrolments	40%	22%	44%	19%	46%	23%	36%	44%	28%	33%
Masters + doctoral students as % of total enrolment	20%	8%	20%	11%	5%	9%	6%	10%	19%	11%
Doctoral students as % of total enrolments	5%	0%	5%	1%	0%	1%	1%	1%	0%	1%
Senior academics as % of total permanent academics	60%	44%	69%	34%	18%	80%	30%	47%	47%	46%
% academics with doctoral degrees	50%	65%	61%	49%	14%	50%	31%	41%	45%	45%
Ratio of SET FTE students to SET academics	20:1	9	11	7	11	9	16	21	11	12
Ratio of other FTE students to other academics	25:1	22	20	25	19	57	43	26	69	35
Average ratio of total graduates to total enrolments	25%	18%	28%	33%	7%	20%	30%	24%	16%	22%
SET graduates as % of total graduates	% to be equal	16%	36%	17%	23%	22%	35%	39%	24%	26%
SET enrolments as % of total enrolments	22%	44%	19%	46%	23%	36%	44%	28%	33%	
Ratio of masters graduates to total masters enrolments	25%	17%	30%	64%	8%	37%	50%	34%	16%	32%
Ratio of doctoral graduates to total doctoral enrolments	15%	14%	16%	19%	4%	10%	10%	27%	19%	15%
Ratio of research publications per academic	1.0	0.16	1.46	0.11	0.04	0.15	0.27	0.17	0.14	0.31
Ratio of doctoral graduates per academic	0.20	0.01	0.17	0.02	0.00	0.02	0.04	0.05	0.03	0.04

Compiled by Ian Bunting  
 Source: Summary of Data Returns from HERANA universities (Bunting 2013)

**Selected flagship data tables for 2007–2011**

**Table A3.6** Masters enrolments for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	951	1 257	1 254	303	32%
Cape Town	2 906	3 306	3 831	925	32%
Dar es Salaam	552	949	922	370	67%
Eduardo Mondlane	420	1 054	1 295	875	208%
Ghana	1 503	2 588	4 280	2 777	185%
Makerere	763	1 470	1 705	942	123%
Mauritius	859	840	958	99	12%
Nairobi	6 145	10 600	11 807	5 662	92%
<b>TOTAL</b>	<b>14 099</b>	<b>22 064</b>	<b>26 052</b>	<b>11 953</b>	<b>85%</b>

Compiled by Ian Bunting

**Table A3.7** Masters graduates for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	186	217	206	20	11%
Cape Town	751	1 009	1 085	334	44%
Dar es Salaam	392	567	566	174	44%
Eduardo Mondlane	23	117	109	86	374%
Ghana	576	1 101	1 591	1 015	176%
Makerere	744	847	670	-74	-10%
Mauritius	360	196	396	36	10%
Nairobi	988	2 015	2 533	1 545	156%
<b>TOTAL</b>	<b>4 020</b>	<b>6 069</b>	<b>7 156</b>	<b>3 136</b>	<b>78%</b>

Compiled by Ian Bunting

**Table A3.8** Doctoral enrolments for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	41	51	54	13	32%
Cape Town	1 002	1 058	1 226	224	22%
Dar es Salaam	190	98	128	-62	-33%
Eduardo Mondlane	3	17	23	20	667%
Ghana	110	241	316	206	187%
Makerere	32	471	563	531	1 659%
Mauritius	49	49	49	0	0%
Nairobi	62	281	255	193	311%
<b>TOTAL</b>	<b>1 489</b>	<b>2 266</b>	<b>2 614</b>	<b>1 125</b>	<b>76%</b>

Compiled by Ian Bunting

**Table A3.9** Doctoral graduates for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	3	8	10	7	233%
Cape Town	142	176	163	21	15%
Dar es Salaam	20	12	24	4	20%
Eduardo Mondlane	0	0	2	2	–
Ghana	11	16	36	25	227%
Makerere	23	38	56	33	143%
Mauritius	10	11	15	5	50%
Nairobi	32	18	61	29	91%
<b>TOTAL</b>	<b>241</b>	<b>279</b>	<b>367</b>	<b>126</b>	<b>52%</b>

Compiled by Ian Bunting

**Table A3.10** Total permanent academics for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	767	712	744	-23	-3%
Cape Town	889	900	1 055	166	19%
Dar es Salaam	900	777	906	6	1%
Eduardo Mondlane	514	1 209	1 333	819	159%
Ghana	767	890	1 058	291	38%
Makerere	1 179	1 150	1 209	30	3%
Mauritius	201	264	287	86	43%
Nairobi	1 292	1 288	1 382	90	7%
<b>TOTAL</b>	<b>6 509</b>	<b>7 190</b>	<b>7 974</b>	<b>1 465</b>	<b>23%</b>

Compiled by Ian Bunting

**Table A3.11** Permanent academics with doctoral degrees for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	299	456	484	184	62%
Cape Town	516	522	665	149	29%
Dar es Salaam	450	427	408	-42	-9%
Eduardo Mondlane	98	60	227	129	132%
Ghana	360	454	529	169	47%
Makerere	365	345	375	9	3%
Mauritius	90	108	121	30	33%
Nairobi	581	580	636	54	9%
<b>TOTAL</b>	<b>2 760</b>	<b>2 952</b>	<b>3 443</b>	<b>682</b>	<b>25%</b>

Compiled by Ian Bunting

**Table A3.12** Proportion of academics with doctoral degrees for the five-year period 2007–2011

University	2007	2009	2011
Botswana	39%	64%	65%
Cape Town	58%	58%	63%
Dar es Salaam	50%	55%	45%
Eduardo Mondlane	19%	5%	17%
Ghana	47%	51%	50%
Makerere	31%	30%	31%
Mauritius	45%	41%	42%
Nairobi	45%	45%	46%
<b>AVERAGE</b>	<b>42%</b>	<b>41%</b>	<b>43%</b>

Compiled by Ian Bunting

**Table A3.13** Research publications for the five-year period 2007–2011

University	2007	2009	2011	Change:	
				2011 compared to 2007	
Botswana	106	128	108	2	2%
Cape Town	1 017	1 309	1 517	500	49%
Dar es Salaam	60	92	90	30	50%
Eduardo Mondlane	23	40	46	23	100%
Ghana	61	124	170	109	179%
Makerere	233	230	382	149	64%
Mauritius	36	29	63	27	75%
Nairobi	105	173	198	93	89%
<b>TOTAL</b>	<b>1 641</b>	<b>2 125</b>	<b>2 574</b>	<b>933</b>	<b>57%</b>

Compiled by Ian Bunting