

CROSS-NATIONAL PERFORMANCE INDICATORS

A case study of eight african universities

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Introduction

Context and objectives

CHET and the context of the case studies project

CHET was conceptualised during the work of the Nelson Mandela appointed National Commission on Higher Education (1994–1996). CHET's initial aim was to focus on research on transformation and on capacity building in higher education institutions.

Capacity building started with the organising of workshops, in conjunction with the new national Department of Education, on the issues of national and institutional planning. These workshops were designed to help institutions develop plans which would give them a specific niche in the new post-apartheid higher education landscape. The national Department was trying at the same time to translate and implement policies, which were based on the National Commission's framework, and on the subsequent 1997 White Paper on higher education transformation.

A significant event for CHET was its decision in 1999 to assess progress with “transformation” in higher education five years after 1994 (the date of the first democratic election in South Africa). This led in 2000 to CHET's first publication on the assessing of performance in higher education.

This publication was followed by what is probably CHET's best-known book, *Transformation in Higher Education in South Africa: Global Pressures and Local Realities* (2002 and republished in 2006 by Springer). This book combined a broader, and more qualitative review of issues such as curriculum, research, staff and leadership, together with indicators of performance. The web blurb describes the publication as follows:

This book presents the most comprehensive and most thorough study of the developments in South African higher education and research after the first democratic elections of 1994 – that is of post-Apartheid South African higher education.
(www.chet.org.za/books/transformation-higher-education-0)

After 2002 CHET began moving away from capacity building, and became more involved in research on higher education transformation, and in particular on the indicators which could be used to assess change in higher education. The outputs of this work on indicators can be seen in the list of publications in the section ‘CHET and performance indicators’ below.

CHET's work on performance indicators has always been based on three assumptions that set it apart from conventional benchmarking and performance indicators. Firstly, CHET never developed indicators to simply compare institutions in order to facilitate competition for status, or rankings. Secondly, CHET always tried to use indicators to advance some notion or policy aimed at reforming (transforming) or improving the efficiency of the higher education system. Thirdly, CHET has tried to connect indicators to theories about higher education, and in the process has explored concepts such as transformation, development and the academic core. What has been constant in this, and hopefully will remain so, is that CHET has not got stuck in the indicator trap – indicators that are just empirical descriptors for the sake of having data.

Objectives of the case studies project

The specific objectives of the case studies project were to develop sets of efficiency indicators for higher education in African countries, and to enhance the ability of higher education planners to engage, both conceptually and technically, with efficiency indicators. The project's deliverables

included (a) the organising of international seminars on cross-national performance indicators, (b) the preparation of frameworks for cross-national performance indicators and for the data needed to support these indicators, and (c) a publication on performance and efficiency indicators within an African context.

Measuring performance in higher education in South Africa

CHET and performance indicators

CHET began its work on indicators and the measuring of performance in higher education in South Africa in 1999. The results of this on-going work have been reported in the publications listed below:

- Cloete N & Bunting I (2000). *Higher Education Transformation: Assessing Performance in South Africa*. Pretoria: CHET.
- Cloete N, Bunting L & Bunting I (2002). *Transformation Indicators Applied to two South African Higher Education Institutions*. Pretoria: CHET.
- Bunting I & Cloete N (2004). *Developing Performance Indicators for Higher Education: A South African Case Study*. Cape Town: CHET.
- Bunting I, Sheppard C, Cloete N & Belding L (2010). *Performance Indicators: South African Higher Education 2000–2008*. Cape Town: CHET.

This new report, which is the outcome of a project funded by the Ford Foundation, adds to this series on performance measurement in higher education.

CHET's reflections on the issues of indicators and performance measurement stemmed in part from its broader interests in higher education governance, and in particular the governance model which had been adopted by South Africa as part of its transformation strategy for higher education. South Africa's higher education governance model became, after 1997, one of state supervision rather than the apartheid era mix of state control and market-driven models.

A key feature of this state supervision model is that it permits higher education institutions to manage their own affairs within a framework of nationally determined objectives. These national objectives include, for example, goals related to total student enrolments in the system, and to the qualifications and fields of study which should be offered by the higher education system. Government uses these enrolment and academic programme goals to steer the higher education system by (a) specifying enrolment targets for individual institutions, (b) determining what qualifications and fields of study they can offer, (c) linking these goals to a funding system which contains performance incentives, and (d) monitoring institutional performance in relation to these goals and incentives.

CHET's 2000 publication in the list above was one of the first attempts made to assess the performance of the South African higher education system relative to the goals contained in the 1997 White Paper *A Programme for the Transformation of Higher Education*. This White Paper was, and remains, South Africa's major higher education policy document.

The 1997 White Paper contains four main transformation goals for the South African higher education system. It also set, within the framework of these broad goals, a number of subsidiary goals. These broad and subsidiary goals were presented by CHET (2000:4–7) in the ways summarised in Table 1 which follows below.

The 2000 publication used data available for the period 1997–1999 in the assessment of the movement of the South African higher education system towards the 18 goals listed in Table 1. CHET recognised at the time that this narrow time-frame did not permit an adequate assessment to be made of the system, particularly because only 1998 and 1999 were strictly post White Paper years. CHET also accepted that because it was not measuring, as is required by the state supervision model, the performance of both the system and individual higher education institutions, it would have to undertake further work when fuller data sets became available and when clear financial incentives had been established for higher education.

TABLE 1 Transformation Goals of the South African 1997 White Paper

A Increased and broadened participation	
Goal 1	Total student enrolments must increase.
Goal 2	The composition of the student body must over time reflect the demographic reality of the broader South African society.
Goal 3	The participation rates of African, coloured and women students must increase.
Goal 4	Career-oriented programmes, particularly in science and technology, must be expanded.
Goal 5	Postgraduate programmes at masters and doctoral levels must be expanded to meet the needs of the academic labour market.
Goal 6	An environment must be created in which private institutions can play a role in expanding access to higher education.
Goal 7	Student throughput and output rates must improve.
Goal 8	The success rates of black students must improve.
Goal 9	The number and proportions of blacks and of women on the staff of higher education institutions must improve over time.
B Responsiveness to social interests and needs	
Goal 10	Basic research must continue to develop and grow. Applications-driven research, which addresses critical national needs, must be developed.
Goal 11	The development of basic and applied research must take place within the framework of a national research plan.
Goal 12	The institutional base for research must be expanded. The research capacities of the technikons and of the historically disadvantaged institutions must be extended.
Goal 13	The graduates and knowledge outputs of higher education must, to an increasing extent, meet the needs of a modernising economy.
C Co-operation and partnerships in governance	
Goal 14	System and institutional governance systems must reflect and strengthen the values and practices of South Africa's new democracy.
Goal 15	The national governance system must be one which supports all institutions and which encourages inter-institutional co-operation, particularly at a regional level.
D Funding	
Goal 16	The proportion of funds available for earmarked purposes must increase.
Goal 17	A targeted programme of institutional redress must be implemented.
Goal 18	Public funding of the higher education system must stabilise, but must be distributed differently.

Descriptive and performance indicators

CHET has, in the various publications listed earlier, used the terms “indicator”, “descriptive indicator” and “performance indicator” in standard ways. It has understood indicators to be ways of referring to the complex properties or states which either individual higher education institutions or a higher education system are expected to possess. CHET has furthermore accepted that distinctions must be drawn between descriptive and performance indicators.

CHET has offered this account of descriptive and performance indicators:

1. Descriptive indicators refer to properties which an institution or a higher education system happens to have. These are often described as “accidental properties”, in one of two senses. The first sense is that these properties may not be the result of the intentional decisions or actions either of institutions or of the system as a whole. In the second sense, even though the property is the result of intentional actions, it is “accidental” because no national or institutional policy goals require the institution or the system to have those properties.
2. Sentences such as these could be examples of descriptive indicators:
 - a. University A’s student enrolment increased at an average annual rate of 5% between 2001 and 2007.
 - b. Female student enrolments at B dropped from 48% of the head count total in 2001 to 40% in 2007.
 - c. Academic staff totals in the higher education system grew from 12 000 in 2001 to 15 000 in 2002.
3. Performance indicators differ from descriptive indicators in these key ways: (a) they must refer to properties which are the result of intentional actions, and (b) the properties to which they refer must be ones which an institution is expected to have in terms of either its own or national goals.
4. An indicator such as 2a above could become a performance indicator if university A was, for example, committed to a national policy which capped its average annual growth rate at 2%. The actual average annual growth rate of 5% would indicate that A had failed to satisfy the national policy’s required growth rate.
5. Point 2b above could also become a performance indicator if university B had been subject to a national policy requirement that it move towards gender equity in its overall student enrolments. The drop in B’s proportion of female students between 2001 and 2007 would indicate that its performance has not met the requirements of the national policy.
6. Point 2c above could become a performance indicator if a national policy were in place to increase the totals of academic staff available in the higher education system.

Performance indicators at system and institutional levels

CHET’s accepted in its 2000 publication that the key ingredients for performance indicators, within South Africa’s state supervised system of higher education, are these:

- a set of policy-driven goals which apply to the system;
- derived from these goals, a set of properties which the system would possess if these goals were achieved;
- ways of referring to these properties; and
- a conceptually consistent and common set of data provided by the system.

In its subsequent work CHET fleshed out these various requirements for performance indicators. This became easier during the period 2000–2004, because of the following developments in the South African higher education system:

- A new higher education management information system (HEMIS) was put in place in 2000.
- The *National Plan for Higher Education* was published in 2001. This spelled out in more detail the broad goals of the 1997 White Paper, and set out implementation plans and targets.
- Detailed academic programme schedules for each higher education institution were approved by the Minister of Education in 2002.
- A new government funding framework, which provided the incentives and targets required by a state supervision model of governance was approved in 2003 and implemented in 2004.

These new policies, and in particular the introduction of HEMIS, enabled CHET to begin discussions on a number of performance indicator models which had been proposed for use in South Africa between 2000 and 2004. These discussions are reported in CHET's 2004 publication *Developing Performance Indicators for Higher Education: A South African Case Study*.

This publication contains proposals on performance measures for the South African higher education system, and takes particular account of discussions and presentations at two seminars organised by CHET during 2004. The second of these seminars had been attended by international experts on the construction and application of performance indicators. The key points which emerged from these seminars were these:

1. Any performance indicator system developed for South Africa must be consistent with its state supervision model of higher education governance.
2. The performance indicators which are developed should not be based on benchmarks, but rather on targets set by government either for the system as a whole or for individual institutions.
3. Because quality assurance had not been developed by 2004, the indicators would have to be based on quantitative data only.

The indicators and targets which CHET proposed in 2004 for the South African higher education system are reproduced in Table 2 below.

A revised version of the institutional-level indicators and targets proposed by CHET in 2004 is set out in Table 3 below. The original version appears as Table 12 on pages 107 to 108 of the 2004 publication.

TABLE 2 CHET 2004: Proposed Indicators and Targets for the South African Higher Education System

NATIONAL POLICY GOALS	INDICATORS	TARGETS
Size of the system		
Goal 1 Opportunities for entry into higher education must improve	Gross participation rate in higher education	20% by 2010
Goal 2 Growth of student enrolments must be financially sustainable	Growth in FTE student enrolments compared to real growth in government funding	Annual growth in FTE students to = real annual growth in government funding
Shape of the system		
Goal 3 Career oriented programmes must increase	Growth in technikon compared to university enrolments	Technikon growth to be higher than university growth
Goal 4 Enrolments in science & technology and business & management must grow	FTE enrolments by broad field of study	Enrolment proportions to be 30% SET, 30% BUS
Goal 5 Masters and doctoral enrolments must grow	Head count enrolments by qualification type	10% of head counts to be masters and doctoral students
Student equity		
Goal 6 The participation of disadvantaged students in higher education must increase	Proportion of African students in contact programmes	60% of contact students to be African
Goal 7 The participation of female students in higher education must increase	Proportion of female students in contact plus distance enrolments	50% of contact + distance students to be females
Goal 8 The imbalances in postgraduate enrolments must be redressed	Proportion of African in masters and doctoral programmes in universities	% of African masters and doctoral students to = % of African students in total enrolments in universities
Goal 9 The imbalances in student success rates must be redressed	Contact undergraduate success rates by race	Success rates to be equalised
Staff equity		
Goal 10 The participation of disadvantaged groups in the professional staff complement of the system must improve	Proportions of permanent academic and professional administrative staff by race	40% of permanent professional staff to be African
Goal 11 The participation of females in the professional staff of the system must improve	Proportions of permanent academic and professional administrative staff by gender	40% of permanent professional staff to be female
Goal 12 Student success rates at both undergraduate and postgraduate levels must improve	FTE degree credits divided by FTE enrolments	Improvements in degree credit % over time
Goal 13 The output of graduates must improve	Graduates divided by head count enrolments	Annual total of graduates to = 25% of head count enrolments
Research outputs		
Goal 14 The output of masters and doctoral graduates must improve	Masters and doctoral graduates divided by head count enrolments	Average of 25%
Goal 15 Research output totals must improve	Output of weighted research outputs per permanent academic relative to total of permanent academic staff	Ratio of 1.0 weighted research outputs per permanent academic staff member

Notes

1. This table is reproduced from Table 11 on pages 101 and 102 of CHET's 2004 publication, *Developing Performance Indicators for Higher Education: A South African Case Study*
2. The national targets in the first column are extracted from the 1997 White Paper: *A Programme for the Transformation of Higher Education*.
3. The source of most of the indicators and targets listed is the 2001 *National Plan for Higher Education*. The exceptions are those linked to Goals 2 and 15, which were derived from Ministerial Statements.

TABLE 3 CHET 2004: Proposed Indicators and Targets for South African Higher Education Institutions

POLICY GOALS	INDICATORS	TARGETS
Student equity		
Goal 1 The participation of disadvantaged students in on-campus programmes must increase	Head count enrolments by instruction mode and by race group	40% of contact students to be African
Goal 2 The participation of female students in all programmes must increase	Head count enrolments by gender	50% of contact + distance students to be females
Goal 3 Imbalances in postgraduate enrolments must be redressed	Proportion of Africans in masters and doctoral programmes	% of African masters and doctoral students to = % of African students in total enrolments
Goal 4 Imbalances in student success rates must be redressed	Contact undergraduate success rates by race	Success rates to be equalised
Staff equity		
Goal 5 The participation of disadvantaged staff groups in the professional staff complement of the system must improve	Proportions of permanent academic and professional administrative staff by race	40% of permanent professional staff to be African
Goal 6 The participation of females in the professional staff complement of the system must improve	Proportions of permanent academic and professional administrative staff by gender	40% of permanent professional staff to be female
Student and staff inputs		
Goal 7 Educational processes must be supported by the provision of adequate numbers of teaching staff	Ratios of FTE enrolments per FTE academic staff member.	16:1 for science and technology programmes; and 24:1 for all other programmes
Goal 8 Academic staff must be well qualified	% of permanent academic staff members with doctorates	40% of permanent academic staff to have doctorates.
Student and staff outputs		
Goal 9 Undergraduate success rates must improve	Undergraduate FTE degree credits as % of FTE enrolments in contact programmes	Average to be 80%
Goal 10 High proportions of enrolled students must graduate each year	Graduates divided by head count enrolments	Annual total of graduates to = 25% of head count enrolments
Goal 11 High proportions of masters & doctoral enrolments must graduate each year	Masters plus doctoral graduates as % of M + D enrolments	Average of 25%
Goal 12 Academic staff must be active in research	Weighted research outputs divided by permanent academic staff	Ratio to be 1.25 for universities and 0.5 for universities of technology

Note

The sources of the indicators and targets are the 2001 National Plan for Higher Education and the new government funding framework which was introduced for the first time in 2004.

Profiles of South African higher education institutions

CHET's 2010 publication *Performance Indicators: South African Higher Education 2000–2008* uses goals 7 to 12 in Table 3 above, together with a range of descriptive indicators, to construct a profile for each of South Africa's 23 higher education institutions. Because the Minister of Education had not made final determinations on equity targets, the first six performance indicators in Table 3 were not included in the profiles. Data on student enrolments by race group and gender were however included as descriptive indicators.

The mix of descriptive and performance indicators included in the 2010 profiles was decided after CHET had held consultative discussions with South African higher education planners during 2007 and 2008. CHET eventually decided that each institutional profile should, using a total of 20 graphs, contain descriptive and performance indicators for 2000–2008 on student enrolments and outputs, staffing inputs and outputs, and key aspects of the income and expenditure of each institution. The indicators for each institution would be related either to targets set by South Africa's Minister of Higher Education and Training, or to averages for the South African higher education system.

The 20 graphs in each profile can be divided into the five groups set out in Table 4 below. Eight of the 20 graphs (those which present data relative to Ministerial targets) contain performance indicators. The remaining graphs present various descriptive indicators.

TABLE 4 Indicators by grouping

I Student enrolments and outputs 2000–2008, relative to Ministerial targets
Graph 1: Head count and full-time equivalent student enrolments
Graph 4: Shape of head count enrolment by qualification type
Graph 5: Shape of head count enrolment by major field of studies
Graph 8: Average success rates
Graph 9: Total graduates
Graph 10: Graduation rates
II Other trends in student enrolments 2000–2008, compared to national averages
Graph 2: Average annual growth rates in student enrolments
Graph 5: Enrolments by population group
Graph 6: Enrolments by gender
III Staff data for 2000–2008, relative to Ministerial targets
Graph 14: Ratio of publication units to academic staff
Graph 15: Ratio of weighted research outputs to academic staff
IV Other staff data for 2000–2008, compared to national averages
Graph 11: Ratio of administrative to academic staff
Graph 12: Ratio of FTE students to academic staff
Graph 13: Proportion of academic staff with doctorates
V Financial data 2000–2008
Graph 16: Total income and expenditure
Graph 17: Deficits and surpluses
Graphs 18 & 19: Sources of income
Graph 20: Subsidy income plus student fees per graduate

The sources of the data used in the South African profiles were these:

- Student input and outputs: data submitted annually by each higher education institution to the Department of Higher Education and Training (DHET) in terms of the requirements of the national higher education management information system (HEMIS).
- Ministerial student input and output targets: *Ministerial Statement on Student Enrolment Planning (October 2007)*.
- Staff data: data submitted annually by each higher education institution to the DHET in terms of the requirements of the HEMIS.
- Research publications: data submitted annually by each university in terms of the requirements of the government funding framework.
- Targets for research outputs per academic staff member: *Ministerial Statement on Higher Education Funding (November 2009)*.
- Income and expenditure data: financial statements submitted annually to the DHET by each institution.

Basic requirements for performance measurement

South Africa's state supervision model sets the following as the essential ingredients for any higher education performance measurement system:

- government's goals for the higher education system,
- Ministerial targets set for individual universities, and
- quantitative data extracted from the national higher education management information system (HEMIS).

The first two elements in South Africa's performance management system can obviously not be applied to universities in other countries, which may have different governance systems, different national higher education policies, and different sets of targets for its universities. The key principle of performance being relative to goals would nevertheless have to remain in place, and any cross-national system would have to identify a set of goals which could apply to all universities involved.

The third requirement of higher education performance measurements being based on coherent quantitative data would have to be applied in any cross-national system. Performance measurement would not be possible without these quantitative data, which must be well-defined and understood across university systems.

Chapter 2 begins the discussion of the issue of the extracting of quantitative data from eight universities in eight different countries.

Developing the cross-national performance indicator project

Setting up the project

In 2007 CHET decided to extend its work on performance measurements to determine if sets of indicators could be found which applied across a range of African countries.

CHET launched the project by inviting a number of other African universities to participate in a workshop on cross-national performance indicators. The workshop was held in Stellenbosch in early 2007, and was attended by delegates from Botswana, Egypt, Kenya, Mozambique, South Africa, Tanzania and Uganda.

The workshop programme began with presentations by international experts on performance indicators. Presentations were also made by representatives from Botswana, Egypt, Kenya, Mozambique, South Africa, Tanzania and Uganda.

At the conclusion of the workshop, delegates indicated that they supported and would participate in the cross-national performance indicator project. The workshop agreed that these performance indicators should be based primarily on quantitative data, and agreed further that the first steps in the project should involve the gathering of data from participating universities. These would initially be sets of quantitative data from which performance indicators could be extracted.

The first seven universities which CHET selected for inclusion in the project were what are generally regarded as the most prominent, often the oldest public university in the participating country. These “flagship” universities are:

- | | |
|--------------------------------|------------|
| 1. University of Botswana | Botswana |
| 2. University of Dar es Salaam | Tanzania |
| 3. Eduardo Mondlane University | Mozambique |
| 4. University of Ghana | Ghana |
| 5. Makerere University | Uganda |
| 6. University of Mauritius | Mauritius |
| 7. University of Nairobi | Kenya |

Nelson Mandela Metropolitan University was selected in the initial phases of the project as the South African example, but was later replaced by the University of Cape Town. This institution, rather than Nelson Mandela, is the South African flagship university.

Collecting data for the project

CHET decided that the data which it collected from the selected universities had to meet one of the basic requirements for quantitative performance measures discussed earlier. This was that the indicators must be based on conceptually consistent and commonly understood sets of data.

CHET decided further that this requirement could be met if the data were collected according to the definitions and concepts built into the South African higher education management

information system (HEMIS). HEMIS includes definitions and concepts to be found in higher education data systems in the USA, UK and Australia.

The data needed, first for Nelson Mandela Metropolitan University, and later for the University of Cape Town, were obtained from their HEMIS data tables for the years 2000 to 2008. No requests had to be submitted to these universities for additional data.

CHET sent, during May 2007, a data template to the other seven universities which had been included in the project. The tables in this data template were accompanied by notes defining the various concepts used, and explaining how calculations should be made.

The templates requested data on the following:

- details of degrees, diplomas and certificates offered;
- head count student enrolments by qualification type;
- head count student enrolments by fields of study;
- full-time equivalent student enrolments by fields of study;
- full-time equivalent successful students by fields of study;
- graduates by qualification type;
- graduates by fields of study;
- permanent academic, administrative and service staff;
- full-time equivalent academic, administrative and service staff; and
- income and expenditure.

Processing data returns

CHET found that many of the data tables returned during 2007 and early 2008 were inconsistent and incorrect. It decided that the best way of resolving these problems would be to send a task team to the universities concerned to discuss the templates, and to collect as much raw data as possible on site. The task team visited these seven universities during 2008.

After concluding the visits, the task team reported to CHET that these were the main reasons why many of the initial data submissions were of a poor quality:

- Some of the universities could not extract the required data because they did not have appropriate or functional electronic student and staff data bases. In these cases, the data were only available in the form of summarised tables in print format.
- Where electronic data bases were in place, the data were often incomplete, classifications were inaccurate, graduate sets were incomplete, and not all marks used to indicate student success in specific courses had been captured.
- A number of universities had no central management information office in which complete sets of the data were stored either in electronic or hard copy format. In these circumstances data had to be collected directly from faculties or other relevant administrative departments. A consequence of this decentralisation was that different versions of data on students and staff were held by the university's various operational units.
- Problems had occurred with the merging of historical staff and student records when colleges or other entities had been incorporated into universities.

- Because the focus of some universities was almost entirely on full-time student enrolments and their full-time staff establishment, their information on part-time students and part-time staff was poor and incomplete.
- The concepts of full-time equivalent students and full-time equivalent staff were not widely used or understood. The data elements needed to make the necessary calculations were not as a result available in a usable format in the case of most of the universities.

In March 2009 CHET held a further workshop, which was attended by representatives of seven of the participating universities. The data task team reported that it had, since the institutional visits, taken the following further steps to remedy the initial data problems:

- It had had further e-mail discussions with the project coordinators based at each university.
- It had subjected electronic student unit records, where these had been available, to detailed analyses.
- Copies of official annual reports and planning documents collected were used to check and correct the data on the CHET templates.
- Statistical reports found on the internet, as well as on the websites of the universities, were also used to check and correct data.

The task team was able to give the workshop this report on the state of the quantitative data, as at the beginning of 2009:

1. All seven universities had been able to submit the following student and staff information:
 - a. details of qualifications;
 - b. head count enrolments by qualification-type and major fields of study;
 - c. graduates by qualification type and major fields of study; and
 - d. permanent academic, administrative and service staff.
2. Only two universities had been able to provide information on full-time equivalent student enrolments. No university could provide information on successful full-time equivalent students.
3. None of the seven universities was able to provide full financial information in terms of the income and expenditure categories listed in the 2007 template. This template had set out these categories and subcategories:
 - a. First stream income: government appropriations.
 - b. Second stream income: tuition fees; student housing fee; all other student fees.
 - c. Third stream income: private gifts and grants; investment income; research contracts; other contracts; sales of goods and services; all other income.
 - d. Current expenditure on student and staff housing; administrative and service staff; goods and services, and all other costs.
 - e. Current expenditure on teaching, research and support services: academic staff; administrative and service staff; goods and services (including scholarships and bursaries); finance costs; depreciation; all other current expenditure.

The following agreements were reached at the March 2009 workshop:

- The seven universities would update their student head count enrolment and graduate data to at least 2007 and if possible to 2008 (the 2007 templates had requested data to the end of 2005).
- They would update their permanent staff data to at least 2007 and if possible to 2008.
- Because the notion of full-time equivalent enrolled students within fields of study is a central one in higher education planning, all universities would provide these data for the period 2000 to 2008. Universities which could not extract this information directly from their data bases would use calculation guidelines to be provided by the CHET task team.
- No further attempts would be made to calculate full-time equivalent successful student numbers. Graduates and graduation rates would be used as measures of student output performance.
- Because the notion of a full-time equivalent academic staff member within a field of study is also central to higher education planning, all universities would provide these data for the period 2000 to 2008. The universities which were not able to provide this information would use calculation guidelines which would also be provided by the CHET task team.
- Universities would attempt to provide the income and expenditure data for 2000 to 2008 in terms of the 2007 template provided by CHET.

The CHET data task team was asked during 2009 to provide information which could be used by the HERANA project (Higher Education Research and Advocacy Network in Africa project). As part of its analyses of the academic core of each of its universities, HERANA wanted quantitative data which would support the following indicators:

Indicator 1: Science and technology (SET) enrolments

Indicator 2: Postgraduate enrolments and outputs

Indicator 3: Teaching loads of academic staff

Indicator 4: Qualifications of academic staff

Indicator 5: Availability of research funding

Indicator 6: Research outputs

The data needed for indicators 1 and 2 were part of the original CHET templates and were easy to provide. No direct data were available for indicator 3 on teaching loads, but suitable proxies were extracted from these templates. Information for indicator 4 had to be obtained as a new input from the participating universities. The research funding data needed for indicator 5 should have been part of the original finance submissions to CHET, but tended to be incomplete.

As far as indicator 6 was concerned, HERANA agreed to follow the SA definition of research outputs, which includes doctoral graduates, the thesis components produced by masters graduates, and research publications. The original CHET data contained the required information on masters and doctoral graduates, but new information had to be found on research publications. It was decided that these should be taken to be research papers which had been reviewed by an editorial body of experts in a field, and had been published in a journal which appears on the citation data base of the Institute of Scientific Information (ISI). The required information on these research publications of the participating universities was produced for CHET by CREST, a research institute of Stellenbosch University.

By the end of 2009 most of the participating universities had been able to meet the commitments made at the March 2009 workshop. Data had been updated beyond 2005, calculations (usually with the assistance of the CHET task team) had been made of full-time equivalent enrolled students and full-time equivalent academic staff. Data had been provided on the formal qualifications of permanent academic staff.

Some gaps which still existed in the data, particularly around income and expenditure and the availability of research funds, were taken up directly with each of the universities concerned.

Data profiles of the participating universities

The final data sets available enabled CHET to produce descriptive and performance indicator profiles for the eight selected universities. The text of each profile contains a total of 29 graphs, and covers the following broad areas:

- head count and full-time equivalent student enrolments;
- graduates, including the efficiency of graduate outputs;
- totals of permanent academic and administrative staff;
- academic staff qualifications;
- full-time equivalent student to full-time equivalent academic staff ratios;
- research outputs; and
- income and expenditure in local currency and in US dollars (USD) at market rates.

The eight profiles are published on the CHET website.

Flagship universities and performance measures

Requirements for cross-national performance indicators

CHET has argued that the key elements in South Africa's higher education performance management system are (a) the goals for the higher education system set out in various government policy documents, (b) Ministerial targets set for individual higher education institutions, and (c) a conceptually consistent and common set of data from which quantitative indicators could be extracted.

Point (c) in this list is satisfied by the quantitative data which have been collected by CHET from the eight universities. Performance measurement would not be possible without these quantitative data, which must be well-defined and understood across the universities concerned.

Points (a) and (b) of South Africa's performance management system can obviously not be applied to universities in other countries, which may have different governance systems, different national higher education policies, and different sets of targets for its universities. The key principle of performance being relative to goals would nevertheless have to remain in place, and any cross-national system would have to identify a set of goals which could apply to all universities involved.

This principle could be met if the top (or flagship) university in each country is identified, if the goals which are built into their mission and vision statements are extracted, and if these are then related to goals which must be embedded in the academic core of each university. This academic core is the inputs available for the delivery of teaching and research, and the research

and teaching outputs which the university produces on basis of these inputs. The cross-national measurement of the performance of universities can then be based on assessments of the extent to which they have satisfied the goals embedded in their academic cores.

Identifying flagship universities

CHET selected a particular group of eight universities because each is a “flagship” public institution; in the sense that each has been perceived to be the top university in its country. To determine that each university can be considered to be a flagship, CHET looked at different rankings.

The 2010 QS (Quacquarelli Symonds) World University Rankings includes only four African universities in its list of the top 600 universities. These are all South African universities: University of Cape Town (ranked 161), University of the Witwatersrand (ranked 360), University of Pretoria (ranked between 451 and 500), and University of KwaZulu-Natal (ranked between 511 and 550). As a further example, the 2010 Times Higher Education World University Rankings lists only two African universities in its top 200 universities. These are University of Cape Town (ranked 107), and Alexandria University in Egypt (ranked 147). It was clear from this that use could not be made of either the QS or Times Higher rankings to assess the flagship status of the eight selected universities.

Some evidence for the perceived flagship status can however be found in the 2010 rankings made by the 4International organisation. This organisation includes on its website any higher education institution which satisfies the following requirements:

- It is officially recognised, licensed or accredited by national or regional bodies such as ministries of education and/or recognised higher education accrediting organizations.
- It is officially entitled to grant four-year undergraduate degrees and/or postgraduate degrees.
- It provides traditional face-to-face learning facilities, programmes and courses.
- It has an active official website.

The 4International organisation provides what it describes as “an approximate popularity ranking of world universities and colleges based upon the popularity of their websites”. The organisation acknowledges that a ranking based on web usage cannot be construed as an evaluation of the quality or level of the academic services provided by different universities.

This website does nevertheless provide some indication of why the eight selected universities could be regarded as country flagships. On the basis of the popularity of its web site, each university is ranked first in its country by the 2010 version of the 4International directory. Each is furthermore included in the 4International ranking list of the top 100 universities in Africa. These two sets of rankings are summed up in Table 5.

Table 5 in effect summarises external perceptions of the eight universities. Each university’s internal perception of itself is also that it is a flagship university. This can be seen in their vision and mission statements.

The key elements of these visions and missions statements of the eight universities, which appear on their official websites, are summed up in Table 6.

TABLE 5 4International web rankings of selected universities

	Number of public universities in country	4International ranking within country	4International ranking in Africa top 100
University of Botswana	2	1	18
University of Cape Town	23	1	1
University of Dar es Salaam	10	1	22
Eduardo Mondlane University	3	1	14
University of Ghana	30	1	17
Makerere University	10	1	30
University of Mauritius	3	1	16
University of Nairobi	16	1	16

TABLE 6 Summaries of vision and mission statements

University of Botswana	<ul style="list-style-type: none"> a To be a leading academic centre of excellence in Africa and the world. b To improve economic and social conditions for the nation while advancing itself as a distinctively African university with a regional and international outlook.
University of Cape Town	<ul style="list-style-type: none"> a To become a premier academic meeting point between South Africa, the rest of Africa and the world. b Through innovative research and scholarship, to grapple with the key issues of the natural and social worlds. c To produce graduates whose qualifications are internationally recognised and locally applicable, underpinned by values of engaged citizenship and social justice.
University of Dar es Salaam	<ul style="list-style-type: none"> a To become a reputable world-class university that is responsive to national, regional and global development needs through engagement in dynamic knowledge creation and application. b To pursue scholarly and strategic research, education, training and public service directed at attainment of equitable and sustainable socio-economic development of Tanzania and the rest of Africa.
Eduardo Mondlane University	<ul style="list-style-type: none"> a To be an institution of excellence in the context of education, science, culture and technology. b To assume responsibilities in the processes of innovation and knowledge transfer and sustainable development. c To achieve integration and affirmation in the worldwide scientific community.
University of Ghana	To develop world-class human resources and capabilities to meet national development needs and global challenges through quality teaching, learning, research and knowledge dissemination.
Makerere University	<ul style="list-style-type: none"> a To be the leading institution for academic excellence and innovations in Africa. b To provide innovative teaching, learning, research and services responsive to national and global needs.
University of Mauritius	<ul style="list-style-type: none"> a The core mission is the creation and dissemination of knowledge and understanding for the citizens of Mauritius and the international community b The university aspires to be a leading international university, bridging knowledge across continents through excellence and intellectual creativity.
University of Nairobi	<ul style="list-style-type: none"> a To be a world-class university committed to scholarly excellence. b To provide quality university education and training and to embody the aspirations of the Kenyan people and the global community through creation, preservation, integration, transmission and utilization of knowledge.

There are obviously what could be described as “broad flagship goals” built into these vision and mission statements. Each of the universities aims:

- to have a high academic rating, which would make it a world-class university or at least a leading or premier university in Africa;
- to be a centre for academic excellence;
- to engage in high quality research and scholarship; and
- to deliver knowledge products which will enhance national and regional development needs.

The flagship goals require each university to at least be a centre for academic excellence, which engages in high quality research and scholarship. They also require each university to deliver knowledge products which would enhance national and regional development needs. These goals will have to be broken down into a number of subsidiary goals which can generate the performance indicators to which quantitative data can be applied.

Flagship goals and the academic core

The institutional missions and visions of each of these eight universities are focused on its academic core which, as has already been stated, consists of two main elements: (a) the inputs available for the delivery of teaching and research, and (b) the outputs which the university produces on the basis of these inputs. CHET’s HERANA project has shown how the broad flagship goals can be broken down into narrower goals related to each university’s teaching and research inputs and outputs, and how these can be used together with empirical data to assess the performance of universities across different countries.

The main aims of HERANA (the Higher Education Research and Advocacy Network in Africa) were those of exploring the relationship between economic development and higher education policy and planning, and the institutionalisation of university development activities. In its publication *Universities and Economic Development in Africa* (CHET 2011), HERANA used a number of key performance indicators to analyse the strength of the academic core of its sample universities, and in this way to determine the extent to which each university had been able to institutionalise development activities.

The goals and indicators employed by HERANA are summarised in Table 7. This table sets out detailed goals which can be extracted from the broad flagship goals of each of the eight universities. The second column explains the reasons why each goal was selected, and the third the quantitative data which will be used as indicators. The final column indicates how HERANA rated the performance of each university relative to the goals in the first column.

Chapter 3 of this report shows how Table 3 can be used as a framework for cross-national performance measures. It will do this by first giving an overview of the key data elements of the eight selected universities, and then by assessing the performance of the eight universities using the goals and ratings listed above.

TABLE 7 HERANA academic core goals and indicators

Goals	Basis for goal	Indicator data	Performance ratings based on indicator scores
Goal 1: Strong enrolments in science, engineering and technology	In African governments and foreign development agencies, there is a strong emphasis on SET as an important driver of development	Average % for 2001–2007 of total head count students enrolled in SET programmes	Strong: % SET enrolments 40% or higher Medium: % SET enrolments between 30% & 39% Weak: % SET enrolments below 30%
Goal 2: Strong postgraduate enrolments	The knowledge economy demands increasing numbers of people with postgraduate qualifications	Average % for 2001–2007 of total head count students enrolled in masters and doctoral programmes	Strong: % masters + doctors enrolments 10% or higher Medium: % masters + doctors enrolments between 5% & 9% Weak: % masters + doctors enrolments below 5%
Goal 3: Favourable academic staff to student ratios	The academic workload should allow for the possibility of research and PhD supervision.	Average ratio for 2001–2007 of full-time equivalent students to full-time equivalent academic staff	Strong: student to academic staff ratio below 20 Medium: student to academic staff ratio between 20 & 30 Weak: student to academic staff ratio above 30
Goal 4: High proportion of academic staff with doctoral degrees	There is a high correlation between staff with doctorates and research outputs	% of permanent academic staff of 2007 with doctoral degrees as highest qualification.	Strong: % academics with doctorates 50% or higher Medium: % academics with doctorates between 30% & 49% Weak: % academics with doctorates below 30%
Goal 5: High levels of research funding per academic	Research requires government and institutional funding and 'third-stream' funding from external sources	Ratio of total research funds available in 2007 to permanent academic staff, in purchasing power parity USD (PPP\$)	Strong: research funding per academic higher than PPP\$20 000 Medium: research funding per academic between PPP\$10 000 and PPP\$20 000 Weak: research funding per academic below PPP\$10 000
Goal 6: High graduation rates in SET fields	Universities must achieve high success rates in order to respond to the skills shortages in the African labour market in SET fields.	Average ratio for 2001–2007 of total SET graduates to total SET enrolments	Strong: ratio of SET graduates to SET enrolments 20% or higher Medium: ratio of SET graduates to SET enrolments between 17% and 19% Weak: ratio of SET graduates to SET enrolments below 17%
Goal 7: High levels of doctoral graduates	Doctoral graduates are critical both for the future reproduction of the academic staff, and for the knowledge economy.	Average ratio for 2001–2007 of total doctoral graduates to total permanent academic staff	Strong: ratio of doctoral graduates to academics 10% or higher Medium: ratio of doctoral graduates to academics between 5% and 9% Weak: ratio of doctoral graduates to academics below 5%
Goal 8: High levels of knowledge production in the form of research publications	Academics must produce peer-reviewed research publications if the university is to participate in the global knowledge community	Average ratio for 2001–2007 of total research publications to permanent academic staff	Strong: ratio of publications per academic 0.50 or higher Medium: ratio of publications per academic between 0.25 and 0.49 Weak: ratio of ratio of publications per academic below 0.25

Overview of the flagship universities

Data overview of the eight universities

Purpose of the overview

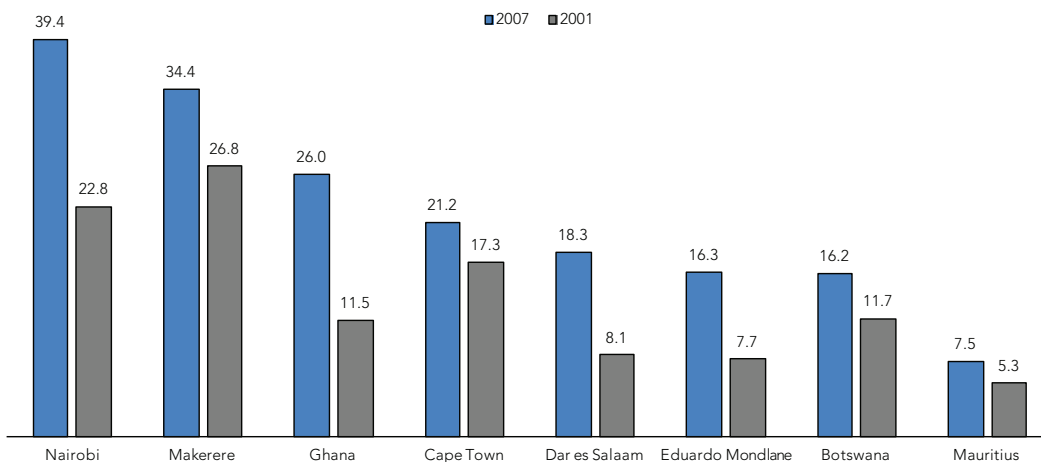
The main purpose of this chapter is to present a broad overview of the eight universities, using the data sets collected by the project. The various graphs compare aspects of the student enrolments, graduates, academic staff, research publications, and income sources of these universities. At the end of the chapter these data, together with others available to CHET, are used to classify the eight universities in terms of a limited number of the categories proposed by a European Commission project.

The data in this overview cover the time period 2001 to 2007. For the purposes of these analyses, the academic year 2000/2001 is recorded as 2001 and 2006/2007 as 2007. Some of the universities supplied data for years beyond 2006/2007 and 2007. These additional data have been used in the detailed profile of each university which is published on the CHET website.

Student enrolments

Graph 1 compares the 2007 (where 2006/2007 is taken to be 2007) enrolment totals of the eight universities with their totals for 2001 (where 2000/2001 is taken to be 2001). These totals are head counts, which treat each student as a unit regardless of the course load he/she is carrying.

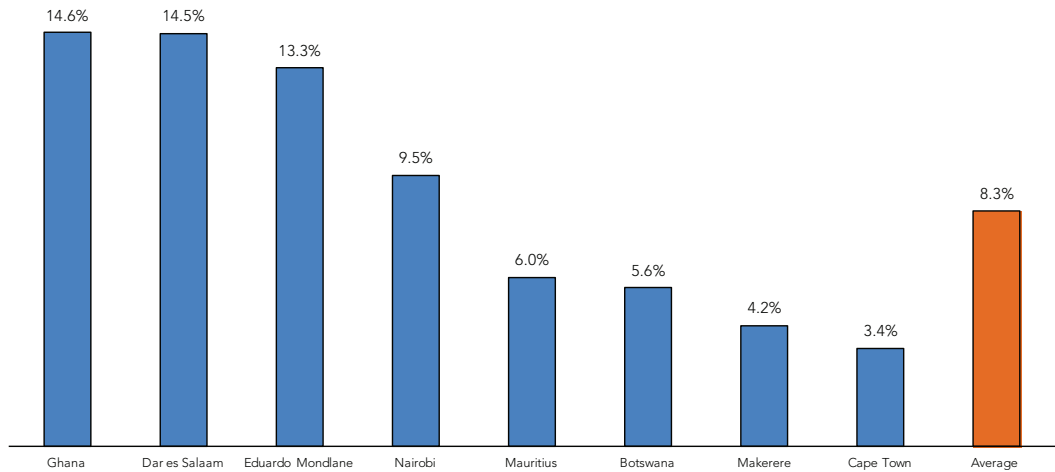
GRAPH 1 Head count enrolments: 2007 compared to 2001 (thousands)



The picture presented by Graph 1 is of rapid growth in some of the universities, and a slower, steadier growth in others.

Graph 2 compares average annual growth rates over the period 2001–2007. The data in the graph show that student enrolments in four of the eight universities (Ghana, Dar es Salaam, Eduardo Mondlane, Nairobi) increased at average annual rates of more than 9%, three (Mauritius, Botswana, Makerere) had moderate growth rates of between 4% and 6%, and only Cape Town had an average annual growth rate of less than 4%.

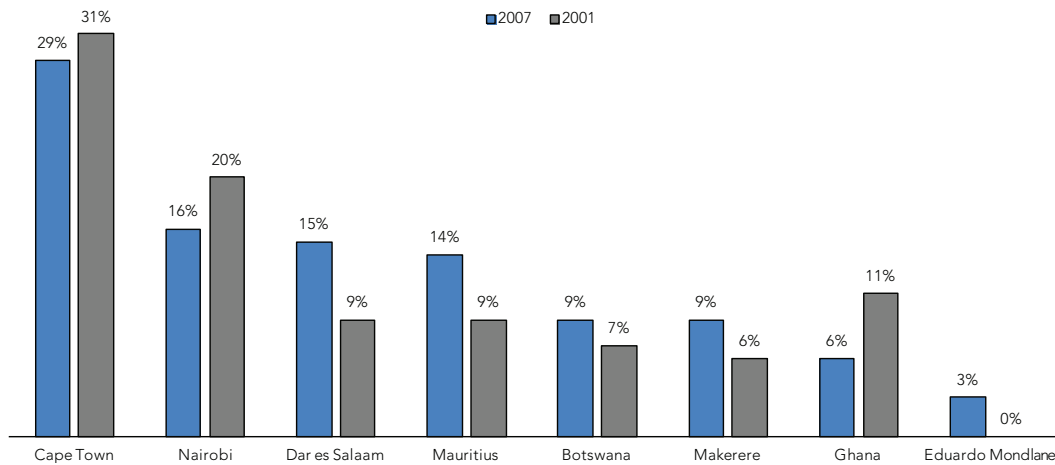
GRAPH 2 Average annual increases in head count enrolments: 2001–2007



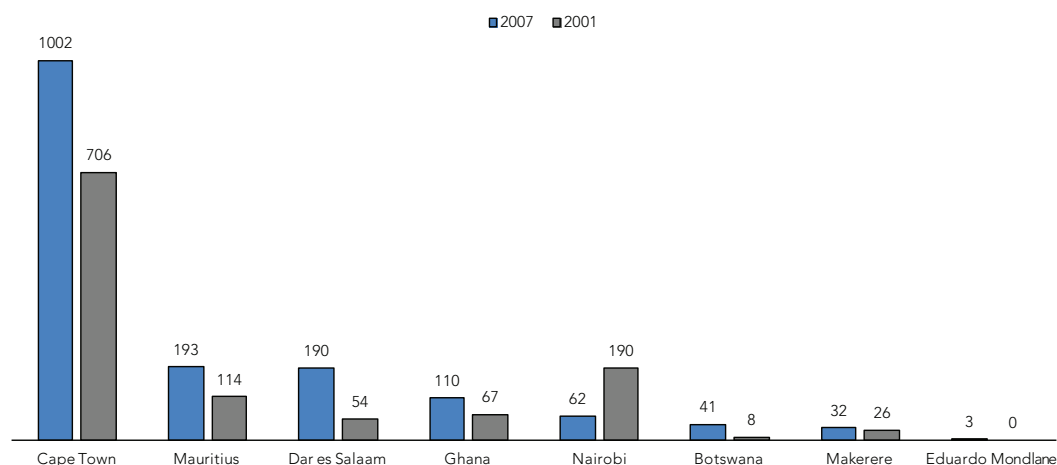
Graph 3 sets out the proportions of students who were enrolled for postgraduate qualifications. Postgraduates include students registered for masters and doctoral degrees as well as for qualifications below masters level, such as postgraduate diplomas. Undergraduates, for this purpose, are students enrolled for bachelors degrees, and undergraduate diplomas and certificates.

The graph shows that all these universities were predominantly undergraduate institutions. Their proportions of postgraduate enrolments in 2007 ranged from a high of 29% for Cape Town to a low of 3% for Eduardo Mondlane.

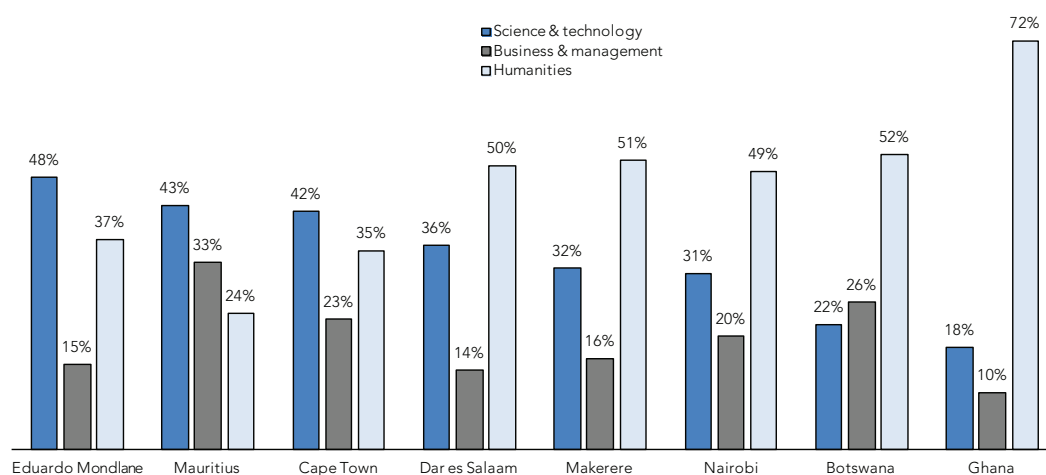
GRAPH 3 Postgraduates as percentage of total enrolments: 2007 compared to 2001



Graph 4 compares the totals of doctoral students who were enrolled in these universities in 2001 and 2007. The graph shows that Cape Town’s doctoral enrolment in 2007 was 1 002, or 61% of the total of 1 633 enrolled at the eight universities. Doctoral students had a 5% share of Cape Town’s enrolment, compared to proportions of 3% for Mauritius and 1% for Dar es Salaam. The other five universities had proportions of doctoral students below 0.5%.

GRAPH 4 Doctoral enrolments: 2007 compared to 2001

Graph 5 uses the notion of a field of study to present a further aspect of the enrolments of these universities. The “field of study”, for these purposes, is the major or principal subject which the student is following in his/her qualification. The various fields of study are aggregated into the three broad categories which are defined in the notes to the graph.

GRAPH 5 Enrolments by fields of study in 2007

Notes

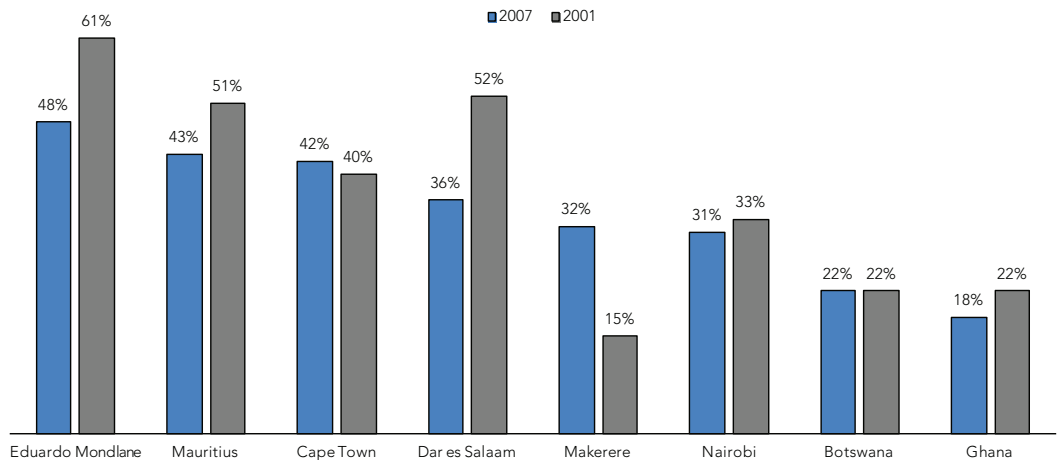
1. The enrolment years in this table are those listed in the note to Table 1.
2. “Science and technology” = all majors in science, engineering and technology, including the health sciences.
3. “Business and management” = all majors in business, commerce, management, accounting, finance.
4. “Humanities” = all majors in languages, fine and applied arts, social sciences, education (including teacher training).
5. The totals include undergraduate as well as postgraduate enrolments.

These eight universities had very different fields-of-study shapes. In terms of the fields of science and technology, enrolment proportions in 2007 ranged from a low of 18% to a high of 48%. Eduardo Mondlane, Mauritius and Cape Town had proportions of students in science and technology fields of over 40%. Dar es Salaam, Makerere and Nairobi had proportions in the range 30% to 39%, and Botswana and Ghana proportions below 25%.



Graph 6 shows how the proportions of science and technology majors changed in 2007 compared to 2001. The main changes were at Eduardo Mondlane, Mauritius and Dar es Salaam where proportions of science and technology majors dropped sharply in 2007 compared to 2001, and at Makerere where the proportion doubled in 2007 compared to 2001.

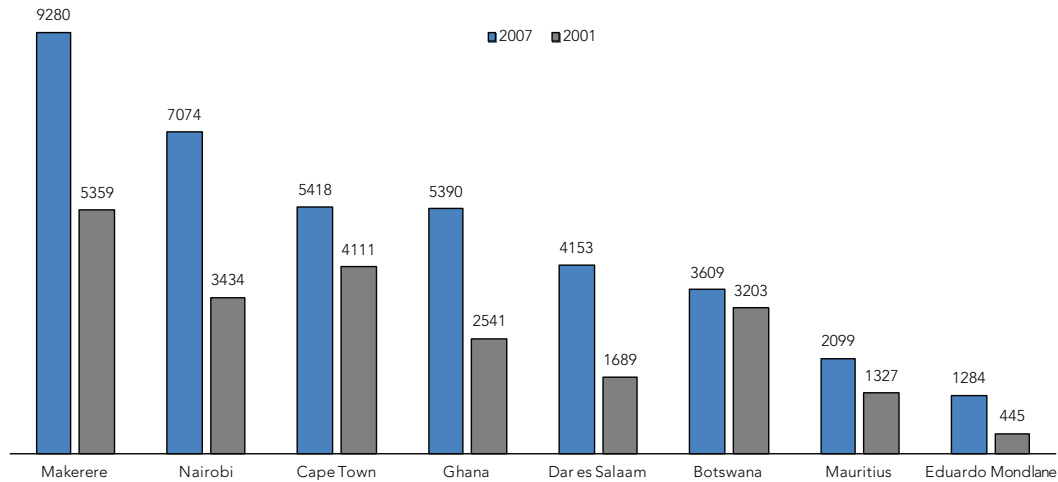
GRAPH 6 Science and technology majors as percentage of total enrolments: 2007 compared to 2001



Graduates

Graduates (students who have satisfied all the requirements of a degree or diploma or certificate) are important measures of the outputs of universities. Graph 7 shows how the graduate totals of the eight universities changed in 2007 compared to 2001.

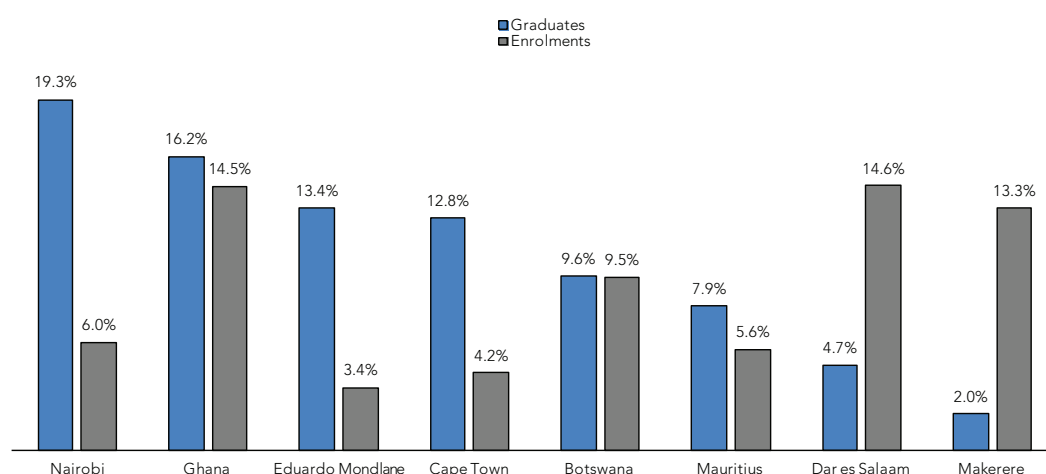
GRAPH 7 Graduates: 2007 compared to 2001 (thousands)



Graph 8 compares the average annual increases that occurred in student enrolments and

graduates from the base year of 2001 up to 2007. The graph shows that, with the exception of Dar es Salaam and Makerere, average annual growths in graduates were higher than average annual growths in head count enrolments. This comparison, as will be seen in the discussions of the detailed institutional profiles, can be used as one of the measures of the graduate output efficiency of each university.

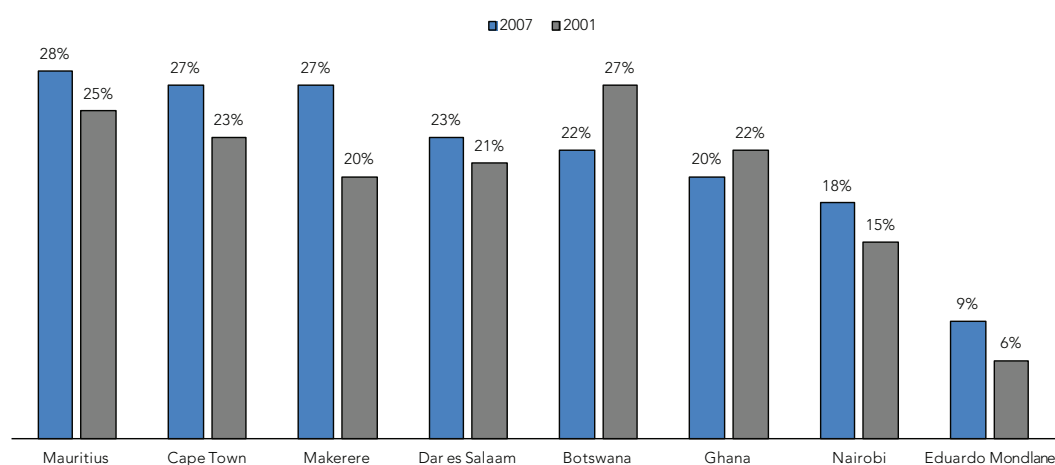
GRAPH 8 Average annual increases in graduates and enrolments: 2001–2007



Graph 9 uses, as a proxy for a graduate throughput rate, a calculation which divides the total head count enrolment in a given year by the number of students graduating in that year. A ratio of 25% for graduates to enrolments indicates that at least 75 out of every 100 students entering the university will eventually graduate.

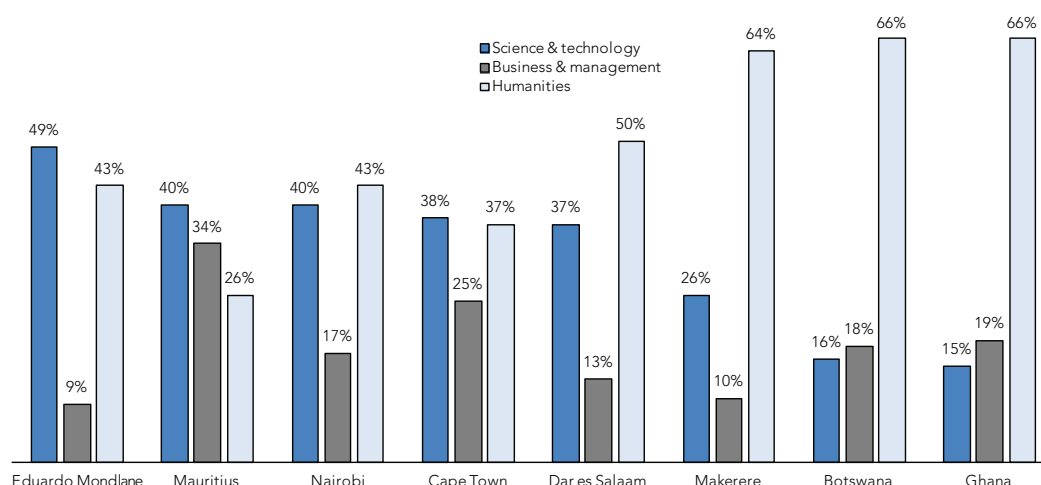
Graph 9 confirms the picture which emerges from Table 8. It shows, by this measure, that graduate output rates improved at six of the eight universities, despite the rapid growth that occurred in enrolments. The ratios achieved in 2007 by Mauritius, Cape Town, Makerere and Dar es Salaam are evidence of highly efficient graduate outputs. These and the output rates of the other four universities are discussed more fully in the individual institutional profiles on the CHET website.

GRAPH 9 Graduates as percentage of enrolments: 2007 compared to 2001



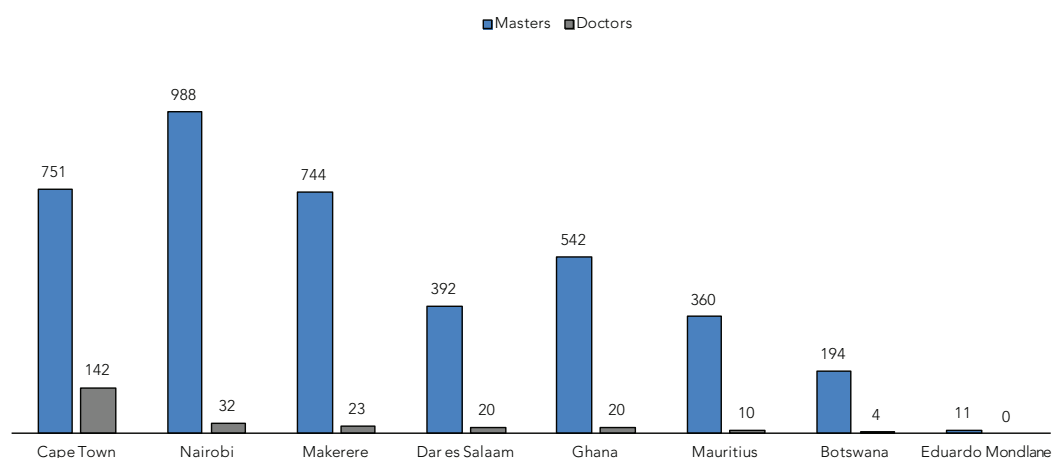
Graph 10 shows what the broad fields of study were of the graduates of the eight universities. These fields are those defined in the note to Graph 5. A comparison of Graphs 5 and 10 will show that Nairobi's 2007 proportion of science and technology graduates was 40%, compared to its enrolment proportion of 32% for this field. In the case of Makerere, its 2007 proportion of science and technology graduates was lower than its enrolment proportion in this field: 26% for graduates compared to 32% for enrolments.

GRAPH 10 Graduates by fields of study in 2007



Graph 11 offers a summary of the masters and doctoral graduates produced by the eight universities. Doctoral graduates in particular can be used as a measure of the research productivity of universities. The graph shows that in 2007 Cape Town produced 142 doctoral graduates, which amounted to 57% of the combined total of the eight universities. Cape Town's total of masters graduates was, in contrast, 19% of the combined total. Four of the large universities (Nairobi, Makerere, Dar es Salaam, and Ghana) produced in 2007 67% of the total of masters graduates.

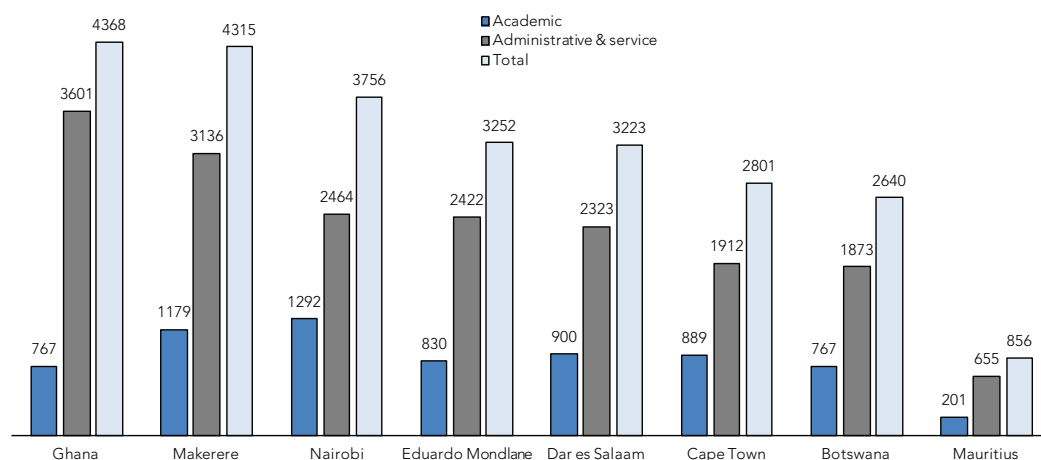
GRAPH 11 Doctors and masters graduates in 2007



Staffing

The staffing resources available to universities are central input measures of their ability to undertake their teaching and research activities. Graph 12 compares the staffing totals of the eight universities in 2007.

GRAPH 12 Permanent staff in 2007

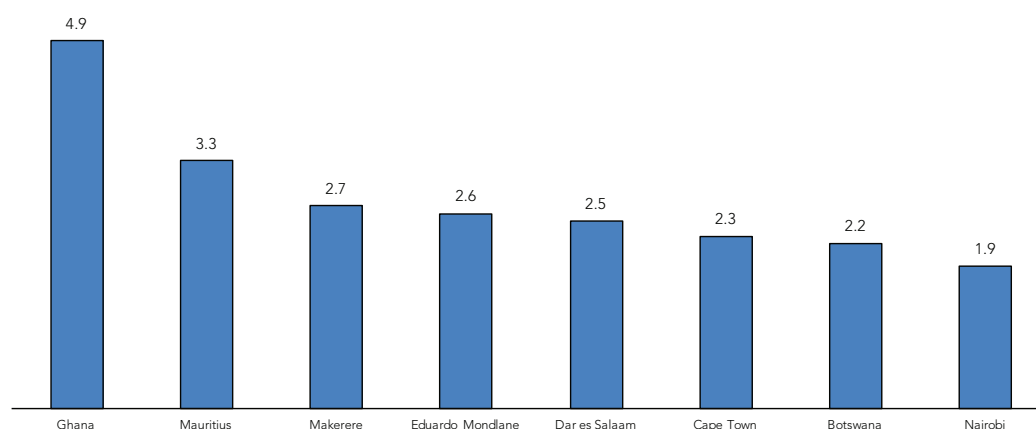


The staff categories used in the graph are defined below:

- A permanent staff member is an employee who either contributes to a retirement fund, or is employed full-time on a contract of at least three years.
- Academic staff members are employees who spend at least 50% of their time on duty on instruction and/or research activities.
- Service staff members are unskilled workers such as general cleaners, kitchen staff, gardening staff and messengers.
- Administrative staff members are all other non-academic employees, including the executive/management of the university.

The data in the graph show that in all the universities the numbers of permanent administrative and service staff employed were considerably higher than the numbers of permanent academic staff, who are the main deliverers of teaching and research services.

Graph 13 shows what the ratios were between these different categories of staff. These range from a high of nearly 5 administrative plus service staff members per academic down to a ratio of 2. The average ratio for the group as a whole was 2.6 administrative plus service staff members per permanent academic.

GRAPH 13 Ratios of administrative + service staff to academic staff

Academic staff

Graph 14 shows how the universities were able to deploy their academic staffing resources to meet the teaching needs of their students. The graph compares the 2007 ratios of full-time equivalent students to full-time equivalent academic staff to the ratios for 2001.

It is important to note that the units involved here are not head count students (see Graph 1) or permanent academic staff (see Graph 12). The units employed are full-time equivalent students and full-time equivalent academic staff. These terms are defined in this way:

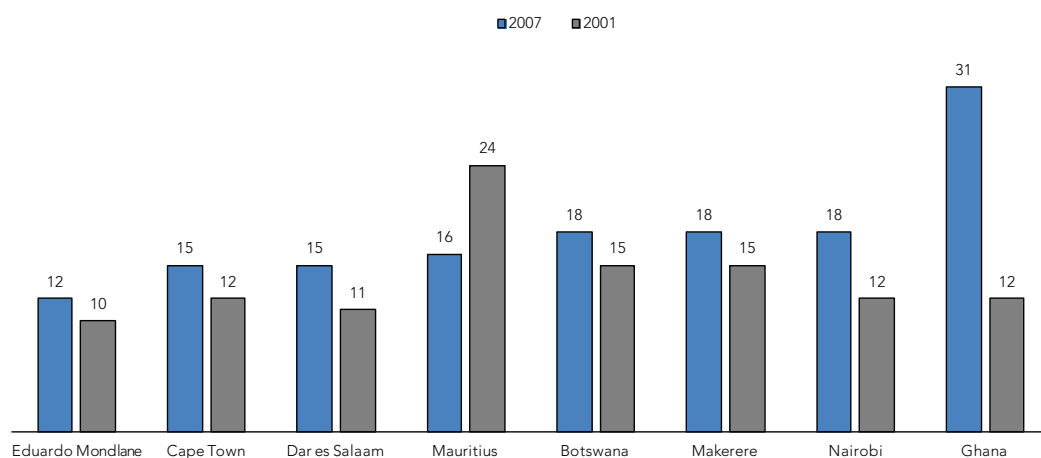
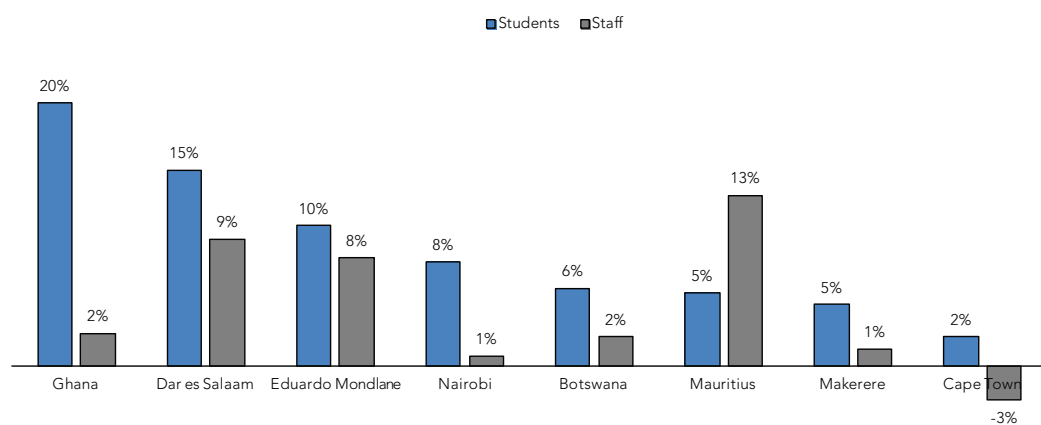
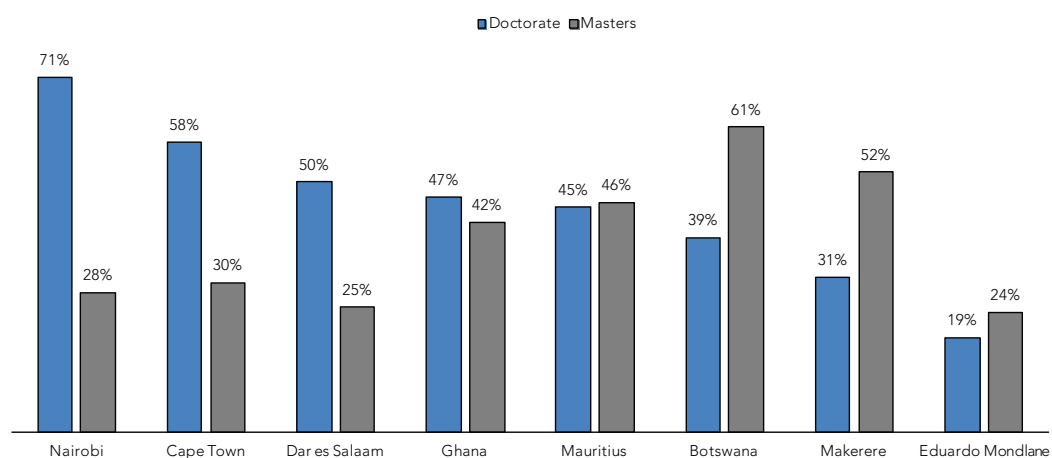
- A full-time equivalent (FTE) enrolment total takes account of a student's course load. So a student carrying a standard full-time curriculum would = 1 FTE student, and a student carrying a half- load would = 0.5 FTE students.
- A full-time equivalent (FTE) staff member is defined as an employee who is employed full-time for twelve months. In the case of academics, part-time and temporary staff should be included in the count. For example, a part-time tutor on a 50% contract would = 0.5 FTE academics, and a temporary academic on a full-time 8 month contract would = 0.67 FTE academics.

Details of the FTE student and FTE academic staff totals of each university appear in its detailed profile on the CHET website. Most of the changes reflected in Graph 14 are the result of growth in academic staff between 2001 and 2007 not matching the rapid student growth which occurred over this period. The differences between these growth rates can be seen in Graph 15 which follows.

Graph 16 returns to the notion of a permanent academic staff member. It shows what the highest formal qualifications were of the permanent staff members who spent at least 50% of their official time on duty on instruction and/or research activities. The qualifications of administrative staff reported in Graph 12 are not included in the graph.

The graph records only the proportions of academic staff whose highest qualification is either a doctorate or a masters degree.

The graph shows that Nairobi had, at 71%, the highest proportion of permanent staff with doctorates in 2007. Four universities (Cape Town, Dar es Salaam, Ghana and Mauritius) had in 2007 proportions of permanent staff with doctorates above 45%. Three (Botswana, Makerere and Eduardo Mondlane) had ratios below 40%.

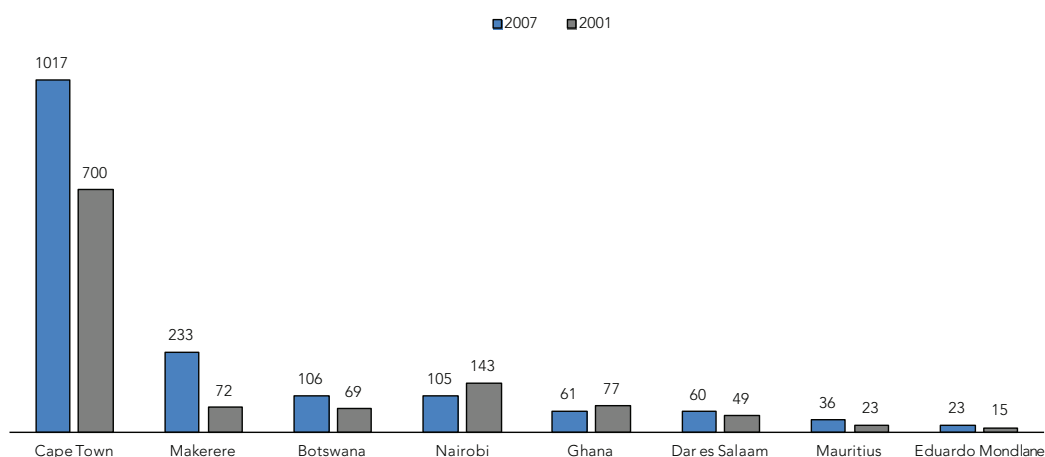
GRAPH 14 Ratios of FTE students to FTE academic staff: 2007 compared to 2001**GRAPH 15 Comparisons of average annual growth rates in FTE students and FTE academics: 2001–2007****GRAPH 16 % of permanent academics with doctors or masters as highest qualification: 2007**

Research publications

Research publications function, together with doctoral graduates, as an important measure of the research productivity of universities. Graph 17 which follows compares the 2007 research publication outputs of these eight universities with their totals for 2001. To be included in the count, a publication had to appear in a research journal which has an editorial board of experts in the field, and which published only material which had been subjected to peer review. Cape Town's count is based on research publications approved by government for subsidy purposes. In the case of the other universities, the count is of research articles appearing on an ISI citation database (see page 10).

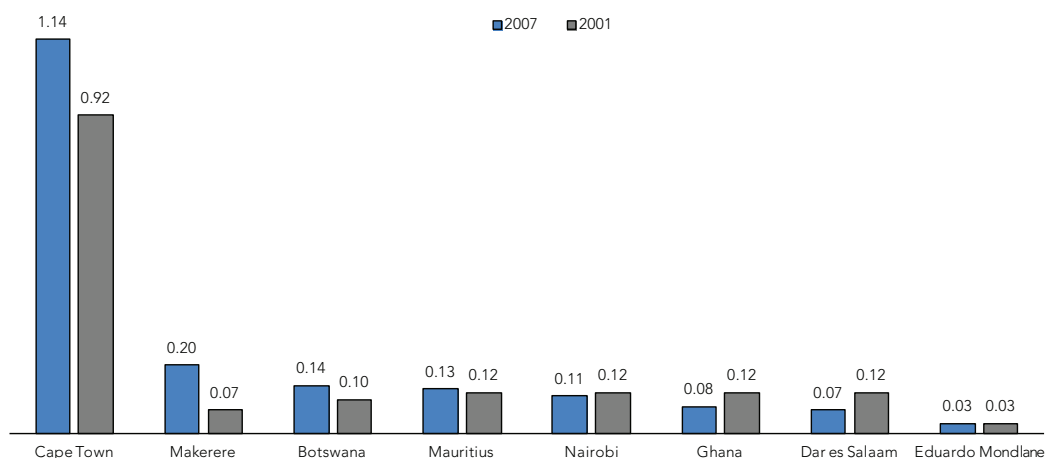
The graph shows that in 2007 Cape Town produced 1 017 research publications, which amounted to 62% of the combined total of the eight universities. This was close to Cape Town's share of 57% of the total of doctoral graduates produced in 2007.

GRAPH 17 Peer-reviewed research publications: 2007 compared to 2001



Graph 18 offers a first measure of the research productivity of the eight universities. It shows what the ratios were in 2001 and 2007 of research publications per permanent academic staff member.

GRAPH 18 Ratio of research publications to permanent academic staff: 2007 compared to 2001



Graph 18 shows that the ratios of Cape Town, Makerere, Botswana and Mauritius improved in 2007 compared to 2001. The use of these ratios as indicators of research productivity will be discussed more fully in the sections which follow. The ratios can however be taken to imply the following:

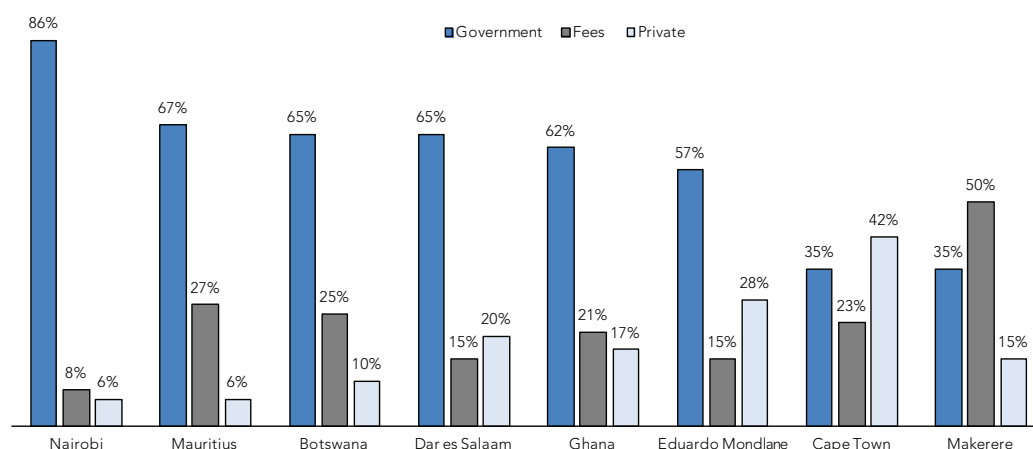
- a ratio of 1.0 implies that permanent academic staff produce on average one research publication each year,
- a ratio of 0.20 implies that permanent academic staff produce on average one research publication every five years, and
- a ratio of 0.10 implies that permanent academic staff produce on average one research publication every ten years.

Sources and totals of income

Graph 19 shows what the main sources of income were for the eight universities. It does so by dividing the income total of each university into these categories:

- “Government funds” which includes all subsidy amounts plus earmarked funds for special purposes.
- “Student fees” which includes tuition and all class fees, as well as accommodation or residence fees.
- “Private income” which includes donations, grants from international agencies, investment income, and income from non-government contracts for research or the delivery of other services.

GRAPH 19 Sources of income in 2007



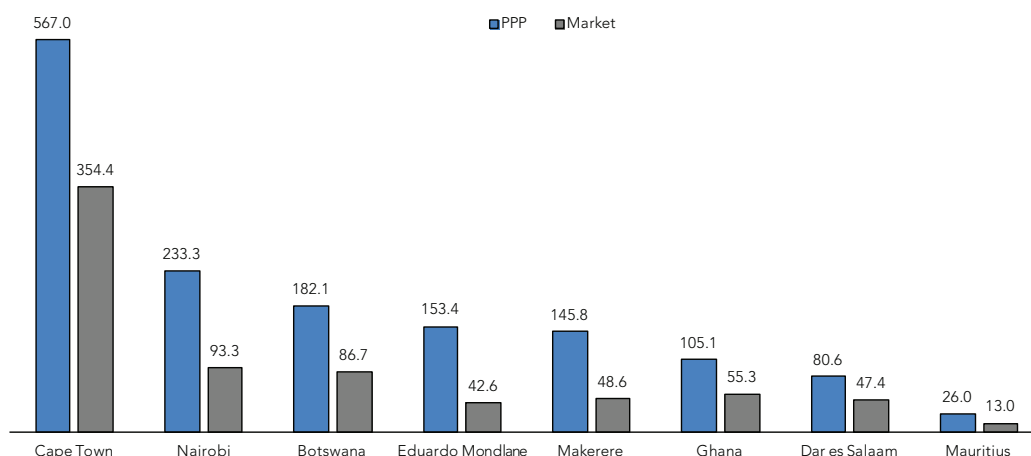
Graph 19 shows that the dependence of these institutions on these three main categories of funding differed sharply. Examples of these differences are these:

- The proportion of income from government sources in 2007 varied from a high of 86% for Nairobi to low proportions of 35% for Mauritius and Cape Town. Four of the universities (Mauritius, Botswana, Dar es Salaam and Ghana) had government funding proportions in the band 62%–67%. The proportion of income from student fees ranged from 8% to 50%.

- The proportion of income from private sources in 2007 ranged from Cape Town's 42% to 6% for Mauritius and Nairobi. The other six universities had private income proportions which ranged from 10% (Botswana) to 28% (Eduardo Mondlane).

Graph 20 compares the 2007 income totals of each university in terms of (a) millions of US dollars (USD) at market rates, and (b) purchasing power parity USD.

GRAPH 20 Total income 2007
(USD millions at market rates and in purchasing power parity USD)



Two main points to note about Graph 20:

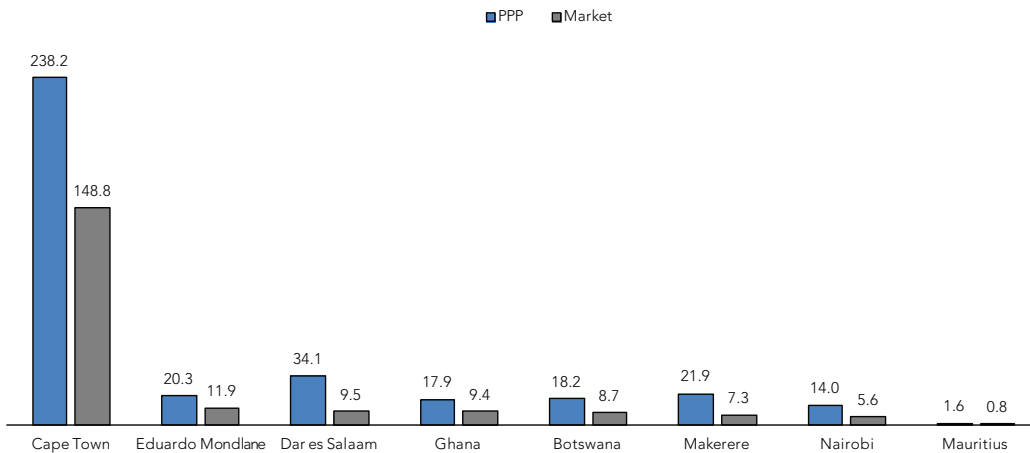
1. The calculations of the 2007 market rate USD were based on the university's total 2007 income in the local currency, and on the average 2007 exchange rate quoted by the central banking authorities of the country in which it is based.
2. The calculations of purchasing power parity USD (PPP\$) were based on estimates contained in the 2008 publication on World Development Indicators. Because these estimates are based on 2005 exchange rates, the following method was used for these 2007 calculations:
 - a. The indicator set gives for each country a ratio between its PPP conversion factor and its average market exchange rate. For example, the SA ratio is given as 0.61, based on a market exchange rate of ZAR6.40 per USD in 2005.
 - b. The 2007 calculations assume that the 2005 ratio will apply again. So the 2007 PPP conversion factor is taken to be 2005 ratio times 2007 market exchange rate. For example, the conversion factor for SA is calculated as 2005 ratio times 2007 exchange rate = $0.61 \times 7.0 = 4.27$.

The data in Graph 20 show that Cape Town had the largest income in 2007, in terms of both market rate USD and PPP USD. Its share of the total market rate US dollar income of the eight universities was 48%, and 38% of the PPP dollar total. The use of PPP USD raised Nairobi's share from 13% of the eight universities' 2007 US market rate total to 16% of the PPP dollar total. Makerere's share increased from 7% of the market rate total to 10% of the PPP total.

One of the main reasons for these differences in total income is the high level of private income raised by Cape Town in 2007. As was said in the earlier definition, private income includes donations, grants from international agencies, investment income, and income from non-government contracts for research or the delivery of other services.

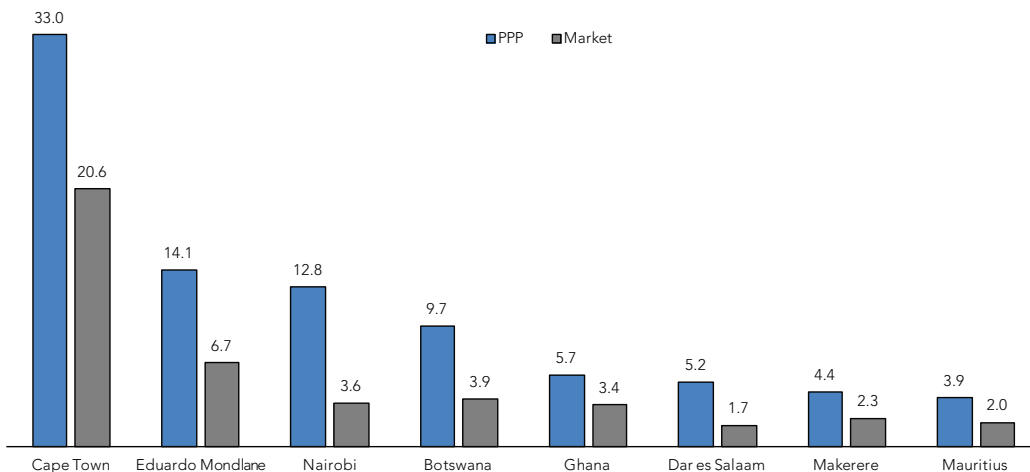
Graph 21 shows what each university's private income was in 2007 in terms of market rate USD and PPP USD. Cape Town's private income in 2007 was USD148 million at market rates, which was 74% of the private income total of the eight universities.

GRAPH 21 Private income 2007
(USD millions at market rates and in purchasing power parity USD)



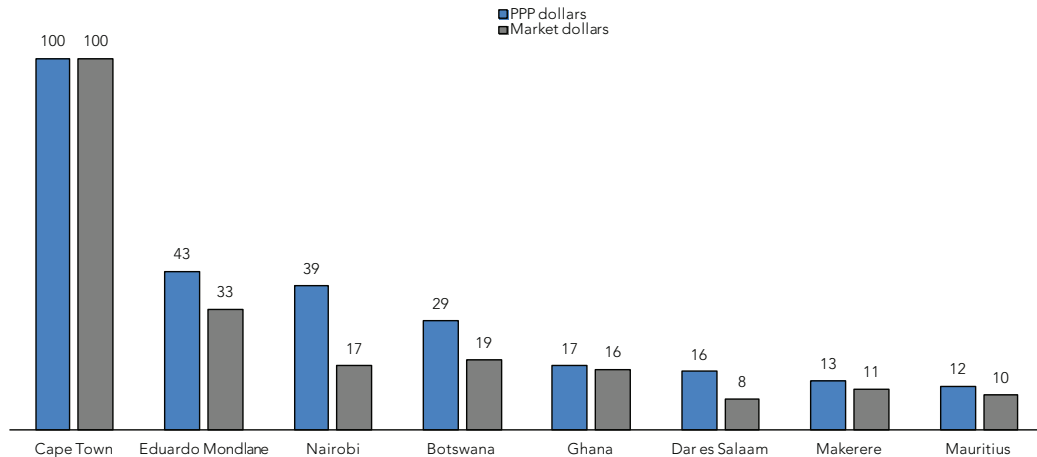
Graph 22 relates the totals in Graph 20 to the 2007 full-time equivalent (FTE) enrolments of the eight universities. The data show what each university's total income per FTE student was in 2007 in terms of both market rate USD and PPP USD.

GRAPH 22 Income per FTE student
(USD thousands at market rates and in purchasing power parity USD)



Cape Town’s income per FTE student in 2007 was more than double that of any of the other seven universities in both market rate USD and PPP USD. Graph 23 shows what the relationships were between these income averages per FTE enrolled student in 2007.

GRAPH 23 Income per FTE student in 2007 on base of Cape Town = 1000



Classifying the eight universities

U-map dimensions

Data which CHET collected during this project can be used to offer preliminary classifications of the eight universities. These classifications are based on dimensions used in the “U-map” project of the European Commission. A detailed account of the project can be found at www.u-map.eu.

The U-map is an on-going project which is developing and implementing a European classification of higher education institutions. The quantitative data available to CHET permit six of the current U-map dimensions to be applied to the eight universities. These dimensions are those concerned with the student profile of a university, its teaching profile, and its research profile.

Student and teaching profiles

Only one of the U-map student profile dimensions can be extracted from the data which CHET has available. This is set out in Table 8.

Three dimensions concerned with teaching profiles are summed up in Tables 9 to 11.

TABLE 8 Student profile: size of student body

Head count student enrolments in 2007		
	Thousands	Profile
Nairobi	39.4	Very large
Makerere	34.4	Very large
Ghana	26.5	Large
Cape Town	22.3	Large
Dar es Salaam	20.7	Large
Eduardo Mondlane	16.3	Large
Botswana	15.5	Large
Mauritius	7.5	Medium

Very large = more than 30 000 heads

Large = between 15 000 and 30 000

Medium sized = between 5 000 and 15 000

Small = less than 5 000

TABLE 9 Teaching profile: degree level focus based on level of degrees awarded

Distribution of graduates: three-year averages					
	Doctorates	Masters	Bachelors	Diplomas & certificates	Degree level focus
Makerere	0%	8%	87%	3%	Bachelors degree
Cape Town	3%	14%	55%	2%	Bachelors degree
Eduardo Mondlane	0%	2%	91%	6%	Bachelors & diplomas/ certificates
Ghana	0%	10%	78%	12%	Bachelors & diplomas/ certificates
Mauritius	0%	16%	70%	14%	Bachelors & diplomas/ certificates
Nairobi	0%	17%	70%	13%	Bachelors & diplomas/ certificates
Dar es Salaam	0%	10%	70%	16%	Bachelors & diplomas/ certificates
Botswana	0%	5%	58%	26%	Bachelors & diplomas/ certificates

Doctorate focus: 5% or more of all qualifications awarded are doctoral degrees

Master focus: 25% or more of all qualifications awarded are masters degree

Bachelor focus: 40% or more of all qualifications awarded are bachelors degree

Sub-degree focus: 5% of all qualifications awarded are diplomas or certificates

[Note: a university can have more than one degree-level focus]

TABLE 10 Teaching profile: expenditure on teaching as percentage of total expenditure

Expenditure on teaching: 3-year averages		
Botswana	>40%	Major
Cape Town	>40%	Major
Dar es Salaam	>40%	Major
Eduardo Mondlane	>40%	Major
Ghana	>40%	Major
Makerere	>40%	Major
Mauritius	>40%	Major
Nairobi	>40%	Major

Major: more than 40% of total institutional expenditure on teaching

Substantial: 10%–40% of expenditure on teaching

Some: 1%–10% of expenditure on teaching

TABLE 11 Teaching profile: range of subjects offered

Fields of study in which programmes are offered									
	Education	Engineering	Social science, business, law	Natural sciences & mathematics	Humanities & arts	Health & social services	Personal services	Agriculture	Profile
Botswana	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Comprehensive
Dar es Salaam	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Comprehensive
Eduardo Mondlane	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Comprehensive
Ghana	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Comprehensive
Makerere	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Comprehensive
Nairobi	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Comprehensive
Cape Town	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Broad
Mauritius	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Broad

Specialised: areas/fields of study covered at most 3

Broad: areas/fields of study covered between 3 and 6

Comprehensive: areas/fields of study covered more than 6

Research profiles

Tables 12 and 13 deal with two of the U-map's research profile dimensions. These concern the production of doctoral graduates and peer-reviewed research publications.

TABLE 12 Research profile: doctorate production

Doctoral graduates as % of full-time equivalent staff: 3-year averages		
	Proportion	Doctorate production profile
Cape Town	15.90%	Major
Makerere	1.89%	Major
Ghana	1.85%	Major
Dar es Salaam	1.81%	Major
Nairobi	1.62%	Major
Mauritius	1.59%	Major
Botswana	0.55%	Some
Eduardo Mondlane	0.00%	None

Major: ratio more than 1.5%
 Substantial: between 0.75% and 1.5%
 Some: between 0.1% and 0.75%
 None: less than 0.1%

TABLE 13 Research profile: peer reviewed publications

Ratio of peer-reviewed publications to FTE academic staff: 3 year averages		
		Peer-reviewed publications profile
Cape Town	1.1	Substantial
Botswana	0.1	Some
Dar es Salaam	0.1	Some
Ghana	0.1	Some
Makerere	0.1	Some
Mauritius	0.1	Some
Nairobi	0.1	Some
Eduardo Mondlane	0.0	None

Major: more than 2
 Substantial: between 1 and 2
 Some: between 0.1 and 1
 None: less than 0.1

Summary of classifications

The key points to note about the results of applying a limited number of U-map dimensions to the eight selected universities are these:

- Two of the universities would be classified as very large (Makerere, Nairobi), five as large (Botswana, Cape Town, Dar es Salaam, Eduardo Mondlane, Ghana), and one as medium-sized (Mauritius).
- The degree-level focus of all 8 universities is on undergraduate qualifications, and all have major levels of expenditure on teaching.
- Their range of programme offerings places the 8 universities in the categories of either comprehensive or broad. None of them would be classified as a specialised university.
- Six of the 8 would be considered, in terms of the production of doctorates, to have a major involvement in research (Cape Town, Dar es Salaam, Ghana, Makerere, Mauritius, Nairobi). Botswana is rated as having “some involvement” in research, and Eduardo Mondlane as having “no involvement”.
- Their outputs of peer reviewed research publications place none of these universities in the category “major involvement in research”. Cape Town falls into the category of a substantial involvement in research, and Eduardo Mondlane in the category of “no involvement” in research. The other six universities fall into the category of “some involvement in research”.

Table 14 offers a summary of the classifications of the eight selected universities in terms of the U-map dimensions in Tables 8 to 13.

TABLE 14 Summary of the classifications of the eight universities on U-map dimensions

	Student profile		Teaching profile		Research profile	
	Enrolment size	Degree level focus	Expenditure on teaching	Range of fields of study	Doctorate production	Peer reviews publications
Botswana	Large	Bachelors & diplomas/ certificates	Major	Comprehensive	Some	Some
Cape Town	Large	Bachelors degree	Major	Broad	Major	Substantial
Dar es Salaam	Large	Bachelors & diplomas/ certificates	Major	Comprehensive	Major	Some
Eduardo Mondlane	Large	Bachelors & diplomas/ certificates	Major	Comprehensive	None	None
Ghana	Large	Bachelors & diplomas/ certificates	Major	Comprehensive	Major	Some
Makerere	Very large	Bachelors degree	Major	Comprehensive	Major	Some
Mauritius	Medium	Bachelors & diplomas/ certificates	Major	Broad	Major	Some
Nairobi	Very large	Bachelors & diplomas/ certificates	Major	Comprehensive	Major	Some

Note

Explanations of the terms used in the classifications appear as footnotes to Tables 3 to 8.

Flagship goals and the academic core

The section on flagship universities in Chapter 2 of this report argued that the key principle of performance being relative to goals could be met in a cross-national performance system if the flagship university in each country is identified, if the broad goals built into its mission and vision statements are extracted, and if these are then restated as goals embedded in the academic core of the university.

The analysis showed that their mission and vision statements require each flagship university to at least be a centre for academic excellence, which engages in high quality research and scholarship. They also require each university to deliver knowledge products which would enhance national and regional development needs. The inputs and outputs related to these broad flagship goals constitute what was described earlier as the academic core of each of the eight universities.

The broad flagship goals can now be broken down into a number of more specific academic core. These goals are summed up in Table 14 below

TABLE 14 Goals in academic core of flagship universities

Goals	Basis for goals
Goal 1: Strong enrolments in science, engineering and technology (SET)	In African governments and foreign development agencies, there is a strong emphasis on SET as an important driver of development
Goal 2: Strong postgraduate enrolments	The knowledge economy demands increasing numbers of people with postgraduate qualifications
Goal 3: Favourable student to academic staff ratios	The academic workload should allow for the possibility of research and doctorate supervision.
Goal 4: High proportion of academic staff with doctoral degrees	There is a high correlation between staff with doctorates and research outputs
Goal 5: High levels of research funding	Research requires government and institutional funding and 'third-stream' funding from external sources
Goal 6: High outputs of graduates in science, engineering and technology (SET) fields	Universities must achieve high success rates in order to respond to the skills shortages in the African labour market in SET fields.
Goal 7: High outputs of doctoral graduates	Doctoral graduates are critical both for the future reproduction of the academic staff, and for the knowledge economy.
Goal 8: High levels of new knowledge production	Academics must produce peer-reviewed research outputs if the university is to participate in the global knowledge community

The institutional data which has been collected during this project can now be linked to the academic core goals in Table 14 above, to enable reviews to be made of the performance of the eight flagship universities.

These performance reviews will rely on (a) the goals identified in Table 14 above, (b) the data in the detailed institutional profiles which are published on the CHET website, (c) the targets used in the analyses of the detailed profiles, and (d) comparisons of indicator scores within a specific group of universities.

TABLE 15 Academic core goals, indicators and rating scores

GOAL	INDICATORS based on 3-year averages	TARGETS related to goals	Relating targets to goals
Goal 1 Strong enrolments in SET	% of total student enrolment with SET majors	Average 40% or higher of total enrolment	Strong SET enrolments require at least 40% of students to be in SET programmes.
Goal 2 Strong postgraduate enrolments	% of total student enrolment in masters & doctoral programmes	Average 10% or higher of total enrolment	Strong postgraduate enrolments require at least 15% of students to be in masters or doctoral programmes.
Goal 3 Favourable student to academic staff ratios	Ratio of full-time equivalent enrolled students to full-time equivalent academic staff	Average ratio below 20	To meet teaching needs of students, ratio of FTE students to FTE academics should not be above 20.
Goal 4 High proportion of academic staff with doctoral degrees	% of academic staff with doctoral degrees	50% or higher of total academics	To meet high level research requirements, at least 50% of academics should have doctoral degrees
Goal 5 High levels of research funding	Research funding per academic staff member in purchasing power parity USD (PPP\$)	Funding per academic above PPP\$20 000	Research outputs are directly related to funding available to academic staff. The minimum should be PPP\$20000 per academic.
Goal 6 High outputs of graduates in SET	SET graduates as % of SET undergraduate enrolments	20% or higher	A ratio of SET undergraduate qualifiers to set undergraduate enrolments of at least 20% implies that graduate output levels are high and dropouts reasonably low.
Goal 7 High outputs of doctoral graduates	Ratio of doctoral graduates to academic staff	Ratio of 15% or higher	A ratio of 15% of doctoral graduates to permanent academic staff implies that each academic should produce on average 1 doctoral graduate every 7 years. This would be a reasonably high output.
Goal 8 High levels of new knowledge production	Ratio of peer-reviewed research articles to academic staff	Research articles per academic of 0.50 or higher	A ratio of 0.50 implies that permanent academic staff should produce one research publication every two years. This would be a reasonably high output.

University of Botswana

Summary of the profile of the University of Botswana

This summary is an extract from the detailed institutional profile published on the CHET website. Botswana's student and staff profile covers most academic years in the ten-year period 2000/2011 to 2009/2010. Some graduate and research publication data were not available for the later years of 2008/2009 and 2009/2010.

Some of the points to note Botswana's profile are these:

- 1 Botswana experienced a moderate average annual growth rate of 2.5% in total student enrolments between 2000/2001 and 2009/2010. Undergraduate enrolments rose at a rate of 2.2% and postgraduates at a rate of 6.7%. Botswana's proportion of postgraduate students rose from 7% in 2000/2001 to 10% in 2009/2010, showing that it remained a predominantly undergraduate university throughout this period.
- 2 Botswana's enrolment shape remained stable between 2000/2001 and 2009/2010. The proportion of science and technology students was 21% in 2009/2010, of business and management students 27%, and of humanities students 52%.
- 3 Botswana's graduate totals grew only in the field of business and management in 2009/2010 compared to 2000/2001. The humanities graduate total was 323 (16%) lower in 2009/2010 compared to 2000/2001, and the business/management total was 23 (4%) higher. The result of these different growth rates was that the share which humanities graduates had of the overall graduate total fell from 62% in 2000/2001 to 58% in 2009/2010, and the share of business/management graduates rose from 20% to 23%. The proportion of science and technology graduates was 18% in 2000/2001 and 19% in 2009/2010.
- 4 Analyses of its graduation rates show that Botswana's graduate output performances have been mixed. There appear to be high levels of student dropouts from its undergraduate programmes in science and technology and business/management, as well as in postgraduate masters programmes.
- 5 Botswana's staff establishment grew at an average annual rate of 1.6% during 2000/2001 to 2009/2010. Academic staff grew at an average annual rate of 1.8% over this period, compared to the average annual growth of 2.5% that occurred in student enrolments. Over the period 2006/2007 to 2008/2009, 51% of Botswana's academic staff members held doctoral degrees. This proportion met the 50% which could be used as a benchmark for research-based universities.
- 6 Botswana's total of research publications increased from 69 in 2000/2001 to 120 in 2007/2008. The total of 120 was however low relative to the number of academic staff reported by Botswana. An academic staff of 848 (the establishment posts reported by Botswana) should produce at least 420 research publications each year.
- 7 The main changes which occurred in Botswana's funding over the period 2000/2001 to 2006/2007 were in its levels of government funding and student fees. The average annual increase in government funding between 2000/2001 and 2006/2007 was 5.5%, compared to the average annual increase of 25.6% in income from student fees. The consequence of this was that the share which government funding had of Botswana's income fell from 80% in 2000/2001 to 65% in 2006/2007. The share of student fees rose from 11% to 25%, while that of private funding remained constant at about 10%.

The academic core of the University of Botswana

Table 16 offers an assessment of the strength of Botswana's academic core using the indicators and indicator score ratings contained in Table 15.

The empirical data for the following goals were derived from graphs in Botswana's institutional profile published on the CHET website:

Goal 1	Graph 4
Goal 2	Graph 5 divided by Graph 1
Goal 3	Graph 19
Goal 4	Graph 20
Goal 6	Graph 14
Goal 7	Graph 23
Goal 8	Graph 22

TABLE 16 Review of the academic core of University of Botswana

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments below 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2007/2008 to 2009/2010	22%	At least 40%	Eduardo Mondlane Mauritius Dar es Salaam	49% 43% 38%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2007/2008 to 2009/2010	8%	At least 15%	Dar es Salaam Mauritius Eduardo Mondlane	12% 10% 3%
Goal 3 Student to academic staff ratios average 2006/2007 to 2008/2009	15	Below 20	Eduardo Mondlane Dar es Salaam Mauritius	11 15 24
Goal 4 Academic staff with doctoral degrees 2006/2007 to 2008/2009	51%	At least 50%	Dar es Salaam Mauritius Eduardo Mondlane	50% 45% 19%
Goal 5 Research funding per academic 2007 only	PPP\$2000	PPP\$20 000	Dar es Salaam Mauritius Eduardo Mondlane	6 400 3 000 2 000
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2005/2006 to 2007/2008	18%	At least 20%	Mauritius Dar es Salaam Eduardo Mondlane	26% 22% 8%
Goal 7 Doctoral graduates per permanent academic average 2005/2006 to 2007/2008	1%	At least 15%	Mauritius Dar es Salaam Eduardo Mondlane	2% 2% 0%
Goal 8 Research publications per permanent academic average 2005/2006 to 2007/2008	0.13	At least 0.50	Mauritius Dar es Salaam Eduardo Mondlane	0.13 0.07 0.03



Table 16 above shows that two of Botswana's indicator scores met the targets related to the eight flagship goals. These are Goal 3 on student to staff ratios and Goal 4 on academic staff with doctorates. Points to note about the other six goals in the academic core are these:

- Goal 1 on percentage of SET enrolments: 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 on percentage masters and doctoral enrolments: Botswana's score is well below the target but is consistent with the scores of two of the other three small universities.
- Goal 5 on research funding: Botswana and the other three small universities all face serious under-funding problems.
- Goal 6 on graduation rates in SET undergraduate programmes: Botswana's score is close to the target score.
- Goals 7 and 8 on high-level knowledge outputs: Botswana's output rates are, like those of the other three small universities, well below the target rates.

The overall impression which emerges from Table 16 is that Botswana's academic core has both strong and weak aspects. Its academic staff quality and its availability of academic staff to meet the teaching needs of students are its strengths. Its main weaknesses are its low proportion of SET enrolments, the low proportion of staff with doctorates, its low level of research funding, and its low research outputs in form of doctorates and publications.

University of Cape Town

Summary of the profile of the University of Cape Town

This summary is an extract from the detailed institutional profile published on the CHET website. The data in the profile cover the ten academic years 2000 to 2009. Some of the points to note are these:

- 1 Cape Town's head count student enrolment grew from 17 500 in 2000 to 23 800 in 2009. The proportion of postgraduate students at Cape Town decreased from 31% in 2000 to 29% in 2009. The institution remained a predominantly science and technology-based university during this period. In 2009 41% of its students were following majors in science and technology, 22% in business and 37% majors in humanities.
- 2 Cape Town's graduate totals grew in all three of the broad fields of study over the ten-year period 2000 to 2009. The average annual growth in science and technology graduates was 5.7%, compared to 5.6% for humanities and 4.0% for business. From an overall point of view, UCT's graduate output performances have been good. The only weakness appears to lie in its undergraduate programmes in business and management, which have higher dropout rates than programmes in science and technology and in humanities.
- 3 In 2009 Cape Town employed a total of 3 261 permanent staff members. These fell into two broad categories: 965 (30%) were academic staff members and the balance of 2 296 (70%) were administrative and service staff members.
- 4 Cape Town's FTE academic staff numbers fell from 1 453 in 2003 to 1 184 in 2009. A consequence was that its student to academic staff ratios rose during the period. The biggest increase was in the business/management ratio which rose from 17:1 in 2000 to an unsatisfactory 42:1 in 2009. Cape Town's ratios of FTE students to FTE academic staff in science and technology and humanities programmes increased during this period, but remained at levels which would be regarded as satisfactory in most countries. In 2009 58% of Cape Town's academic staff members held doctoral degrees, which was well above the average of 34% for all universities in South Africa.
- 5 Cape Town's research publication outputs were high throughout the period 2000–2009. UCT's average ratio for the ten-year period 2000 to 2009 was 1.0, which implies that its permanent academic staff produced on average one research publication each year.
- 6 Cape Town's income from all sources increased from R1 048 million in 2000 to R2 793 million in 2009. Because its annual expenditure on all activities was below its annual income, Cape Town was able to report surpluses in all years between 2000 and 2009.

Reviewing the academic core of the University of Cape Town

Table 17 offers a review of the strength of Cape Town's academic core using the indicators and indicator score ratings contained in Table 15.

The empirical data for the following goals are, wherever possible, the latest available three-year averages derived from graphs in Cape Town's institutional profile published on the CHET website. The relevant graphs are:

Goal 1	Graph 4
Goal 2	Graph 5 divided by Graph 1
Goal 3	Graph 19
Goal 4	Graph 20

Goal 6	Graph 14
Goal 7	Graph 23
Goal 8	Graph 22

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 18 of Cape Town's institutional profile on the CHET website.

TABLE 17 Review of the academic core of University of Cape Town

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments higher than 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2007 to 2009	41%	At least 40%	Nairobi Makerere Ghana	29% 38% 23%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2007 to 2009	18%	At least 15%	Nairobi Makerere Ghana	16% 7% 5%
Goal 3 Student to academic staff ratios average 2007 to 2009	15	Below 20	Nairobi Makerere Ghana	14 17 29
Goal 4 Academic staff with doctoral degrees 2007 to 2009	58%	At least 50%	Nairobi Makerere Ghana	71% 52% 30%
Goal 5 Research funding per academic 2007 only	PPP\$47 700	PPP\$20 000	Nairobi Makerere Ghana	5 300 4 900 3 400
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2007 to 2009	19%	At least 20%	Nairobi Makerere Ghana	20% 15% 14%
Goal 7 Doctoral graduates per permanent academic average 2007 to 2009	17%	At least 15%	Nairobi Makerere Ghana	4% 1% 1%
Goal 8 Research publications per permanent academic average 2007 to 2009	1.14	At least 0.50	Nairobi Makerere Ghana	0.14 0.09 0.02

Table 17 shows that Cape Town has achieved the targets related to seven of the eight goals. Its average graduation rate undergraduate programmes in science and technology is 1 percentage point below the target. Cape Town's other output scores are well above both the targets and the averages of the other large universities in the group.

University of Dar es Salaam

Summary of the profile of the University of Dar es Salaam

This summary is an extract from the detailed institutional profile published on the CHET website. The data in the profile cover the eight academic years 2000/2001 to 2007/2008. Some of the points to note are these:

- 1 Dar es Salaam's head count student enrolment grew from 8 100 in 2000/2001 to 20 700 in 2007/2008. This represented an exceptionally high average annual growth rate of 14.4%. Undergraduate enrolments more than doubled, and postgraduate enrolments more than quadrupled. Dar es Salaam's proportion of postgraduate students rose, as a result, from 9% in 2000/2001 to 15% in 2007/2008.
- 2 Because growth rates in science and technology were approximately half of those in other fields of study, Dar es Salaam's enrolment shape changed between 2000/2001 and 2007/2008. The proportion of science and technology students fell from 52% in 2000/2001 to 39% in 2007/2008. The proportion of business and management students rose from 10% in 2000/01 to 12% in 2007/2008. The proportion of enrolments in humanities rose from 38% to 47%.
- 3 Between 2000/2001 and 2006/2007, Dar es Salaam's graduate growth rate was higher than its enrolment growth rate, which is an indication of improved output efficiency. The proportions of Dar es Salaam's graduates in the three broad fields of study changed over this period. The share which science and technology had of the graduate total dropped from 41% in 2000/2001 to 37% in 2006/2007. The share of humanities graduates rose from 48% to 50%, and of business management majors from 11% to 13%.
- 4 In 2007/2008 Dar es Salaam employed a total of 3 268 permanent staff members. These fell into two broad categories: 945 (29%) were academic staff members and the balance of 2 323 (71%) were administrative (including service) staff members.
- 5 Dar es Salaam's total of full-time equivalent (FTE) academic staff grew from 586 in 2000/2001 to 1 060 in 2007/2008; an average annual increase of 9.3%. This was a high rate of increase, but because it did not match the increase of 14.1% in FTE student enrolments, Dar es Salaam's ratios of FTE students to FTE academic staff rose over this period. Dar es Salaam's FTE student to FTE academic staff ratio in the field of science and technology increased from 13:1 in 2001 to 16:1 in 2007/2008, which is the upper limit of what should apply in a major research university. Its ratio of FTE students to FTE academic staff ratio in humanities fields increased, but only rose from 8:1 in 2000/2001 to 14:1 in 2007/2008.
- 6 The research output of Dar es Salaam's academic staff members has been low. An appropriate benchmark for research output in a university is that each permanent academic staff member should produce at least one research article every two years. This benchmark implies that Dar es Salaam's 900 permanent academic staff members should have produced 450 research articles in 2007/2008, rather than the actual total of 70.
- 7 The main change which occurred in Dar es Salaam's funding over the period 2000/2001 to 2006/2007 was in its level of private funding. Private funding dropped at an annual average rate of 12.0% over this period, compared to average annual increases of 3.0% in government funding and 25.5% in student fee income. The share with government funding had of Dar es Salaam's Dar es Salaam's Dar es Salaam's income rose from 55% in 2000/2001 to 65% in 2006/2007. The share of student fees rose from 4% to 15%, while that of private funding fell from 41% to 19% over the same period.

Reviewing the academic core of the University of Dar es Salaam

Table 18 offers a review of the strength of Dar es Salaam's academic core using the indicators and targets contained in Table 15.

The empirical data for the following goals were derived from graphs in Dar es Salaam's institutional profile published on the CHET website:

Goal 1	Graph 4
Goal 2	Graph 5 divided by Graph 1
Goal 3	Graph 19
Goal 4	Graph 20
Goal 6	Graph 14
Goal 7	Graph 23
Goal 8	Graph 22

TABLE 18 Assessment of the academic core of University of Dar es Salaam

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments below 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2005/2006 to 2007/2008	38%	At least 40%	Eduardo Mondlane Mauritius Botswana	49% 43% 22%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2005/2006 to 2007/2008	12%	At least 15%	Mauritius Botswana Eduardo Mondlane	10% 8% 3%
Goal 3 Student to academic staff ratios average 2005/2006 to 2007/2008	15	Below 20	Eduardo Mondlane Botswana Mauritius	11 15 24
Goal 4 Academic staff with doctoral degrees average 2005/2006 to 2007/2008	50%	At least 50%	Botswana Mauritius Eduardo Mondlane	51% 45% 19%
Goal 5 Research funding per academic 2007 only	PPP\$6400	PPP\$20 000	Mauritius Botswana Eduardo Mondlane	3 000 2 000 1 000
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2005/2006 to 2007/2008	22%	At least 20%	Mauritius Botswana Eduardo Mondlane	26% 18% 8%
Goal 7 Doctoral graduates per permanent academic average 2005/2006 to 2007/2008	2%	At least 15%	Mauritius Botswana Eduardo Mondlane	2% 1% 0%
Goal 8 Research publications per permanent academic average 2005/2006 to 2007/2008	0.07	At least 0.50	Mauritius Botswana Eduardo Mondlane	0.13 0.13 0.03

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 18 of UDSM's profile on the CHET website.

Table 18 above shows that three of Dar es Salaam's indicator scores met the targets related to the eight flagship goals. These are Goal 3 on student to staff ratios, Goal 4 on academic staff with doctorates and Goal 6 on SET graduation rates. Points to note about the other five goals in the academic core are these:

- Goal 1 on percentage of SET enrolments: Dar es Salaam's proportion of SET enrolments is close to the target, but is lower than those of two of the other three small universities.
- Goal 2 on percentage masters and doctoral enrolments: Dar es Salaam's score is close to the target, and is above those of the other three small universities.
- Goal 5 on research funding: Dar es Salaam and the other three small universities all face serious under-funding problems.
- Goals 7 and 8 on high-level knowledge outputs: Dar es Salaam's output rates are, like those of the other three small universities, well below the target rates.

The overall impression which emerges from Table 18 is that Dar es Salaam's academic core has both strong and weak aspects. Its academic staff quality and its availability of academic staff to meet the teaching needs of students are input strengths, and its science and technology graduation rate is its output strength. Dar es Salaam's main weaknesses are its low level of research funding, and its low research outputs in form of doctorates and publications.

Eduardo Mondlane University

Summary of the profile of Eduardo Mondlane University

This summary is an extract from the detailed institutional profile published on the CHET website. The data in the profile cover the eight academic years 2000/2001 to 2007/2008. Some of the points to note are these:

- 1 Student enrolments at Eduardo Mondlane grew from 7 700 in 2000/2001 to 16 300 in 2007/2008. This was a high average annual growth rate of 11.3%. The highest growth rate occurred in humanities majors and the lowest in science and technology majors. The average annual growth rate in humanities majors between 2000/01 to 2007/2008 was 16.6%, in business/management majors 15.8%, and in science and technology majors 7.1%.
- 2 Eduardo Mondlane's proportion of science and technology students fell from 62% in 2000/2001 to 48% in 2007/2008. The proportion of business and management students rose from 11% in 2000/2001 to 14% in 2007/2008. The proportion of enrolments in humanities rose from 27% to 48% over this period.
- 3 Between 2000/2001 and 2006/2007, Eduardo Mondlane's graduate growth rate was higher than its enrolment growth rate, which is an indication of improvements in its output efficiency.
- 4 In 2007/2008 Eduardo Mondlane employed a total of 3 035 permanent staff members. These fell into two broad categories: 842 (28%) were academic staff members and the balance of 2 193 (72%) were administrative (including service) staff members.
- 5 Eduardo Mondlane's total of full-time equivalent (FTE) academic staff grew from 642 in 2000/2001 to 1 054 in 2007/2008; an average annual increase of 6.4%. Because this did not match the increase of 10.8% in FTE student enrolments, Eduardo Mondlane's ratios of FTE students to FTE academic staff rose over this period. The overall ratio of 13:1 in 2007/2008 remained however a highly favorable one.
- 6 The research output of Eduardo Mondlane's permanent academic staff members has been low. Its 842 permanent academic staff members produced a total of only 21 research publications in 2007/2008.
- 7 The main change which occurred in Eduardo Mondlane's funding over the period 2000/2001 to 2007/2008 was in its level of private funding. Private funding grew at an annual average rate of 8.4% over this period, compared to average annual increases of 17.3% in government funding and 24.0% in student fee income. The share which government funding had of Eduardo Mondlane's income rose from 52% in 2000/2001 to 57% in 2006/2007. The share of student fees rose from 10% to 15%, while that of private funding fell from 38% to 28%.

Assessing the academic core of the Eduardo Mondlane University

Table 19 offers a review of Eduardo Mondlane's academic core using the indicators and targets contained in Table 15.

The empirical data for the following goals are, wherever possible, the latest available three-year averages derived from graphs in Eduardo Mondlane's institutional profile published on the CHET website. The relevant graphs are:

Goal 1	Graph 4
Goal 2	Graph 5 divided by Graph 1
Goal 3	Graph 19

Goal 4	Graph 20
Goal 6	Graph 14
Goal 7	Graph 16 divided by Graph 18
Goal 8	Graph 22

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 17 of Eduardo Mondlane's profile on the CHET website.

TABLE 19 Review of the academic core of Eduardo Mondlane University

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments below 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2005/2006 to 2007/2008	49%	At least 40%	Mauritius Dar es Salaam Botswana	43% 38% 22%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2005/2006 to 2007/2008	3%	At least 15%	Dar es Salaam Mauritius Botswana	12% 10% 8%
Goal 3 Student to academic staff ratios average 2005/2006 to 2007/2008	11	Below 20	Dar es Salaam Botswana Mauritius	15 15 24
Goal 4 Academic staff with doctoral degrees average 2005/2006 to 2007/2008	19%	At least 50%	Botswana Dar es Salaam Mauritius	51% 50% 45%
Goal 5 Research funding per academic 2007 only	PPP\$2000	PPP\$20 000	Dar es Salaam Mauritius Botswana	6 400 3 000 2 000
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2005/2006 to 2007/2008	8%	At least 20%	Mauritius Dar es Salaam Botswana	26% 22% 18%
Goal 7 Doctoral graduates per permanent academic average 2005/2006 to 2007/2008	0%	At least 15%	Dar es Salaam Mauritius Botswana	2% 2% 1%
Goal 8 Research publications per permanent academic average 2005/2006 to 2007/2008	0.03	At least 0.50	Botswana Dar es Salaam Mauritius	0.13 0.13 0.07

Table 19 shows that two of Eduardo Mondlane's indicator scores met the targets related to the eight flagship goals. These are Goal 1 on the proportion of SET enrolments, and Goal 3 on student to staff ratios. Points to note about the other six goals in the academic core are these:



- Goal 2 on percentage of masters and doctoral enrolments: Eduardo Mondlane's proportion of enrolments is well below both the target and the indicator scores of the other three small universities.
- Goal 4 on percentage of staff with doctorates: Eduardo Mondlane's proportion is well below both the target and the indicator scores of the other three small universities.
- Goal 5 on research funding: Eduardo Mondlane and the other three small universities all face serious under-funding problems.
- Goal 6 on the output of SET graduates: Eduardo Mondlane's output is well below both the target and the indicator scores of the other three small universities.
- Goals 7 and 8 on high-level knowledge outputs: Eduardo Mondlane's output rates are, like those of the other three small universities, well below the target rates.

The overall picture offered in Table 19 is that Eduardo Mondlane's academic core has both strong and weak aspects. Its strengths are its high proportion of SET enrolments and the availability of academic staff. Its main weaknesses are the low percentage of masters and doctoral enrolments, low percentage of staff with doctorates, low research funding, low output of SET graduates, and low research outputs in form of doctorates and publications

University of Ghana

Summary of the profile of the University of Ghana

This summary is an extract from the detailed institutional profile published on the CHET website. Ghana's student and staff profile covers most academic years in the ten-year period 2000/2001 to 2009/2010. Some graduate and research publication data were not available for the later years of 2008/2009 and 2009/2010.

- 1 The data show that Ghana's head count student enrolment grew from 12 600 in 2000/2001 to 32 600 in 2009/2010; at the very high average annual growth rate of 9.6% over the ten-year period. Undergraduates grew at an average annual rate of 10.0% and postgraduate enrolments at the lower rate of 5.9%. A consequence of this was that Ghana's proportion of graduate students fell from 12% in 2000/2001 to 8% in 2009/2010.
- 2 Ghana was in 2009/2010 predominantly a humanities-based university. In 2009/2010 64% of its students were following programmes in humanities. Its proportion of SET majors had grown in 2009/2010 compared to 2000/2001 (from 22% to 26%), but at the expense of majors in business and management. The proportion of enrolments in this field dropped from 16% in 2000/2001 to 10% in 2009/2010.
- 3 Between 2000/2001 and 2009/2010, Ghana's graduate growth rate matched its enrolment growth rate. Ghana's average graduation rates do however indicate that it has high drop out rates. The calculations made suggest that 40% of students entering undergraduate programmes in science and technology as well as in humanities are likely to drop out without obtaining their qualifications. The estimated drop out rate for business/management is higher but the calculations may be misleading because of the decline that has occurred in student enrolments in this field of study.
- 4 The proportions of Ghana's graduates in the three broad fields of study changed over this period. The share which science and technology had of the graduate total dropped from 20% in 2000/2001 to 14% in 2009/2010, and of business management majors from 20% to 17%. The share of humanities graduates rose from 60% in 2000/2001 to 68% in 2009/2010.
- 5 In 2009/2010 Ghana employed a total of 4 989 permanent staff members. These fell into two broad categories: 947 (19%) were academic staff members and the balance of 4 042 (81%) were administrative and service staff members
- 6 The differences between Ghana's student to academic staff ratios in science and technology and those of other programmes are strikingly large. The 2007/2008 science and technology ratio of 10:1 is typical of those found in universities in other countries. The ratios for humanities and business/management programmes would however be regarded as unacceptably high in most countries. The humanities ratio was 44:1 in 2007/2008, and that of business/management 56:1.
- 7 The proportion of Ghana's permanent academic staff with doctorates was 61% in 2009/2010. This proportion was above the suggested benchmark of 50% for universities with strong research profiles.
- 8 The research output of Ghana's permanent academic staff members, measured in terms of research publications and doctoral graduates, has been low.
- 9 The main changes which occurred in Ghana's funding over the period 2000/2001 to 2007/2008 were in its levels of student fees and private funding. The private funding share of Ghana's income rose from 8% in 2000/2001 to 16% in 2007/2008, while the student fees share fell from 28% to 21%. The share with government funding had of Ghana's income dropped from 65% in 2000/2001 to 63% in 2007/2008.

Reviewing the academic core of the University of Ghana

Table 20 offers a review of Ghana's academic core using the indicators and targets contained in Table 15.

TABLE 20 Assessment of the academic core of the University of Ghana

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments higher than 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2007/2008 to 2009/2010	23%	At least 40%	Cape Town Makerere Nairobi	41% 38% 29%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2007/2008 to 2009/2010	7%	At least 15%	Cape Town Nairobi Makerere	18% 16% 5%
Goal 3 Student to academic staff ratios average 2007/2008 to 2009/2010	29	Below 20	Nairobi Cape Town Makerere	14 15 17
Goal 4 Academic staff with doctoral degrees average 2007/2008 to 2009/2010	52%	At least 50%	Nairobi Cape Town Makerere	71% 58% 30%
Goal 5 Research funding per academic 2007 only	PPP\$3400	PPP\$20 000	Cape Town Nairobi Makerere	47 700 5 300 4 900
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2007/2008 to 2009/2010	14%	At least 20%	Makerere Cape Town Nairobi	20% 19% 15%
Goal 7 Doctoral graduates per permanent academic average 2007/2008 to 2009/2010	1%	At least 15%	Cape Town Makerere Nairobi	17% 4% 1%
Goal 8 Research publications per permanent academic average 2007/2008 to 2009/2010	0.02	At least 0.50	Cape Town Makerere Nairobi	1.14 0.14 0.09

The empirical data for the following goals are, wherever possible, the latest available three-year averages derived from graphs in Ghana's institutional profile published on the CHET website. The relevant graphs are:

- Goal 1 Graph 4
- Goal 2 Graph 5 divided by Graph 1
- Goal 3 Graph 19
- Goal 4 Graph 20
- Goal 6 Graph 14
- Goal 7 Graph 23
- Goal 8 Graph 22

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 18 of Ghana's detailed profile on the CHET website. Table 20 shows that only one of Ghana's indicator scores met the targets related to the eight flagship goals. This was Goal 4 on the proportion of academic staff holding doctoral degrees. Points to note about the other seven goals in the academic core are these:

- Goal 1 on percentage of SET enrolments: Ghana's proportion of SET enrolments is about half of the target, and the lowest in the group of large universities with student enrolments above 20 000.
- Goal 2 on percentage of masters and doctoral enrolments: Ghana's proportion of enrolments is well below both the target and the indicator scores of two of the other three large universities.
- Goal 3 on student to academic staff ratios: Ghana's ratio does not meet the target, and is the least favourable ratio in the group of large universities.
- Goal 5 on research funding: Ghana and two of the other three large universities face serious under-funding problems.
- Goal 6 on the output of SET graduates: Ghana's output is well below the target, but is not out of line with those of the other large universities.
- Goals 7 and 8 on high-level knowledge outputs: Ghana's output rates are, like those of the two of the other three large universities, well below the target rates.

The main weaknesses in Ghana's academic core are its low proportions of SET enrolments, low SET graduation rate, low research funding, and low research outputs in the form of doctorates and publications.

Makerere University

Summary of the profile of Makerere University

This summary is an extract from the detailed institutional profile published on the CHET website. Makerere's student and staff profile covers most academic years in the ten-year period 2000/2001 to 2009/2010. Some graduate and research publication data were not available for the later years of 2008/2009 and 2009/2010.

- 1 Makerere's head count student enrolment reached a peak of 35 000 in 2005/2006, and then fell to 33 100 in 2009/2010. The largest drop was in postgraduate enrolments which fell from a 2005/2006 peak of 3 100 to 1 500 in 2009/2010. Undergraduates grew at an average annual rate of 2.5% over the ten-year period between 2000/2001 and 2009/2010.
- 2 Makerere's main growth occurred in the broad field of science and technology. The total of students enrolled for science and technology majors increased from 4 400 in 2000/2001 to 13 200 in 2009/2010. Their proportion of the total enrolment changed from 16% in 2000/2001 to 40% in 2009/2010. The total of students enrolled for humanities majors increased from 17 400 in 2000/2001 to 20 900 in 2002/2003, before falling to 16 500 in 2009/2010. Their proportion of the total enrolment fell from 65% in 2000/2001 to 40% in 2009/2010.
- 3 Substantial changes occurred in Makerere's masters enrolments over this period. Masters enrolments rose from 1 167 in 2000/2001 to a peak of 2 767 in 2006/2007, but then fell sharply to 1 470 in 2009/2010. Doctoral enrolments remained low during the period for which data were available. Makerere nevertheless remained a predominantly undergraduate university during the period 2000/2001 to 2009/2010. In 2009/2010 only 5% of its enrolments were in postgraduate degrees.
- 4 Makerere's total of graduates doubled from 5 359 in 2000/2001 to 11 523 in 2009/2010. This was an average annual increase of 8.9%, which was more than three times higher than the increase in enrolments. Makerere's output efficiency, by this measure, improved considerably over this period.
- 5 Masters graduates increased from 309 in 2000/2001 to 1 014 in 2009/2010; at an average annual rate of 14.1%. The output of doctoral graduates remained low over this period. A total of 249 doctoral graduates were produced over the ten-year period, compared to a total of 6 526 masters graduates
- 6 In 2006/2007 Makerere employed a total of 4 315 permanent staff members. These fell into two broad categories: 1 179 (27%) were academic staff members and the balance of 3 136 (73%) were administrative and service staff members.
- 7 Data analyses suggest that Makerere has had high drop out rates in some fields of study. The calculations indicate that more than 50% of students entering undergraduate programmes in business/management are likely to drop out without obtaining their qualifications. The drop out rate of entrants into science and technology programmes is likely to be 35%. The drop out rate in humanities programmes is lower at 25%.
- 8 In 2009/2010 Makerere employed a total of 3 795 permanent staff members. These fell into two broad categories: 1 182 (31%) were academic staff members and the balance of 2 613 (69%) were administrative and service staff members. Makerere's permanent staff total in all categories fell by 461 in 2009/2010 compared to 2000/2001. The decline occurred in the administrative/service category which dropped by 596 over the period (an average annual decline of 2.3%. The permanent academic staff total grew at an average annual rate of 1.4% over the period 2000/2001 to 2009/2010, compared to the average annual growth of 2.4% that occurred in student enrolments.

- 9 Makerere's FTE academic staff total exceeded its permanent staff total throughout the period 2000/2001 to 2009/2010. The average ratio of FTE to permanent academic staff over this period was 145%, which implies that Makerere was able to increase its available academic resources quite considerably through the use of temporary and/or part-time staff.
- 10 During the period 2006/2007 to 2009/2010, an average of only 31% of Makerere's permanent academic staff members held doctoral degrees. This is below the proportion of 50% which could be used as a benchmark for research-based universities.
- 11 The research output of Makerere's permanent academic staff members, measured in terms of research publications and doctoral graduates, has been low.
- 12 The main change which occurred in Makerere's funding over the period 2000/2001 to 2006/2007 was in its level of student fee income. The ratio of government funding to student fees was 63:37 in 2000/2001 and 41:59 in 2006/2007.

Reviewing the academic core of the Makerere University

Table 21 offers a review of Makerere's academic core using the indicators and targets contained in Table 15.

The empirical data for the following goals are, wherever possible, the latest available three-year averages derived from graphs in Makerere's institutional profile published on the CHET website. The relevant graphs are:

Goal 1	Graph 4
Goal 2	Graph 5 divided by Graph 1
Goal 3	Graph 19
Goal 4	Graph 20
Goal 6	Graph 14
Goal 7	Graph 23
Goal 8	Graph 22

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 18 of Makerere's detailed profile on the CHET website.

Table 21 shows that two of Makerere's indicator scores met the targets related to the eight flagship goals. These are Goal 3 on student to staff ratios, and Goal 6 on SET graduation rates. Makerere in fact had the best SET graduation of the group of four large universities.

Points to note about the other six goals in the academic core are these:

- Goal 1 on percentage of SET enrolments: Goal 1 on percentage of SET enrolments: Makerere's proportion of SET enrolments was, at 38%, close to the 40% target.
- Goal 2 on percentage of masters and doctoral enrolments: Makerere's proportion of enrolments was well below both the target and the indicator scores of two of the other three large universities.
- Goal 4 on percentage of staff with doctorates: Makerere's proportion is well below both the target and the indicator scores of the other three large universities.
- Goal 5 on research funding: Makerere and two of the other three large universities face serious under-funding problems.

- Goals 7 and 8 on high-level knowledge outputs: Makerere's output rates are, like those of the two of the other three large universities, well below the target rates.

Makerere's academic core has both strong weak and weak aspects. Its strengths are its favourable student to academic staff ratios, and its output of SET graduates. Its main weaknesses are the low percentage of masters and doctoral enrolments, low percentage of staff with doctorates, low research funding, and low research outputs in form of doctorates and publications

TABLE 21 Review of academic core of Makerere University

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments higher than 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2007/2008 to 2009/2010	38%	At least 40%	Cape Town Nairobi Ghana	41% 29% 23%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2007/2008 to 2009/2010	5%	At least 15%	Cape Town Nairobi Ghana	18% 16% 7%
Goal 3 Student to academic staff ratios average 2007/2008 to 2009/2010	17	Below 20	Nairobi Cape Town Ghana	14 15 29
Goal 4 Academic staff with doctoral degrees average 2007/2008 to 2009/2010	30%	At least 50%	Nairobi Cape Town Ghana	71% 58% 52%
Goal 5 Research funding per academic 2007 only	PPP\$4900	PPP\$20 000	Cape Town Ghana Nairobi	47 700 5 400 5 300
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2005/2006 to 2007/2008	20%	At least 20%	Cape Town Nairobi Ghana	20% 15% 14%
Goal 7 Doctoral graduates per permanent academic average 2007/2008 to 2009/2010	4%	At least 15%	Cape Town Nairobi Ghana	17% 1% 1%
Goal 8 Research publications per permanent academic average 2005/2006 to 2007/2008	0.14	At least 0.50	Cape Town Nairobi Ghana	1.14 0.09 0.02

University of Mauritius

Summary of the profile of the University of Mauritius

This summary is an extract from the detailed institutional profile published on the CHET website. Mauritius' student and staff profile covers most academic years in ten-year period 2000/2001 to 2009/2010. Some graduate and research publication data were not available for the later years of 2008/2009 and 2009/2010.

Some of the points to note Mauritius' profile are these:

- 1 Mauritius' head count student enrolment grew from 5 300 in 2000/2001 to 9 900 in 2009/2010. Its undergraduate enrolment grew at an average annual rate of 7.2% over the full period of 2000/2001 to 2009/2010. Postgraduate enrolments more than doubled between 2000/2001 and 2004/2005, but then levelled off. The average annual growth in postgraduate enrolments across the full ten-year period was 7.6%. The proportion of postgraduate students in Mauritius' enrolment rose from 9% in 2000/2001 to 16% in 2004/2005, but then dropped to 9% in 2009/2010. This was the result of a decrease that occurred in postgraduate enrolments over the period 2005/2006 to 2009/2010.
- 2 Mauritius' enrolment pattern changed over this ten-year period, because of its different growth rates by field of studies. Business/management majors grew at an average annual rate of 11.4%, humanities at an average annual rate of 7.4%, and science and technology majors of 5.2%. The share which business/management majors had of Mauritius' enrolment as a consequence rose from 24% in 2000/2001 to 33% in 2009/2010. The science and technology share fell from 51% to 42% in 2009/2010.
- 3 Mauritius' graduate total increased at an average annual rate of 7.0% between 2000/2001 and 2009/2010, which was close to the growth rate of 7.2% in head count enrolments. This showed that Mauritius was able to maintain its graduate output efficiency rate during a period of rapid enrolment growth. Mauritius' graduate totals grew in all three broad fields, and remained reasonably consistent, between 2000/2001 and 2009/2010. In 2009/2010 science and technology graduates had a 44% share of the graduate total, compared to 28% for business management and 28% for humanities.
- 4 Mauritius employed a total of 879 permanent staff members in 2009/2010. These fell into two broad categories: 225 (26%) were academic staff and the balance of 654 (74%) were administrative and service staff members. In 2000/2001 Mauritius employed 200 full-time equivalent academic staff (FTE) members. This total more than doubled to 411 in 2006/2007, but then dropped sharply after 2006/2007. The total in 2009/2010 was 136 (33% lower than the peak total of 411).
- 5 Between 2006/2007 and 2009/2010, an average of 45% of Mauritius' permanent academic staff members held doctoral degrees, which is below the proportion of 50% which could be used as a benchmark for research-based universities
- 6 The research output of Mauritius' permanent academic staff members, measured in terms of research publications and doctoral graduates, has been low.
- 7 The main changes which occurred in Mauritius' funding over the period 2000/2001 to 2006/2007 were in its levels of government funding and student fees. The share which government funding had of Mauritius' income fell from 77% in 2000/2001 to 67% in 2006/2007. The share of student fees rose from 17% to 27%, while that of private funding remained steady at around 6%.

Reviewing the academic core of the University of Mauritius

Table 22 offers a review of Mauritius' academic core using the indicators and targets contained in Table 15.

Table 22 Review of the academic core of the University of Mauritius

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments below 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2007/2008 to 2009/2010	43%	At least 40%	Eduardo Mondlane Dar es Salaam Botswana	49% 38% 22%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2007/2008 to 2009/2010	10%	At least 15%	Dar es Salaam Botswana Eduardo Mondlane	12% 8% 3%
Goal 3 Student to academic staff ratios average 2007/2008 to 2009/2010	24	Below 20	Eduardo Mondlane Dar es Salaam Botswana	11 15 15
Goal 4 Academic staff with doctoral degrees average 2007/2008 to 2009/2010	45%	At least 50%	Botswana Dar es Salaam Eduardo Mondlane	51% 50% 19%
Goal 5 Research funding per academic 2007 only	PPP\$3000	PPP\$20 000	Dar es Salaam Botswana Eduardo Mondlane	6 400 2 000 1 000
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2005/2006 to 2007/2008	26%	At least 20%	Dar es Salaam Botswana Eduardo Mondlane	22% 18% 8%
Goal 7 Doctoral graduates per permanent academic average 2005/2006 to 2007/2008	2%	At least 15%	Dar es Salaam Botswana Eduardo Mondlane	2% 1% 0%
Goal 8 Research publications per permanent academic average 2001 to 2007	0.13	At least 0.50	Botswana Dar es Salaam Eduardo Mondlane	0.13 0.07 0.03

The empirical data for the following goals were derived from graphs in Mauritius' institutional profile published on the CHET website:

- Goal 1: Graph 4
- Goal 2: Graph 5 divided by Graph 1
- Goal 3: Graph 19
- Goal 4: Graph 20
- Goal 6: Graph 14
- Goal 7: Graph 23
- Goal 8: Graph 22

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 18 of Mauritius' profile on the CHET website.

Table 22 shows that only two of Mauritius' indicator scores met the targets related to the eight flagship goals. These are Goal 1 on the proportion of SET enrolments, and Goal 6 on SET graduation rates. Mauritius' had the best SET graduation of the group of four small universities.

Points to note about the other six goals in the academic core are these:

- Goal 2 on percentage of masters and doctoral enrolments: Mauritius' proportion of enrolments was below both the target but was consistent with the indicator scores of two of the other three small universities.
- Goal 3 on student to academic staff ratios: Mauritius' ratio does not meet the target, compared to the other three small universities which had favourable student to staff ratios.
- Goal 4 on percentage of staff with doctorates: Mauritius' proportion is close to the target and is comparable to the indicator scores of two of the other three small universities.
- Goal 5 on research funding: Mauritius and two of the other three small universities face serious under-funding problems.
- Goals 7 and 8 on high-level knowledge outputs: Mauritius' output rates are, like those of the two of the other three large universities, well below the target rates.

Mauritius' academic core meets one of the flagship input goals and one of the output goals. Its main weaknesses are low research funding, and low research outputs in form of doctorates and publications.

University of Nairobi

Summary of the profile of the University of Nairobi

This summary is an extract from the detailed institutional profile published on the CHET website. The data in the profile cover the seven academic years 2000/1 to 2006/7. Data for later years were not available. Some of the points to note about this seven-year period are these:

- 1 Nairobi's head count student enrolment increased from 22 800 in 2000/2001 to 39 400 in 2006/2007; an average annual growth rate of 9.6%. Undergraduates grew at an average annual rate of 10.8%, and postgraduate enrolments at the lower rate of 6.1%. A consequence of this was that Nairobi's proportion of postgraduate students fell from 20% in 2000/2001 to 16% in 2006/2007.
- 2 Enrolments in humanities programmes grew at an average annual rate of 11.0% between 2000/2001 and 2006/2007. Because the growth rates in science and technology and business/management were lower at 8.6% and 8.1%, Nairobi's enrolment shape by field of study changed slightly over this period. The proportion of science and technology students fell from 33% in 2000/2001 to 31% in 2006/2007, and the proportion of business/management students from 21% to 20%. The proportion of enrolments in humanities rose from 45% to 49%.
- 3 Between 2000/2001 and 2006/2007, Nairobi's graduate growth rate was higher than its enrolment growth rate, which is an indication of improved output efficiency. Nairobi's average graduation rates do however indicate that it has high drop out rates in science and technology and humanities fields of study.
- 4 The proportions of Nairobi's graduates in the three broad fields of study changed only slightly over this period. The share which science and technology had of the graduate total rose from 38% in 2000/2001 to 40% in 2006/2007, and of business management majors from 15% to 17%. The share of humanities graduates fell from 47% to 43%, despite the large increase in this field's share of total enrolments.
- 5 In 2006/2007 Nairobi employed a total of 3 756 permanent staff members. These fell into two broad categories: 1 292 (34%) were academic staff members and the balance of 2 464 (66%) were administrative (including service) staff members.
- 6 Nairobi's total of full-time equivalent (FTE) academic staff grew from 1 304 in 2000/2001 to 1 363 in 2006/2007; an average annual increase of 0.6%. Because this did not match the increase of 7.7% in FTE student enrolments, Nairobi's ratios of FTE students to FTE academic staff rose over this period. Nairobi's ratio in the field of science and technology increased from 6:1 in 2000/2001 to 9:1 in 2006/2007, but would still be regarded as a satisfactory ratio by most universities. Its ratios of FTE students to FTE academic staff ratio in humanities fields increased from 20:1 to 31:1, and in business/management from 28:1 to 42:1. These ratios would both be regarded as unsatisfactory by many universities.
- 7 The research output of Nairobi's permanent academic staff members has been low. An appropriate benchmark for research output in a university is that each permanent academic staff member should produce at least one research article every two years. This benchmark implies that Nairobi's 1 292 permanent academic staff members should have produced 645 research articles in 2007/2008, rather than the actual total of 136.
- 8 The main change which occurred in Nairobi's funding over the period 2000/2001 to 2006/2007 was in its level of government funding. The share with government funding had of Nairobi's income rose from 82% in 2000/2001 to 86% in 2006/2007. The share of student fees fell from 11% to 8% over this period, and that of private funding from 7% to 6%.

Reviewing the academic core of the University of Nairobi

Table 23 offers a review of Nairobi's academic core using the indicators and targets contained in Table 15.

Table 23 Review of the academic core of the University of Nairobi

Goals and indicator averages	Indicator scores	Targets related to goals	Range of indicator scores: universities with enrolments higher than 20 000	
INPUT GOALS				
Goal 1 Enrolments in SET as % of total enrolment average 2007/2008 to 2009/2010	38%	At least 40%	Cape Town Nairobi Ghana	41% 29% 23%
Goal 2 Masters + doctors enrolments as % of total enrolment average 2007/2008 to 2009/2010	5%	At least 15%	Cape Town Nairobi Ghana	18% 16% 7%
Goal 3 Student to academic staff ratios average 2007/2008 to 2009/2010	17	Below 20	Nairobi Cape Town Ghana	14 15 29
Goal 4 Academic staff with doctoral degrees average 2007/2008 to 2009/2010	30%	At least 50%	Nairobi Cape Town Ghana	71% 58% 52%
Goal 5 Research funding per academic 2007 only	PPP\$4900	PPP\$20 000	Cape Town Ghana Nairobi	47 700 5 400 5 300
OUTPUT GOALS				
Goal 6 Graduation rates in undergraduate SET fields: average 2005/2006 to 2007/2008	20%	At least 20%	Cape Town Nairobi Ghana	20% 15% 14%
Goal 7 Doctoral graduates per permanent academic average 2007/2008 to 2009/2010	4%	At least 15%	Cape Town Nairobi Ghana	17% 1% 1%
Goal 8 Research publications per permanent academic average 2005/2006 to 2007/2008	0.14	At least 0.50	Cape Town Nairobi Ghana	1.14 0.09 0.02

The empirical data for the following goals are, wherever possible, the latest available three-year averages derived from graphs in Nairobi's institutional profile published on the CHET website. The relevant graphs are:

- Goal 1: Graph 4
- Goal 2: Graph 5 divided by Graph 1
- Goal 3: Graph 19
- Goal 4: Graph 20
- Goal 6: Graph 14
- Goal 7: Graph 13
- Goal 8: Graph 22

The data for Goal 5 on research funding per permanent academic were extracted from the HERANA profile of each university. HERANA had made estimates of the total of research funding available in each university in 2007, and had converted this to purchasing power parity USD (PPP\$). These totals were divided by the permanent academic staff totals for that year. These academic staff totals appear in Graph 18 of Nairobi's detailed profile on the CHET website

Table 23 shows that Nairobi met the targets of three of the input goals but none of the output goals. The data up to 2006/2007 suggest that Nairobi's crucial weaknesses are low research funding, low graduation rates in SET programmes, and low research outputs in form of doctorates and publications.

Cross-national assessment of the eight flagship universities

Tables 24 and 25 sum up the individual university reviews offered in Tables 16 to 23. The tables can be read as more than just summaries. Because a common data set and a common set of academic core goals have been used, the tables can be used to compare the input and output performances of eight flagship universities across national borders.

TABLE 24 Summary of reviews of academic core: universities where enrolment is greater than 20 000 students

	Cape Town	Ghana	Makerere	Nairobi
INPUT GOALS				
Goal 1: Enrolments in SET	Meets target	Below target & below other large universities	Close to target. & higher than two of other large universities	Below target, & below other three large universities
Goal 2: Masters + doctors enrolments	Meets target	Below target, & below other large universities	Below target, & well below two other large universities	Meets target
Goal 3: Student to academic staff ratios	Meets target	Below target, & below other large universities	Meets target	Meets target
Goal 4: Academic staff with doctoral degrees	Meets target	Meets target	Below target, & below other three large universities	Meets target
Goal 5: Research funding per academic	Meets target	Below target, but similar to two other large universities	Below target, but similar to two other large universities	Below target, but similar to two other large universities
OUTPUT GOALS				
Goal 6: Graduation rates in SET fields	Below target, but consistent with other three large universities	Below target, but consistent with other three large universities	Meets target	Below target, but consistent with other three large universities
Goal 7: Doctoral graduates per permanent academic	Meets target	Below target, but similar to two other large universities	Below target, but similar to two other large universities	Below target, but similar to two other large universities
Goal 8: Research publications: per permanent academic	Meets target	Below target, but similar to two other large universities	Below target, but similar to two other large universities	Below target, but similar to two other large universities

TABLE 25 Summary of reviews of academic core: universities where enrolment is less than 20 000 students

	Botswana	Dar es Salaam	Eduardo Mondlane	Mauritius
INPUT GOALS				
Goal 1: Enrolments in SET	Below target, and well below other three small universities	Below target, but consistent with two of other small universities	Meets target	Meets target
Goal 2: Masters + doctors enrolments	Below target, but consistent with two of other small universities	Below target, but higher than other three small universities	Below target, and below other three small universities	Below target, but consistent with two of other small universities
Goal 3: Student to academic staff ratios	Meets target	Meets target	Meets target	Does not meet target; has an unfavourable ratio
Goal 4: Academic staff with doctoral degrees	Meets target	Meets target	Meets target	Below target, but consistent with two of other small universities
Goal 5: Research funding per academic	Below target, but consistent with other three small universities	Below target, but consistent with other three small universities	Below target, but consistent with other three small universities	Below target, but consistent with other three small universities
OUTPUT GOALS				
Goal 6: Graduation rates in SET fields	Meets target	Meets target	Below target, but consistent with two of other small universities	Meets target
Goal 7: Doctoral graduates per permanent academic	Below target, but consistent with other three small universities	Below target, but consistent with other three small universities	Below target, but consistent with two of other small universities	Below target, but consistent with other three small universities
Goal 8: Research publications: per permanent academic	Below target, but consistent with other three small universities	Below target, but consistent with other three small universities	Below target, but consistent with two of other small universities	Below target, but consistent with other three small universities

Conclusion

Summing up

The Introduction gave the main objectives of this project as developing sets of efficiency indicators for higher education in African countries, and enhancing the ability of higher education planners to engage, both conceptually and technically, with efficiency indicators. The project's deliverables were to include (a) the organising of international seminars on cross-national performance indicators, (b) the preparation of frameworks for cross-national performance indicators and for the data needed to support these indicators, and (c) a publication on performance and efficiency indicators within an African context. The project has met, but not without some difficulties, all three of these objectives.

The discussion in this report will have shown that the project has raised a number of issues concerning the availability and the quality of higher education data across the eight selected African countries, and the linking of these data to common sets of higher education targets and goals.

CHET believes, despite these data problems, that the *Higher Education Research and Advocacy Network for Africa* (HERANA) project's notion of an academic core (see Chapter 2 on flagship university goals and the academic core) has permitted assessments to be made of the eight case study universities. These assessments will provide a basis for the further development of cross national performance indicators. This new work will emerge from the second phase of the HERANA project.

The HERANA project

After 2002 CHET began to accept that "transformation" is an elusive concept that was increasingly being used in South Africa as part of a political rhetoric designed more to discredit opponents and institutions than to develop progressive notions of change. This led CHET to start thinking more about higher education's contribution to development, which is also an elusive concept but one less loaded with what Karl Marx called "surplus" politics. From this change of course the two phases of the HERANA project emerged

In the first phase (HERANA 1), CHET developed a set of analytical propositions that included a three-pronged focus for the analysis of higher education data, namely: the existence of a pact on the role of universities in economic development; the nature and the strength of the academic core of the universities; and the connections (coordination) between the academic core and development. HERANA 1 developed indicators for all three of these key concepts of pact, academic core, and knowledge policy coordination. The analyses and conclusions of HERANA 1 were published in 2011 as *Universities and Economic Development in Africa*.

A new, second phase of HERANA will develop further the analyses and findings of the first phase. HERANA 2 will cover a wide range of higher education projects, which will include a project on information systems for higher education policy and management.

A basic assumption which will underpin the HERANA 2 information project is that the way in which a university organises information has implications for how it works as an institution. The new project will accept that information can serve different purposes, and that different information systems could be designed for securing different institutional goals and purposes. It will accept further that such goals could include maximising effective decision-making, maximising the democratic ideal of informing the public and the citizens, and maximising trust among actors in competitive markets. Trust in the quality of information and in the institutions generating information is obviously crucial for securing trust in government and democracy.

A major focus of HERANA 2's new information project will be on evidence-based planning and policy-making. It will take the notion of "evidence-based" to be part of a discourse or set of methods which is based on empirical information, and which informs the policy process rather than attempting to affect directly the eventual goals of policies.

Policy which is based on systematic evidence not only produces better outcomes, but also provides more opportunity for democratic participation. The literature provides two contrasting examples in this regard. The first is how Tanzania implemented a process of health service reform which was informed by the results of household disease surveys, and which ultimately contributed to a 40% reduction in infant mortality. The second is how the HIV/AIDS crisis deepened in a number of countries, particularly in South Africa, because governments ignored the evidence on both causes and treatment. In higher education, evidence-based policy-making and management could, for example, counter the tendency by new university vice-chancellors to proclaim that they are going to "put the institution in the top 100 universities in the world within five years" while the institution's doctoral and research outputs are declining, rather than increasing.

HERANA 1 showed that the management of information is an indicator of the degree of institutional coherence, or fragmentation, of the organisation. While in some cases fragmentation is the result of a shortage of trained staff or inappropriate technology, the biggest problem appears to be the lack of institutionalisation of data and procedures. Because institutionalisation is the basis for evidence-based policy and management, it is problematic when "once-off", and disconnected, data sets are used to influence decision-making.

Institutionalisation will, in the HERANA 2 context, refer to procedures, data and technology, and to the ways in which these procedures, data and technology are connected between different components of the institution; for example student admissions, registrations, and graduations. Often, institutions address one component of the process, such as a new information technology system or an imported information package, rather than all components in the system. It is the process of institutionalisation of information that needs to be addressed, with particular reference to developing comparable cross-country higher education data sets.

Capacity development in HERANA 2 will include the following components:

- A cross-national data framework will be developed. This will involve participants in the HERANA 2 network discussing the definitions and application of those data concepts which serve useful purposes in performance measurement, national and institutional planning, and in cross-national comparisons.
- Possible applications of a new data framework will be explored. This will involve determining how the various data concepts could be applied in different institutional contexts across different national borders.
- Consultations will be held on the construction of appropriate business plans for each university's management of data, including the use of data in institutional planning and performance measurement.
- Case studies will be prepared on the use of data for planning and policy development within each participating institution.

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 - University of Botswana (Botswana)
 - University of Cape Town (South Africa)
 - University of Dar es Salaam (Tanzania)
 - Eduardo Mondlane University (Mozambique)
 - University of Ghana (Ghana)
 - Makerere University (Uganda)
 - University of Mauritius (Mauritius)
 - University of Nairobi (Kenya)

