Strengthening knowledge production in universities:

Five South African case studies
Programme on Innovation, Higher Education and Research for Development
IHERD

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## Acronyms and abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tr>
<td>NMMU</td>
<td>Nelson Mandela University</td>
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<tr>
<td>TUT</td>
<td>Tshwane University of Technology</td>
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<tr>
<td>UCT</td>
<td>University of Cape Town</td>
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<tr>
<td>UFH</td>
<td>University of Fort Hare</td>
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<tr>
<td>UKZN</td>
<td>University of KwaZulu-Natal</td>
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Abstract

Internationally, there is growing consensus among national policymakers and other central socio-economic actors that universities are important drivers for economic growth and development. They contribute to the creation of a highly skilled and competent labour force, and also produce new knowledge. Properly equipped, universities can play an important role in creating the innovation and development that will support a national economy in a competitive world. However, how can this process be stimulated?

The OCED Programme on Innovation, Higher Education and Research for Development (IHERD) focused on a range of national and institutional policies and strategies to improve knowledge production. This study provides empirical and analytical information about institution specific strategies and practices that strengthen research management. This study could also be useful for capacity building in future research management training programmes.

This study\(^1\), which is part of a larger project on knowledge production in South African universities, examines a selected group of universities with different historical and institutional backgrounds that all have proven evidence of growth of high-level knowledge inputs and outputs. The selected universities represent three institutional categories used in South Africa’s higher education planning, including the traditional universities, the comprehensive universities, and the universities of technology.

Five universities have been selected from a total of 23 institutions in South Africa, including three traditional universities (University of Cape Town, University of KwaZulu-Natal and University of Fort Hare), one comprehensive university (Nelson Mandela Metropolitan University) and one university of technology (Tshwane University of Technology). The University of Cape Town is a historically white university and the University of Fort Hare is a historically black university. Neither of them was affected by mergers. In contrast, the other three institutions have all been restructured and merged as a result of the reform of South Africa’s higher education system.

The case studies which the universities submitted to the research team towards the end of 2012, as well as data from the South African Higher Education Management Information System (HEMIS) are the primary documents used to analyse the situation in the five universities.

A first major observation is that all of the institutions have become part of the global and national policy context of increasing knowledge production, as partially described at the Innovation, Higher Education and Research for Development (IHERD) group meeting in Marseille (July 2013).

The seven key functions of the research and management offices could be clustered into three broad categories: development, support and incentives. The development function deals, on the one hand, with policies that promote research culture and, on the other hand, with broader capacity building, such as further studies and academic advancement. Support is mainly concerned with specific skills, often legal and financial assistance for

\(^1\) This report is partially supported by Carnegie Corporation and Ford Foundation
commercialisation, grant applications and funds management among others. The functions focusing on direct incentives are predominantly output orientated, while indirect incentives are more oriented towards career development and high-status awards. Institutions focussed on different combinations of the three approaches to strengthen research output, based on their academic and managerial capacity.

The five selected institutions have all increased their research output over the last five years. They also mirror an international trend where the ‘managerial professional’ strata in universities has expanded and consolidated.
Introduction: Strengthening knowledge production

In the knowledge economy/society, universities have gained political and economic importance as institutions that produce and transfer knowledge. While it is certainly so that many other institutions form an important part of any national innovation landscape, universities are the only specialised institutions whose core business is the production, reproduction and dissemination of knowledge, including the education of the next knowledgeable – or suitably qualified – generation.

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

> Top research universities in industrialised countries (often referred to as the Super RUs) usually dominate the global ranking tables. In contrast, their counterparts in middle and low-income countries have, if anything, more important missions because they are the engines of local knowledge development and natural leaders of their own evolving academic systems. As these systems become increasingly complex and the need to nurture knowledge networks for research grows ever more essential, the success of these institutions becomes even more crucial for national development policy (2013: 18).

At the national level there are three critical aspects that affect the response of national states to globalisation and the need to have a globally competitive – or at least globally involved – economy. The first is the notion of a pact or agreement amongst key political, socio-economic and academic leaders that knowledge is an important driver of development. When such agreement starts emerging, a second issue is the need for national policies and strategies that enable the country to respond adequately. These will usually be a mixture of policies borrowing from international best practices and national, contextual factors. Thirdly, associated with the increased importance of higher education is the fact that more actors, including departments, become interested in higher education policymaking. This level of interest raises the need for coordinated knowledge policies (Braun 2008; Cloete et al. 2011).

In South Africa, the recent National Development Plan 2030 of the National Planning Commission (2012), the Green Paper of the Department of Higher Education and Training (2012) and the 2011 budget speech to Parliament by the Minister of Science and Technology all show significant policy shifts towards strengthening doctoral education and research capacity, albeit in an as yet uncoordinated manner. Although none of these are final policy documents, they are signals that originate from different departments in the national government and, as such, place pressure on South African (SA) higher education institutions to improve their research performance.
It is, however, not only government policies that pressurise higher education institutions to improve their research performance. Leathwood and Read describe the pressure on institutions and academics as follows:

*Research is a key purpose of higher education, and in a globalised and highly competitive knowledge-intensive world, it has become increasingly important to global, regional and national policy agendas. It is, therefore, now a high stakes activity for universities, with their positionality in national and global league tables largely dependent upon research achievements and reputations as reflected in citations, grants and awards. As a consequence, academics are also under ever greater pressure to perform to meet the demands of the new research economy (2013: 2).*

Institutional responses to global trends, government demands and market opportunities are a complex interaction between academic domain dynamics and leadership/managerial capacity (Muller et al. 2006). A higher education institution’s academic capacity consists of a range of factors: its number and proportion of academics with doctorates and research expertise, along with its ability to attract good undergraduate and postgraduate students, to engage business, communities and government in research and contract work, and to be a part of international academic/funding networks. A strong academic capacity enables a higher education institution to establish extensive links with the larger society, which potentially lead to an increase in and diversification of financial resources. In higher education, basic resources are not only financial, but are also human and reputational, with students, finance and high-potential academic staff following in response to reputation, research programmes and more funding (ibid.).

But strong academic capacity does not necessarily indicate institutional homogeneity or uniformity in strategy and style. On the one hand, management may develop a strong, unitary sense of purpose and use academic capacity to drive an enterprising agenda. More often, though, high academic capacity fosters diversity. In an institution with high academic capacity, the established culture – or the power of the academics with their extensive societal links – will often resist the imposition of a unified purpose, making the institution much less governable centrally while also setting up a fluctuating tension between leadership/management and the academic staff within their academic units (such as faculties, departments, schools, colleges and centres).

Strong managerial capacity demonstrates a number of factors, including the ability of professionalised leadership to respond legitimately to external pressures and marshal or steer internal dynamics. Institutions can be expected to embody a specific mix of academic and managerial capacity. Unlike industrial or commercial enterprises, where knowledge and decision-making are disseminated through a hierarchy of management and workers, administration is not the main source of expertise and decision-making within universities. Rather, administration and academic staff tend to have different roles, independent authority, low levels of standardisation and even different agendas. The term for the operational links within such a structure is 'loose coupling'. Internal loose coupling deals in part with the nature of the governance and coordination relationship between institutional leadership and the academic staff (ibid.).
Implementing change, including enhancing capacity building, does not simply involve introducing new structures and new positions. It involves a number of approaches to lever a change dynamic. The first is symbolic, being instances where policy/intention is part of the discourse or culture and does not have any tangible rewards. The second approach involves the establishment of rules or administrative requirements which demand conformity; and the third approach requires the setting up of structures or processes that will enhance or support change in the expected direction. The fourth approach involves the use of rewards that may either be intangible, such as promotion or improvement in status or tangible, such as conference or research monies which constitute an indirect reward. The fifth approach provides for direct monetary reward (Meek et al. 2010).

In the sections which follow, the responses of a group of SA public universities to pressures on their production of high-level knowledge are outlined and analysed. These analyses are placed in the context raised in this introductory section, as well as the universities’ organisational histories, structures and activities.

**Selecting the SA case studies**

Two main conditions were applied in the selection of universities for these five case studies. The first was that there should be evidence of growth in the high-level knowledge inputs and outputs of each university, and in particular in those which do not appear in the top cluster of the country’s high-level knowledge producers. The second was that a spread of institutions with different histories should be selected in order to take account of the three institutional categories used in higher education planning in South Africa.

South Africa’s 2001 *National Plan for Higher Education* (Ministry of Education, 2001) took universities and technikons to be two distinct categories within higher education institutions. These categories were expanded to three after the conclusion of the 2004-2005 merger processes, which reduced South Africa’s total of 36 public higher education institutions to 23. The three categories of higher education institution which are currently recognised for national planning purposes are (a) universities, defined as institutions offering primarily and mainly university-type academic programmes; (b) comprehensive universities, which offer a mix of technikon-type and university-type academic programmes; and (c) universities of technology, defined as institutions offering primarily and mainly technikon-type academic programmes.

The institutions selected were made up of:

- Three universities: University of Cape Town (UCT), University of KwaZulu-Natal (UKZN) and University of Fort Hare (UFH)
- One comprehensive university: Nelson Mandela Metropolitan University (NMMU); and
- One university of technology: Tshwane University of Technology (TUT).
This list includes one historically white university (UCT) and one historically black university (UFH), both of which were not affected by mergers. UKZN was created by a merger between a historically white and a historically black university, and NMMU was a merger of a historically white university with a historically white technikon. TUT and UKZN are large institutions, with headcount student enrolments in 2011 of 50 000 and 42 000 respectively. NMMU, with a 2011 headcount student enrolment of 26 000, and UCT, with a 2011 enrolment of 25 000, are medium-sized institutions. UFH is a small institution with a 2011 headcount enrolment of 11 000 (DHET 2012).

Figure 1 offers a brief picture of the growth that has occurred in the research publication and doctoral graduate outputs of the five universities. The growth rates reflected here exceeded those in the public system as a whole. The five universities were responsible for 33% of the total growth that occurred in research articles between 2007 and 2011 in South Africa, and for 78% of the growth in doctoral graduates in South Africa.

![Figure 1: Growth in research articles and doctoral graduates, 2007–2011](source: DHET (2012))

**Analysing the case studies**

**Institutional reports**

The primary documents used to analyse the situation in the five universities were the case study reports which the universities submitted to the research team towards the end of 2012. Appendix 1 contains a list of the institutional contacts and the case study authors at all five universities.

The five selected universities were asked to nominate two senior members of their staff who were involved with research management. The constituted group comprised mainly deputy vice-chancellors and directors of research development and management. Three workshops were held with this group, taking place in November 2011 (East London),
February 2012 (Pretoria) and September 2012 (Cape Town). At the first meeting, an account of the information required was discussed; this was re-discussed and finalised at the second meeting; and at the final meeting, written case studies were presented by authors. Additional information was collected from the authors during subsequent follow-ups. Case study authors wrote reports averaging 10 000 words and covering the following areas:

- The university’s research vision and mission, and research strategic plan;
- Its policies on the initiation, coordination and production of research;
- Its main research focus points, and how these were determined or selected;
- The direct and indirect rewards used by the university as levers in the implementation of knowledge production policies;
- The staffing and functioning of the university’s overall research organisation and management; and
- The funding of its research activities, including the distribution of research funds controlled by its council, processing of applications to government and other research agencies, and approving of external research contracts.

Full reports for the five case studies will, with the permission of authors and universities, be placed on the CHET website. The participants and authors of the case studies are listed in Appendix 1.

**University of Cape Town (UCT)**

*Enrolments and high-level knowledge performance*

UCT is classified as a university. In 2011, it had a headcount enrolment total of 25 300 students, of whom 69% were enrolled for undergraduate qualifications, 11% for postgraduate qualifications below masters level and 20% for masters and doctoral degrees.

Table 1 summarises UCT’s high-level knowledge input and output profile. This profile follows the OECD in taking a university’s high-level knowledge inputs to be doctoral enrolments and academic staff, and its high-level knowledge outputs to be doctoral graduates and research publications.

*Table 1: High-level knowledge inputs and outputs of UCT, 2007–2011*

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<td><strong>Inputs</strong></td>
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<tr>
<td>Doctoral enrolments</td>
<td>1 002</td>
<td>1 068</td>
<td>1 226</td>
<td>224</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22%</td>
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<tr>
<td>Permanent academic staff</td>
<td>889</td>
<td>965</td>
<td>1 055</td>
<td>166</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>19%</td>
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<tr>
<td>Permanent academics with doctorates</td>
<td>518 (58%)</td>
<td>549 (57%)</td>
<td>667 (63%)</td>
<td>149 (29%)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Outputs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research articles</td>
<td>915</td>
<td>1 038</td>
<td>1 124</td>
<td>209</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23%</td>
</tr>
<tr>
<td>Doctoral graduates</td>
<td>178</td>
<td>160</td>
<td>182</td>
<td>4</td>
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<td></td>
<td></td>
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<td>2%</td>
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Source: DHET (2012)
The table shows that UCT’s high-level knowledge inputs have been strong. Its doctoral enrolments were on average 10% of the total doctoral enrolments in the public higher education system. By 2011, it had a higher proportion of permanent academics with doctorates than any other of the public universities in South Africa. Its ratio of doctoral enrolments to total permanent academic staff over this five-year period was approximately 1:1, which reflects a strong academic staff commitment to doctoral programmes. Its ratio of doctoral enrolments to total permanent academic staff with doctorates over the period was approximately 2:1, which is an indication of a high level of engagement of qualified doctoral supervisors in research supervision.

UCT’s high-level knowledge output performance has been one of the strongest in the public university system in South Africa. In 2011, UCT had 2.7% of the public university system’s total student enrolment, and 6.2% of its permanent academic staff. From this base, it produced 12.5% of the public higher education system’s doctoral graduates and 11.4% of its research articles in 2011.

Indicators based on ratios of high-level knowledge outputs to permanent academic staff reinforce this picture of research strength:

- UCT’s ratio for 2011 of research publications to total permanent academics was 1.07 compared to a target ratio of 1.0 which has been used in national performance assessments. Over the same period, the national average was 0.55.
- Its ratio for 2011 of doctoral graduates to total permanent academics was 0.17 compared to a proposed target ratio of 0.15. The proposed target is based on the assumption that permanent academics should, on average, produce one doctoral graduate every seven years.

Context for analyses of key aspects

The context for UCT can be summed up as follows:

- UCT’s level of professional administration is high and it offers high levels of professional support to academics and to executive managers. Its ratio of academic executive/management professionals is high, which implies that it emphasises academic rather than executive/management posts.
- UCT’s academic capacity is also high. High proportions of its permanent academic staff hold senior ranks of professor, associate professor and senior lecturer, and proportions of the academic staff at all levels hold doctorates.
- UCT’s high-level knowledge output performance is strong. It produces research publications and doctoral graduates at levels above the national averages for universities and above targets based on national output policies.

Specific aspects of UCT’s case study report will now be discussed within this contextual framework.
Research organisation and management

UCT's organisation and management of research operate at both central and faculty board levels. Each faculty board has its own research committee, and is encouraged to develop a faculty-specific research strategy. Central committee structures include a university research committee, a board for graduate studies, a postgraduate funding committee and a range of committees that distribute research funds on a competitive, proposal-driven basis.

At a central administrative level, the organisation and management of research is driven by the Department of Research and Innovation. The flow chart depicted in Figure 2 summarises the structures and reporting lines of this department.

Figure 2: Structure and reporting lines of UCT's Department of Research and Innovation

UCT's case study document describes the responsibilities of the units in Figure 2 as follows:

- Research Office: The functions of this unit include developing research capacity and running research development programmes, accrediting and evaluating the university's research groupings, tracking the university's publication count, building proposals, forging new and strategic partnerships, expanding access to
national and international grants, and facilitating the university's engagement with global rankings.

- **Postgraduate Studies:** The recruitment and registration of doctoral students is a responsibility of academic departments and faculties, along with a central doctoral degrees board. This unit provides a broad-based support service to doctoral students and postdoctoral research fellows, including the administration of financial support. Included in the category of financial support are funding programmes which enable doctoral students to present their work at local and international conferences and to conduct research at collaborating international institutions.

- **Research Contracts and Intellectual Property Services:** This unit supports researchers who wish to engage in partnerships with industry, other higher education institutions, and national and international governmental or intergovernmental entities. These partnerships range from grants, service contracts, collaborative research agreements, material transfer agreements and clinical trial agreements to major research consortia. The unit also provides administrative and legal support to researchers who have inventions which need to go through patent processes.

The staffing data in Table 2 shows that, in 2011, UCT had a total of 48 staff members in its Department of Research and Innovation. If the directors of the three offices within the Department are not classified at executive/management level (which they should not be), then UCT's 48 posts can be split across three HEMIS categories. These classifications have been based on descriptions of staff establishments, rather than from UCT's HEMIS data.

Table 2 offers a summary of the staff classification across UCT’s research management.

<table>
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<th>Classification</th>
<th>Number</th>
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<tr>
<td>Executive/management professionals</td>
<td>2</td>
</tr>
<tr>
<td>Support professionals</td>
<td>26</td>
</tr>
<tr>
<td>Non-professional administrators</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>48</strong></td>
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</table>

The data in Table 2 show that only two out of 28 (or 7%) of the professional staff in UCT's Department of Research and Innovation could be classified as executive/management staff, with the balance of 26 providing professional support to UCT’s active and new researchers. This division between the two categories of administrative professionals is consistent with UCT’s overall management structure, which as was seen earlier, emphasises professional support rather than executive/management.

Additional data and ratios can be used to illustrate the extent and strength of UCT's administrative support for research and innovation:

- In 2011, UCT had an enrolment of 1,200 full-time and part-time doctoral students. Even though responsibility for their academic activities rested primarily with academic faculties and departments and supervisors, a total of 12 staff
members (professional and non-professional) were available to support these doctoral students.

- In 2011, UCT had a total of 1,055 permanent academics. If it had retained this total through to 2012, the ratio of permanent academics to total staff (professional and non-professional) in the Department of Research and Innovation would have been 22:1, while the ratio of permanent academics to professional staff in the research administration would have been 38:1.

The conclusion which must be drawn is that the professional staffing capacity of UCT’s research organisation is high.

**Research policies and implementation strategies**

UCT’s case study document says that it did not have any explicit research policies before 1996, which was the year in which major changes to South Africa’s higher education policies were under discussion. In 1996, UCT adopted a set of research policies when it became clear that universities would be expected, in a post-apartheid South Africa, to contribute to the resolution of national social and economic problems. UCT’s explicit research policy became that of acknowledging all four types of research that were categorised in the report of the 1995 National Commission on Higher Education (traditional, applications-driven, strategic and participation-based) (NCHE 1995), and of accepting that it should be involved in and disseminate all these forms of research.

UCT’s implementation strategies evolved over time to include the following:

- Recognising signature themes for research: The signature themes provide a framework for multi-, inter- and trans-disciplinary research to be done on an interdepartmental and inter-faculty basis. The themes are grounded in existing areas of excellence while being aligned to institutional, regional and national priorities.
- Engaging with the national centres of excellence programme: UCT also participates in the National Research Foundation’s national centres of excellence programme. It has been responsible for six national centres since 2004.
- Engaging with the research chairs initiative: UCT participates actively in the National Research Foundation’s research chairs initiative. UCT had been awarded 35 research chairs by 2012.
- Establishing research groupings: A total of 68 formally constituted units, centres and institutes have been accredited by the university’s central research committee. These research groupings are peer-reviewed every five years, after which their status is withdrawn or renewed for a further cycle, or an improvement plan is put in place.
- Fostering international links and collaboration: These programmes are designed to help academics to insert themselves into international networks that enable exchanges and foster collaboration. UCT’s support for conference travel has grown at approximately double the rate of inflation over the past five years. It has furthermore joined the World Universities Network, which has a particular focus on junior academic exchange and the fostering of early-career staff.
- Developing research capacity: UCT has adopted programmes which engage retired or current senior scholars with strong research and supervision track records to build research capacity among academics who are not yet established researchers. The programmes offer seminars, workshops and individual mentoring which enable senior scholars to assist young academics to plan their research activities, to complete their own doctoral degrees and to produce accredited publications.

- Next generation of academics programme: UCT coordinates the next generation of academics programme, which is funded by the Carnegie Corporation of New York. The programme’s aim is to produce new (particularly black and female) academics in the fields of economics, civil engineering and infectious diseases through the provision of doctoral bursaries, postdoctoral fellowships and the development of postgraduate training hubs. UCT is cooperating in this programme with the University of the Witwatersrand, the University of Ghana and Makerere University.

UCT's research implementation strategies, listed above are what could be expected of a SA university which has strong management and academic capacities. The national engagements summarised in (1) to (3) and the inward engagements in (4) and (5), both require strong groups of research leaders and strong support from professional staff in the research administration. The research development focus in (6) and (7) requires strong professional support, as well as inflows of doctoral graduates and junior, but well-qualified academic staff.

Research funding

The implementation of the research policies and strategies above requires substantial research funding. The funds available to UCT in 2010, which do not include amounts used for academic staffing costs or the staffing costs of the Department of Research and Innovation, are summed up in Table 3.

This direct research-related income total of $ 89 million does not include the $ 11.2 million in government subsidies which UCT earned from doctoral and research masters graduates and which was absorbed into its general operating budget. The total of $ 89 million was 28% of UCT’s total 2010 income of $ 322 million from all sources.

UCT’s research funding total of $ 89 million can be related in a straightforward way to its academic staff complement: in 2010, the total research income per permanent academic (using the 2010 staff total) was $ 92 600. This is considerably higher than the income ratios of the other four case studies covered in this report.
Research incentives for academic staff members

UCT says in its case study brief that no direct rewards are provided for research produced, and no portion of the government subsidy earned through research publications is returned directly to individual authors. UCT also does not have incentives in place to encourage staff to recruit and supervise doctoral students. Given its overall research performance and the levels of research funding available, this response to indirect incentives is not surprising. The details in Table 3 show that, in 2010, at least 77% of UCT’s research funds were raised either by individual academic researchers or by groups of researchers. These funds were external contracts of $45 million, NRF grants of $17 million and private sector grants of $6.2 million.

UCT does have in place mechanisms designed to encourage research activity, but these vary across faculties and also change over time. As was indicated earlier, a portion of the university’s total government research output funding is allocated to faculty research committees in direct relation to their shares of research outputs for that year. The faculty research committees are encouraged to distribute these funds in ways that would incentivise research activities. In some faculties, researchers who have produced peer-reviewed publications are invited to apply for modest grants through a proposal-driven process. These grants are relatively small and amounts could be considered mainly as tokens. Rather than direct financial incentives, UCT prefers to talk about ‘levers and rewards’.

The main incentive for academic staff at UCT to engage in research activities is policy that makes research outputs important elements in annual academic staff-appraisal processes. Decisions on both promotion and salary increments are based on research-performance assessments of individual staff members. UCT makes numerous references to a research culture and describes how the two most successful faculties, medicine and science

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2 All financial amounts in this report have been converted from South African Rands (ZAR) to US Dollars ($) using a rate of ZAR 10.00 = US$ 1.00.
(responsible for 80% of accredited publications), have developed around particular disciplines and have a strong focus on international publications and collaboration.

**Summing up of UCT case study**

UCT was classified earlier as an institution with high management and academic capacity. The analyses in this section have showed that the capacity of its research administration in terms of both total and professional staff is high.

The analyses showed further that UCT’s approach focuses strongly on building academic capacity and developing new researchers, as well as on support for strong researchers. Its incentives tend to be indirect and to be orientated towards strengthening and rewarding an existing culture of high-level knowledge production.

Because of the strength of its overall research performance, UCT is able to respect the independence of researchers. Its case study report indicates that, although it does have centrally driven knowledge-production policies, entities within the university are strongly encouraged to exercise autonomy in formulating policies that fit their own needs. It is widely accepted within the university that there is no one-size-fits-all solution to addressing the challenge of knowledge production.

The UCT report also seems to be keenly aware of the need to avoid strong central managerial control of research, with its accompanying loss of academic authority. UCT says that many research activities and polices have been devolved to faculty level in order to reduce the notion of a central managerial control. UCT nevertheless does have a strong, professional research administration base. These UCT commitments to a devolved system of research control and authority and to a strong research administration are not contradictory. As was seen in the discussion of Table 2, a primary function of the central research administration is that of providing professional support to UCT’s research activities.

A final point to note is that UCT is an example of a university which places heavy emphasis on research projects driven by individual and groups of academics but which, at the same time, makes provision for national and/or institutional research projects. It is able to do this because its academic capacity, overall management capacity and research management capacity are all high.

**University of KwaZulu-Natal (UKZN)**

**Enrolments and high-level knowledge performance**

UKZN is classified as a university. In 2011, it had a headcount enrolment total of 41 800 students, of whom 80% were enrolled for undergraduate qualifications, 7% for postgraduate qualifications below masters level and 13% for masters and doctoral degrees
Table 4 summarises UKZN’s high-level knowledge input and output profile. This profile follows the OECD in taking a university’s high-level knowledge inputs to be doctoral enrolments and academic staff, and its high-level knowledge outputs to be doctoral graduates and research publications.

### Table 4: High-level knowledge inputs and outputs of UKZN, 2007–2011

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<tr>
<td><strong>Inputs</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Doctoral enrolments</td>
<td>1117</td>
<td>1141</td>
<td>1286</td>
<td>169</td>
</tr>
<tr>
<td>Permanent academic staff</td>
<td>1531</td>
<td>1452</td>
<td>1470</td>
<td>-61</td>
</tr>
<tr>
<td>Permanent academics with doctorates</td>
<td>466 (30%)</td>
<td>552 (38%)</td>
<td>606 (41%)</td>
<td>140</td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research articles</td>
<td>794</td>
<td>1 034</td>
<td>1 152</td>
<td>358</td>
</tr>
<tr>
<td>Doctoral graduates</td>
<td>106</td>
<td>159</td>
<td>154</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: DHET (2012)

UKZN’s research inputs are not as strong as those of UCT. Its main input weakness concerns the number and proportions of staff with doctoral degrees. The data show that, even though its total of staff with doctorates increased from 466 in 2007 to 606 in 2011, UKZN’s 2011 proportion of permanent academic staff with doctorates – who would be expected to be its research leaders – was only 41% compared to the UCT proportion of 63%.

It should, however, be noted that UKZN’s input ratios of doctoral enrolments to permanent academics show that it had a strong commitment to doctoral programmes. Its ratio of doctoral enrolments to total permanent academic staff over the five-year period 2007-2011 was approximately 0.8:1, compared to UCT’s ratio of 1:1. UKZN’s ratio of doctoral enrolments to total permanent academic staff with doctorates over the period was approximately 2.2:1, which was higher than UCT’s 2:1 ratio, and which is an indication of a high level of engagement of qualified doctoral supervisors in research supervision at UKZN.

UKZN’s research article total in 2011 was slightly higher than that of UCT in the same year (1 152 compared to 1 124), but indicators based on ratios of high-level knowledge outputs to permanent academic staff suggest that its research performance was slightly lower than that of UCT. This can be seen below:

- **UKZN** employed 1 470 permanent academics in 2011 and produced 1 152 research articles in that year, at a ratio of 0.8 articles per academic. UCT’s 1 055 permanent academics produced 1 124 research articles in 2011 at a ratio of 1.1 articles per academic.
- **UKZN’s** permanent academics produced 154 doctoral graduates in 2011, at a ratio of 0.10 graduates per academic. UCT’s permanent academics produced 182 doctoral graduates at a ratio of 0.17 graduates per academic. Problems clearly exist with UKZN’s outflow of doctoral graduates.
Context for analyses of key aspects

The context at UKZN can be summed up as follows:

- UKZN’s overall level of professional administration is low and it offers low levels of professional support to academics, as well as to executive managers. Its ratio of academic executive/management professionals is high, which implies that it emphasises academic over executive/management posts.
- UKZN’s academic capacity should be graded as falling between low and high. In 2011, only 41% of its permanent academics held doctoral degrees and only 40% held the rank of professor, associate professor or senior lecturer.
- In terms of the numbers of outputs produced, UKZN’s high-level knowledge output performance can be rated high. The output ratios to permanent academic staff, and particularly of doctoral graduates, are, however, below the levels set by UCT, which is regarded as the top research university in South Africa.

Specific aspects of UKZN’s case study report will now be discussed within this contextual framework.

Research organisation and management

Figure 3 shows that UKZN’s research organisation is far more complex than that of UCT. One reason is that UKZN, unlike UCT, is spread over five campuses and two metropolitan complexes. UCT also has a number of campuses, but these are located in one city within a radius of, at most, ten kilometres from the main campus. The UKZN case study brief says that a second reason for its complexity is that the research organisation has had to be mapped onto the university's reorganised academic structure.
A major feature of UKZN’s reorganisation has been that the traditional South African academic structure of faculty boards and academic departments has been replaced by a new structure consisting of four colleges and nineteen schools. In the new structure, responsibility and decision-making is devolved to the colleges, which are each headed by a Deputy Vice Chancellor. Each Deputy Vice Chancellor is supported by a College Dean of Research and a College Dean of Teaching and Learning. Each school has a head who is supported by one academic leader for research and another for teaching and learning. The work of the College Dean of Research is supported by staff within the college.

The case study report says that, even though UKZN devolved research responsibilities to colleges and College Deans of Research, it decided, because of the size of the university, to continue to entrust overall research leadership to the Deputy Vice Chancellor (Research), supported by the University Dean of Research and by the Central Research Office. Furthermore, UKZN decided to keep the post of University Dean of Research at the level of full professor rather than to change it to one at administrative director level.

Research policy development and strategy implementation are driven through the Research Strategy Group, which is chaired by the Deputy Vice Chancellor (Research). The
four College Deans of Research and the University Dean of Research are members of the Research Strategy Group. The case study brief adds that the central research office is the primary driver for the implementation of strategic and operational aspects of the university’s research strategy. For this reason, certain clusters have remained in the central office and report to the University Dean of Research. These include the university ethics clusters, which include bio-medical research ethics, human and social sciences and animal ethics.

The UKZN case study says that its research contracts division has been moved out of the central research office and is now based in its legal and contracts department, which is in the office of the Registrar. Responsibility for intellectual property matters and for the financial management of research grants has remained in the central research office.

UKZN did not give detailed information on the total number of staff it employs across all parts of its research structure. It did, however, include a short table giving a summary of staff costs in its central research office. These amounted to $ 1.4 million in 2012, which should have been sufficient to employ two research executive/management professionals, approximately ten research support professionals and 12 non-professional research administrators. Although no account has been offered of research staff costs in the decentralised college structures, it can be assumed that the colleges had, between them, four research executive/managers (in the form of their Deans of Research), and possibly six research support professionals and eight non-professional research administrators. These assumptions would give UKZN’s research organisation a total of six executive/management professionals, 16 support professionals and 20 non-professional research administrators.

Some important points to note about the calculations above are the following:

- These figures reflect a high investment by UKZN in its research organisation and management. One indication of this is that the research organisation’s spread across the staffing categories represents a considerably higher level of administrative professionalisation than is evident in UKZN’s overall staffing structure. This overall level of administrative professionalization is rated as low.

- A further point to note is that, given that the servicing of research contracts is not part of its research management, the total of 42 professional and non-professional staff in the research organisation (as calculated above) would be comparable to that of UCT. The ratio of permanent academic staff to research administrative staff would, however, be higher than that of UCT. The 2011 UKZN ratio would probably be around 30 academics per research administrator compared to UCT’s ratio of 22:1. Its ratio of permanent academics to professional staff in the research organisation would be 1470/26 = 57, which is less favourable than the UCT ratio of 38:1.

A conclusion which can be drawn is that the capacity of UKZN’s research administration cannot be rated high. Its rating would be high/low, being somewhere between a high and a low rating. 
UKZN’s case study document says that the university has set itself the following goals: African-led globalisation, responsible community engagement, pre-eminence in research, excellent teaching and learning, being an institution of choice for learners, being an institution of choice for staff and effective management. The document then moves on to discuss five ways in which UKZN is implementing these goals.

- **Research focus areas:** UKZN has identified nine research focus areas which it believes are globally relevant, yet locally responsive, and which would support its vision to be a notable centre of African scholarship in South Africa. The focus areas include agriculture and food security, biotechnology, energy and technology for sustainable development, gender, race and identity studies, HIV/AIDS, tuberculosis and health promotion, and indigenous African knowledge systems.

- **South African research chairs initiative:** UKZN participates fully in this initiative of the National Research Foundation. The interrelated objectives of the initiative include advancing the frontiers of knowledge through focused research in identified fields, stimulating and coordinating the work of other researchers, supervising postgraduate students and postdoctoral researchers, providing a critical focus for the development of excellence in ideas and capacity, and promoting gender and racial equity in the scientific community. In 2011, UKZN had eight research chairs, and was awarded a further three in 2012.

- **Research centres and institutes:** UKZN takes research centres to be crucial to the building of existing and new research focus areas, and to producing research outputs. It requires these research centres to generate their own operating income, but does provide the infrastructure required. Research groupings have to satisfy rigorous procedures and conditions before being awarded centre status.

- **Research capacity development:** UKZN’s Directorate of Research assumes that, in addition to the existing knowledge producers, a new generation has to be developed and supported. For this purpose, an array of workshops and skills-training exercises are in place: professional training for doctoral supervisors, writing workshops, research costing, training on how to get an article published, and workshops explaining national polices and how to use the university’s data management system. UKZN also believes that it was the first university in South Africa to invest considerable funds in pre-doctoral training for staff. The six modules in the pre-doctoral training programme include literature reviews, data collection and analysis. Supervisors participate in some of the modules. An explicit focus in the pre-doctoral training programme is gender. The Women in Research Academy assists women to publish and provides career development support. The Academy also identifies women with special potential/skills and nominates them for awards and special grants.

- **The PhD project:** The Vice Chancellor has a special project to increase the number of academic staff members with doctorates. Staff members without a doctorate have to register for a PhD, and targets are set which are linked to performance.

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3 The Vice Chancellor was a prominent member of the National Planning Commission (NDP, 2012) which recommended that in order to improve quality in the SA higher education system, the proportion of staff with doctorates have to be raised from around 35% to 70%.
evaluations. In addition to fee remissions, staff can also apply for a doctoral grant of $3 000 for research work. Participants have to sign a collegial contract that commits them to a completion contract, with negative financial implications if they do not complete their doctorates.

**Research funding**

UKZN’s 2010 research income and its sources are summed up in Table 5.

**Table 5: UKZN research income, 2010**

<table>
<thead>
<tr>
<th>Source of Funding</th>
<th>$ m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government subsidy for research development</td>
<td>1.2</td>
</tr>
<tr>
<td>Private sector research contracts and grants</td>
<td>74.5</td>
</tr>
<tr>
<td>National Research Foundation grants</td>
<td>5.4</td>
</tr>
<tr>
<td>Other government-related grants</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Total research-related income</strong></td>
<td><strong>81.9</strong></td>
</tr>
</tbody>
</table>

This research-income total of $81.9 million quoted in the table appears to exclude the $26.6 million in government subsidies which UKZN’s research publications and doctoral and research masters graduates would have earned in 2010. The total of $81.9 million reflected in the table was 27% of UKZN’s total 2010 income of $301 million from all sources. This was close to UCT’s 2010 figures of research funding, and represents 28% of UKZN’s total income from all sources of $322.1 million.

UKZN’s 2010 research total of $81.9 million can be related to its permanent academic staff as follows: in 2010, the total research income per permanent academic (using the 2010 staff total) was $58 400. Because it employed fewer permanent academic staff, UCT’s ratio of research funds per permanent academic was 58% higher at $92 600.

**Research incentives for academic staff members**

UKZN has in place a complex set of direct and indirect incentives for members of the academic staff, the implementation of which would require high levels of administrative support. The analyses of its research organisation and management suggest that it has these required levels in place, particularly as far as administrative professionals are concerned.

UKZN’s case study report claims that the university has in place ‘one of the most “lucrative” schemes to incentivise publications’. In addition, UKZN claims to have one of the most comprehensive schemes to steer the strengthening of research. It starts with support for research masters and doctoral students who get a full (100%) remission of fees. This is followed by an active campaign to recruit postdoctoral fellows from the African continent. The annual tax-free amount set for these fellowships is $20 000. As an additional stimulus, a special postdoctoral edition was created of the publication *Research Voices*, which publishes accessible reports for the public, based on accredited research journal articles.
In terms of direct publication incentives, the central research office allocates to each college amounts based on the proportion of the total research output which they produced. These funds can be used by colleges for activities such as supporting academics to attend conferences. In addition, an academic receives $2,400 for a single authored article in an accredited journal. UKZN also has direct incentives in place for the publication of books, chapters in books, conference proceedings and creative awards.

UKZN’s incentive scheme includes rewards for the successful supervision of masters and doctoral graduates. The incentive scheme also rewards academic staff members who successfully complete their doctoral degrees. A further, more indirect, incentive is that the top 30 published academics are recognised in the university’s annual research report (only research journal articles are counted). They attend an annual awards function and also receive monetary awards.

**Summing up of UKZN case study**

UKZN is a new institution which was created through the merger of the University of Durban-Westville and the University of Natal. The case study report presents a post-merger picture of a drastic management and governance restructuring, and of the introduction of a wide range of new policies and programmes which are probably the most far-reaching in the SA higher education context. The research-strengthening organisation and structure cover the full spectrum of development, support and incentives. The policy that requires academic staff members without a PhD to enrol for a doctorate and that links their progress to their staff performance assessments is probably unprecedented in South Africa.

The case study authors describe UKZN’s general approach as ‘proactive engagement with the context … with a view to subverting it in the long term’. The aim of this approach is to engage with the institutional context while introducing changes (reforms) that set off further reforms, ‘leading ultimately to changing where power is located (creating a new structured balance of power) and eventually transforming the context (system)’. The argument is made that this response promotes a ‘progressive agenda and, while not all the consequences of the engagement are positive, it is better than not responding’.

The case study also argues that there is a difference between corporate cultures and a managerial agenda, and that the underlying assumption is to pluralise power. An example of this can be seen in the college-based Research Deans and staff. In this dispersed power system, there can be checks and balances in which authoritarian tendencies can contain progressive changes. From the case study description, it seems the reforms around strengthening (reforming) research play out as a double move: simultaneous centralisation and decentralisation, but with power firmly concentrated at the centre.

A final point to note is that UKZN could be regarded as an example of a university which has a strong focus on centrally-driven research policies at national and institutional levels, but which may not be leaving adequate space for individual and group-driven research projects. This may be a consequence of its low academic capacity and its low overall

25
management capacity. The management capacity of its research organisation is stronger than that of its overall management but can at best be rated as high/low.

**University of Fort Hare (UFH)**

*Summary of enrolments and high-level knowledge performance*

UFH is classified as a university. It is one of the smallest universities in South Africa: in 2011, it had a headcount enrolment total of 11 100 students, of whom 83% were enrolled for undergraduate qualifications, 8% for postgraduate qualifications below masters level and 9% for masters and doctoral degrees.

Table 6 summarises UFH’s high-level knowledge input and output profile. This profile follows the OECD in taking a university’s high-level knowledge inputs to be doctoral enrolments and academic staff, and its high-level knowledge outputs to be doctoral graduates and research publications.

| Table 6: High-level knowledge inputs and outputs of UFH, 2007–2011 |
|-----------------------------|--------|--------|--------|--------|
| **Inputs**                  |        |        |        |                                  |
| Doctoral enrolments         | 155    | 227    | 263    | 108    | 70%     |
| Permanent academic staff    | 292    | 347    | 291    | -1     | 0%      |
| Permanent academics with doctorates | 55 (19%) | 89 (26%) | 102 (35%) | 47 | 84% |
| **Outputs**                 |        |        |        |                                  |
| Research articles           | 63     | 120    | 168    | 65     | 103%    |
| Doctoral graduates          | 10     | 34     | 44     | 34     | 340%    |

Source: DHET (2012)

UFH’s research input values are below those of the other two university case studies already discussed in this report. Its main weakness concerns the low number and proportion of its academic of staff who have doctoral degrees. The table does, however, show that major changes have occurred at the input level at UFH. Its proportion of permanent academic staff with doctoral degrees increased from 19% in 2007 to 35% in 2011, and its enrolments of doctoral students rose by 108 (or 70%) in 2011 compared to 2007. The input ratio used in the earlier case studies of doctoral enrolments per permanent academic improved from 0.53 in 2007 to 0.90 in 2011, reflecting an increasing staff commitment to doctoral programmes.

When UFH’s research outputs are related to its research inputs, its overall performance falls below those of the other two universities already discussed. The main issue concerns the ratio between its permanent academic staff and its research publication units. In 2011, UFH’s 291 permanent academics produced 168 research articles, at a ratio of 0.58 articles per academic. This ratio was below what has become an accepted national target of 1.0, and was lower than UCT’s ratio for 2011 of 1.10 and UKZN’s of 0.80 articles per permanent academic.
It should, however, be noted that changes occurred in UFH’s research outputs over this five-year period. As can be seen in Table 6, substantial increases occurred in its research article total (up by 103% in 2011 compared to 2007) and in its doctoral graduate numbers (up by 340% from ten in 2007 to 44 in 2011). UFH’s increased research output has continued: in 2012 the number of doctoral graduates increased to 50 and the accredited research publications to 180.

Context for analyses of key aspects

The context at UFH can be summed up as follows:

- UFH’s level of professional administration is high and it offers high levels of professional support to academics, but its professional support for executive managers is low. Its ratio of academic staff to executive/management professionals is low, which implies that it may be emphasising executive/management posts to too great an extent.
- UFH’s academic capacity is low. In 2011, it had a total of only 48 professors and associate professors available, who should be its research leaders. Only 31% of its 2011 total of 291 permanent academic staff members held doctoral degrees.
- Even though UFH’s high-level knowledge output totals have been improving, its performance in terms of its ratios of outputs to academic staff members have been below those of the other two universities already covered in the case study project.

Specific aspects of UFH’s case study report will now be discussed within this contextual framework.

Research organisation and management

UFH has a central university committee for research and development. The main functions of the committee are to oversee the implementation of UFH’s strategic research plan, including the introduction or amendment of research policies, and approval of the research budget. This committee is chaired by the Deputy Vice Chancellor: Academic Affairs. The Dean of Research reports to this Deputy Vice Chancellor. All other deans and directors with a research mandate report quarterly to the Dean of Research on research activities.

UFH’s research management structure is set out in Figure 4. The staffing data in the figure show that UFH had, not counting the Deputy Vice Chancellor, a total of nine staff members in its research management. There are only three who could be classified as holding professional posts, which includes the Dean who could be classified as holding an executive/management post.

The level of professional research support available to academic staff at UFH is therefore low. In 2011, there would have been one support professional in the research administration for every 145 permanent academics. If the Dean were included in the
support total, the ratio would still be nearly 100 research administrative professionals per permanent academic.

Research policies and implementation strategies

UFH’s case study document says that, prior to 2006, interactions with national policy frameworks, knowledge production initiatives and research-facilitating structures were sporadic, fragmented and uncoordinated across the university. There was no strategic drive institutionally to interact with these policy frameworks. The document adds that this situation changed after 2006, when it became clear that if UFH was not prepared to become actively involved in research, it would remain a low-ranking teaching institution which would be a political embarrassment, given its socio-political history and connectedness to state power.

The changes that occurred were underpinned, firstly, by a realisation that research-capacity development for academic staff and postgraduate students was a priority for UFH. This was connected to centralisation and strengthening of the research administration, which allowed for a greater sense of planned facilitation, monitoring and evaluation of research efforts. Further interventions were the development of a strategic research plan for 2009-2016 and the development of a set of research policies aligned to national strategic priorities.
UFH’s document says that its 2009–2016 strategic plan was supported by a philosophy and strategy that recognised the need for research to address local, regional and national needs. It committed UFH to engage in a critical dialogue with partners to build research in areas which would complement the university's historical niche as an African university, while ensuring that it would achieve internationally recognised excellence. The document stresses that UFH recognises that research is led and driven by individuals and groups with a vision and passion to seek answers to questions that bother them. Because UFH recognises that postgraduate students should be part of research, its research administration includes postgraduate studies, although the disciplinary scholarship task of postgraduate degrees falls under direct faculty control.

The briefing document adds that UFH’s research strategy embeds itself at the bottom end of the scholarly process by facilitating research-methodology renewal and workshops on applied-research practices. It also continues to support well-established areas of excellence and to facilitate the growth of these research niche areas. The following research niche areas have been in place at UFH, with the support of the National Research Foundation: sustainable agricultural and land use strategies, water resources for sustainable development, renewable energy research on systems, resources and economics, culture, heritage and social transformation, and unlocking the potential of indigenous plants for sustainable livelihood.

UFH has also embarked on a new strategy to develop or redevelop and strengthen successful research niche areas. This has been assisted by the introduction of the research chairs initiative of the National Research Foundation. In 2010, UFH received a chair in social change and, in 2012, another one and a half chairs in biodiversity and meat science.

In a further attempt to focus research institutionally a number of research institutes, units and centres have been established with what the briefing document describes as ‘varying success’. In total, UFH has 19 different research units, centres or institutes. No policy framework has been in place to guide the establishment of such entities, but in the 2010 academic review of research, a set of guidelines was developed for the restructuring and repositioning of these entities. These guidelines will address the confusion about nomenclature, funding, governance, research capacity and research output.

Some specific steps which UFH has taken towards the implementation of its research strategy are the following:

- Targets have been set for the annual totals of accredited research outputs which the institution is expected to produce.
- Seed research funding is provided for new academic staff members.
- Papers are harvested from completed dissertations and theses. To promote knowledge production, awards are made for six-month periods to doctoral graduates to stay on and extract at least three publishable research papers from their completed theses.
- Postdoctoral fellowships of $ 15 000 per annum are allocated to faculties for projects which are consistent with the strategic objectives of UFH. In 2012, a total of seven fellowships were being funded by UFH.
Experienced academics, researchers and experts from educational, public and private sectors are recruited to serve UFH as specialists in their respective fields. They are employed on a part-time basis as emeritus or adjunct professors, fellows or associates to supervise postgraduate students, conduct and publish research, provide cutting edge information, deliver quality lectures and secure and manage consultancies.

UFH has set out a wide-ranging, perhaps overly-ambitious, array of research policies and strategies which would be fit for a larger university with a more substantial management and academic capacity than that possessed by UFH. The main concerns which must arise are whether UFH can implement these plans, given the limited professional support capacity in its research administration, its limited academic capacity and the obvious financial constraints which it faces.

Research funding

UFH appears to have excluded external research income, such as National Research Foundation and contract research grants, in its case study document. It refers only to research income derived from government subsidies. Table 7 offers an estimate of UFH's research income for 2012.

<table>
<thead>
<tr>
<th></th>
<th>$ m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government subsidy for research development</td>
<td>1.2</td>
</tr>
<tr>
<td>Government subsidy for research outputs</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total income</strong></td>
<td><strong>1.6</strong></td>
</tr>
</tbody>
</table>

UFH's full government output subsidy for 2010 was $ 3.5 million, generated by research publications ($ 1.5 million), research masters graduates ($ 1 million) and doctoral graduates ($ 1 million). If only $ 0.4 million of this total of $ 3.5 million was treated as research income, the balance would have been used in UFH's general operating budget.

If UFH's research funding total for 2010 was only $ 1.6 million, then it would clearly not have been able to implement major changes in its research activities. This can be seen in the calculation of its average research income per permanent academic. This would, in 2010, have been only $ 5 500 per permanent academic, which is equivalent to 6% of UCT's average of $ 92 600 per permanent academic.

Research incentives for academic staff members

The gap between research policies and plans and available resources emerges again in UFH's account of its research incentives. Its case study report refers only to the following direct incentives for research outputs:

- $ 2 000 is paid for each accredited research article. If an article has more than one author, the $ 2 000 is shared between them.
- $2,000 is paid for each masters graduate and $6,000 for each doctoral graduate. If a graduate had more than one supervisor, then the amounts are shared between them.
- The winners of the Vice Chancellor’s Senior and Emerging Researcher medals receive cash awards of $1,500.

**Summing up of UFH case study**

The UFH case study report describes the turmoil arising from the collapse of apartheid, particularly in the homeland system, the rapid changes in academic staff and management, and the offering of severance packages, mainly to senior white academics, all of which contributed to the further eroding of ‘what was left of a culture of research’.

The report goes further to assert that the 2009-2016 strategic plan and the subsequent policy of setting of an institutional research targets were major steps towards demonstrating that the institution was serious about the need for change. According to the case study report, the research strategy operates at a number of interlinked levels. It embeds itself in the bottom end of the scholarly process, but at the same time supports well-established areas of excellence and the growth of niche areas, while finally attempting to identify new areas of research foci. Doubts about UFH’s ability to implement these plans were expressed in earlier subsections of this analysis.

The case study report, when taken together with the earlier analyses of its management and academic capacities, suggest that UFH’s change efforts have been involved primarily in developing institutional research policies and strategies. Because of resource constraints, specific implementation issues, particularly those around staffing, staffing incentives and access to research funding, appear to have been secondary.

**Nelson Mandela University (NMMU)**

*Enrolments and high-level knowledge performance*

NMMU is classified as a comprehensive university. This classification requires NMMU to offer technikon-type programmes through vocational undergraduate diplomas and certificates, as well as university-type degrees. In 2011, NMMU had a headcount enrolment total of 26,300 students, of whom 87% were enrolled for undergraduate qualifications, 4% for postgraduate qualifications below masters level and 9% for masters and doctoral degrees.

Table 8 summarises NMMU’s high-level knowledge input and output profile. This profile follows the OECD in taking a university’s high-level knowledge inputs to be doctoral enrolments and academic staff, and its high-level knowledge outputs to be doctoral graduates and research publications.
Table 8: High-level knowledge inputs and outputs of NMMU, 2007–2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctoral enrolments</td>
<td>327</td>
<td>392</td>
<td>441</td>
<td>114</td>
</tr>
<tr>
<td>Permanent academic staff</td>
<td>528</td>
<td>569</td>
<td>579</td>
<td>51</td>
</tr>
<tr>
<td>Permanent academics with doctorates</td>
<td>182</td>
<td>210</td>
<td>228</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outputs</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Research articles</td>
<td>165</td>
<td>196</td>
<td>284</td>
<td>119</td>
</tr>
<tr>
<td>Doctoral graduates</td>
<td>35</td>
<td>39</td>
<td>59</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: DHET (2012)

NMMU’s research input data show that, even though its total of staff with doctorates increased from 182 in 2007 to 228 in 2011, its proportion of permanent academic staff with doctorates – who would be expected to be its research leaders – was only 39% in 2011. NMMU’s input ratios of doctoral enrolments to permanent academics show that its commitment to doctoral programmes increased over this five-year period. Its ratio of doctoral enrolments to total permanent academic staff was 0.62 in 2007 and 0.76 in 2011.

NMMU’s research output totals also increased over this period: research articles increased by 119 (or 72%) and doctoral graduates by 24 (or 69%) in 2011 compared to 2007. However, when NMMU’s research outputs are related to its research inputs, its overall performance falls below that of UCT. The main issue concerns the ratios between permanent academic staff as research inputs and the key outputs of research articles and doctoral graduates. Examples of the ratios are the following:

- In 2011, NMMU’s 579 permanent academics produced 284 research articles at a ratio of 0.49 articles per academic. This ratio was well below UCT’s ratio for 2011 of 1.07 research articles per permanent academic.
- NMMU’s permanent academics produced 59 doctoral graduates in 2011, at a ratio 0.10 graduates per academic. UCT’s permanent academics produced 182 doctoral graduates at a ratio of 0.17 graduates per permanent academic.

**Context for analyses of key aspects**

The context at NMMU can be summed up as follows:

- NMMU’s level of professional administration is high. However, it offers low levels of professional support to both academics and executive managers. Its ratio of academic executive/management professionals is low, which implies that it may be emphasising executive/management posts to too great an extent.
- NMMU’s academic capacity is a mix of high and low. In 2011, it had 142 professors and associate professors and 240 senior lecturers. However, only 48% of these senior academics had doctoral degrees (compared with the overall 2011 total of 31% of academics at NMMU holding doctoral degrees).
Even though NMMU’s high-level knowledge output totals have been improving, its performance in terms of its ratios of outputs to academic staff members have been below the targets set in national performance indicator analyses.

Specific aspects of NMMU’s case study report will now be discussed within this contextual framework.

Research organisation and management

NMMU has a central university committee for research and innovation. This central committee is responsible for developing and monitoring an institutional strategic plan for research and innovation activities, monitoring the quality, quantity and relevance of NMMU’s research and innovation outputs, ensuring that there is effective liaison with external research councils, monitoring the quality of proposals presented to external agencies, recommending a research funding model for the university and monitoring research allocations and budgets.

At a central administrative level, responsibility for the organisation and management of research rests with the Deputy Vice Chancellor (Research and Engagement). The flow chart which follows summarises the structures and reporting lines of this central research administration.

Figure 5: Structure and reporting lines of NMMU research organisation and management
NMMU's case study document describes the responsibilities of the units in the figure as follows:

- **Department of Research Management:** The primary function of this department is to support established researchers and to develop, implement and manage research information management systems.

- **Department of Research Capacity Development:** The three core functions of this department are: (a) to provide financial assistance to postgraduate candidates and postdoctoral fellows; (b) to ensure on-going development of emerging researchers; and (c) to provide oversight for the institutional research ethics committees.

- **Department of Innovation Support and Technology Transfer:** This department is responsible for the protection and management of intellectual property owned by NMMU, through attracting and assessing invention disclosures as well as patenting and other forms of intellectual property protection. Where appropriate, intellectual property is assigned or licensed to a wholly-owned NMMU company that undertakes commercialisation activities, such as licensing and spin-out company formation. The department also facilitates and negotiates external, research-related grants and contracts, with specific emphasis on intellectual property ownership issues.

The staffing data in Figure 5 show that in 2010 NMMU had, excluding the Deputy Vice Chancellor, a total of 18 posts in its research organisation, at least ten of which could be classified as holding support professional posts. These ten support professional posts would include the three posts of director because the heads of small departments should not, in HEMIS terms, be classified as executive/management posts.

The extent of NMMU's administrative support for research and innovation can be seen in these ratios:

- In 2011, UMMU had a total of 579 permanent academics. Its ratio of permanent academics to total research staff (professional and non-professional) was 579/18 = 32. This is higher than the UCT ratio of 22, but is comparable to the ratio of 30:1 calculated for UKZN.

- In 2011, UMMU had a total of ten professionals in its research administration. Its ratio of permanent academics to total professional research staff was therefore 579/10 = 58. This is once again less favourable than the UCT ratio of 38 academics per research administration professional, but is comparable to the ratio of 57:1 calculated for UKZN.

A conclusion similar to that drawn about the capacity of UKZN's research administration should be reached. The management capacity of NMMU cannot be rated as high. Its rating would have to be high/low, that is, somewhere between a high and a low rating.
Research policies and implementation strategies

NMMU’s case study document says that one of its strategic priorities is to create and sustain an environment that encourages, supports and rewards a vibrant research, scholarship and innovation culture. It uses two main implementation strategies to do this:

- Defining academic focus areas and institutional research themes: NMMU has defined eight academic focus areas to provide broad-based strategic direction to its teaching, learning, research and engagement activities. It has identified a limited number of institutional research themes within the broad scope of its eight academic focus areas. These institutional research themes draw on existing and potential research strengths at NMMU and include the following: manufacturing technology and engineering, nano-scale characterisation and development of strategic materials, biodiversity conservation and restoration, coastal marine and shallow water ecosystems, sustainable human settlements and sustainable local economic development.

- Determining a core research strategy: NMMU’s core research strategy is premised on (a) the imperative to grow critical mass in a specifically-targeted set of cognate disciplines and cross-disciplinary domains which are directly linked to its strengths, while (b) at the same time, also enhancing research productivity across the university. The implementation of the core strategy has involved establishing a stimulating research policy environment, implementing a positive investment strategy which targets people, research infrastructure and equipment, and acquiring and retaining research talent.

As part of its implementation strategies, NMMU has been approaching external bodies to fund research chairs. It had a total of five research chairs in 2010, and was awarded a further four in 2012 under the National Research Foundation’s research chairs initiative.

Research funding

NMMU’s 2010 research income and its sources are summed up in Table 9.

<table>
<thead>
<tr>
<th>Source of Research Income</th>
<th>Amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External contracts/grants &amp; National Research Foundation grants</td>
<td>7.5</td>
</tr>
<tr>
<td>NMMU operating budget for research</td>
<td>1.2</td>
</tr>
<tr>
<td>NMMU operating budget for masters &amp; doctoral graduates</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9.5</strong></td>
</tr>
</tbody>
</table>

NMMU’s full government output subsidy for research for 2010 was $6.3 million, generated by research publications at $2.7 million, research masters graduates at $1.9 million and doctoral graduates at $1.7 million. It appears from Table 9 that only about $2 million of the $6.3 million in subsidies generated by research outputs may have been treated as
research income. The balance would have been used for other purposes in NMMU's general operating budget.

The total of $9.5 million of research contract and government subsidy funding reflected in the table was 7% of NMMU's total 2010 income of $132 million from all sources. This was well short of UCT's and UKZN's 2010 figures for research funding, which showed that 28% and 27% of their total income from all sources was used for research activities.

NMMU's 2010 research total of $9.5 million can be related to its 2010 permanent academic staff complement of 574 as follows: its total research income per permanent academic was $16 600. This was equivalent to 18% of UCT's average 2010 research income per permanent academic of $92 600 and 28% of UKZN's average of $58 400.

NMMU's research funding seems to fall well short of what it would need to fully implement the core research strategy described earlier.

Research incentives for academic staff members

NMMU's case study document says that it uses various incentives to encourage academic staff members to engage in research activities that will enhance its research strategy. These incentives include the following:

- Direct payments are made to authors for research publications which earn government subsidies. In 2012, $3 300 was awarded per research publication unit, with this amount being split if more than one author was involved.
- 10% of the annual research output subsidy is allocated to faculty research offices for distribution to academic staff and 3% is allocated for postgraduate bursaries.
- Awards are made to individual academic staff members:
  - One annual award of $2 000 is made for innovation and technology transfer;
  - One annual award of $2 000 is made for the NMMU researcher of the year;
  - Annual awards of about $1 000 are made by each faculty to its researcher of the year; and
  - Awards ranging from $5 000 to $2 000 are made for staff members receiving NRF ratings.
  - Three annual prizes, each of $2 000, are awarded to academic staff members for outputs in the performing and creative arts.
- Supervisors of masters and doctoral graduates receive awards based on a sliding scale which takes account of the length of time for which the student was registered. The awards to supervisors for doctoral graduates can range from $1 200 down to $300, and for masters graduates from $400 down to $200.

During 2010, $1.3 million was disbursed as incentives for individual researchers. The amounts involved are summed up in Table 10.
### Table 10: NMMU research funding incentives disbursements, 2010

<table>
<thead>
<tr>
<th>Category</th>
<th>$ m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty research and innovation committees</td>
<td>0.2</td>
</tr>
<tr>
<td>Payments to individual researchers</td>
<td>0.6</td>
</tr>
<tr>
<td>Supervisors of masters and doctoral graduates</td>
<td>0.3</td>
</tr>
<tr>
<td>New National Research Foundations ratings</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.3</strong></td>
</tr>
</tbody>
</table>

**Summing up of NMMU case study**

NMMU is one of the institutions in the HERANA network. In the 2011 assessment of NMMU, one of the comments made was that the university is conflicted by its contested identity, which refers to the different tensions inherent in merging a traditional university with a technikon. The NMMU case study report makes it clear that research-policy formulation and implementation are central components of the university’s attempt to forge a new identity and culture that will include strengthening knowledge production.

The overall approach is a centre-driven by a strong focus on incentives. In the words of the case study report:

> To give effect to these ideals, NMMU has developed a comprehensive set of institutional policies aimed at stimulating existing researchers and encouraging new researchers to improve their research productivity. Many of these policies are incentive based and also provide for considerable increases in financial support for postgraduate study. In addition, organisational structures have been established to support the development of enhanced research capacity amongst staff, with particular emphasis on developing the next generation of academics. (NMMU case study report, 2012)

The centre-driven management system adopted by NMMU will face a number of major resource issues. The first concerns the management capacity of its research organisation. To be a key player in the development of a research ethos and drive at NMMU, the research organisation will almost certainly need a larger group of support professionals than it has at present. A second key resource issue is that of improving the academic capacity of its academic staff in terms of the availability of senior academics with doctoral qualifications. A further resource issue is that of the relatively small amount of direct research funding available for academic research projects and for the various incentive schemes that have been put in place.

A final point to note is that NMMU, like UKZN, could be regarded as an example of a university which has a strong focus on centrally-driven research policies at national and institutional levels, but which may not be leaving adequate space for individual and group-driven research projects. This may be a consequence of its low academic capacity, its low research-support capacity and its low level of research funding.
**Tshwane University of Technology (TUT)**

*Enrolments and high-level knowledge performance*

TUT is classified as a university of technology and, as such, is required to offer primarily vocational programmes at an undergraduate level. In 2011, it had a headcount enrolment total of 50 100 students, of whom 96% were enrolled for undergraduate qualifications, 1% for postgraduate qualifications below masters level and 3% for masters and doctoral degrees.

Table 11 which follows summarises TUT’s high-level knowledge input and output profile. This profile follows the OECD in taking a university’s high-level knowledge inputs to be doctoral enrolments and academic staff, and its high-level knowledge outputs to be doctoral graduates and research publications.

**Table 11: High-level knowledge inputs and outputs of TUT, 2007–2011**

<table>
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<tr>
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<tbody>
<tr>
<td>Doctoral enrolments</td>
<td>137</td>
<td>169</td>
<td>245</td>
<td>108</td>
</tr>
<tr>
<td>Permanent academic staff</td>
<td>819</td>
<td>797</td>
<td>836</td>
<td>17</td>
</tr>
<tr>
<td>Permanent academics with doctorates</td>
<td>106</td>
<td>140</td>
<td>165</td>
<td>59</td>
</tr>
<tr>
<td>(13%)</td>
<td>(18%)</td>
<td>(20%)</td>
<td></td>
<td>(56%)</td>
</tr>
</tbody>
</table>

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<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Research articles</td>
<td>81</td>
<td>101</td>
<td>179</td>
<td>98</td>
</tr>
<tr>
<td>Doctoral graduates</td>
<td>12</td>
<td>25</td>
<td>28</td>
<td>16</td>
</tr>
</tbody>
</table>

Source: DHET (2012)

TUT’s research input data show that even though its total of staff with doctorates increased from 106 in 2007 to 165 in 2011, its 2011 proportion of permanent academic staff with doctorates – who would be expected to be its research leaders – was a very low 20%. TUT’s input ratios of doctoral enrolments to permanent academic shows that its commitment to doctoral programmes remained low over this five-year period. Its ratio of doctoral enrolments to total permanent academic staff was 0.17 in 2007 and 0.29 in 2011, which are indications of low academic-staff involvement with doctoral programmes. An improvement was, however, noted in the ratio of doctoral enrolments to permanent academics with doctoral degree. This ratio rose from 1.29 in 2007 to 1.48 in 2011, which suggests that qualified supervisors were engaging more frequently in doctoral programmes.

TUT’s research output totals increased over this five-year period, but its overall research performances remained low by comparison with those of the other four case studies. The main issue concerns the ratios between permanent academic staff as research inputs and the key outputs of research articles and doctoral graduates. Examples of the ratios are the following:
In 2011, TUT’s 836 permanent academics produced 179 research articles, at a ratio of 0.21 articles per academic. This ratio was well below NMMU’s ratio for 2011 of 0.49 research articles per permanent academic (the NMMU result being the second lowest ratio amongst the case studies).

TUT’s permanent academics produced 28 doctoral graduates at a ratio of 0.03 graduates per academic in 2011, which was well below UKZN and NMMU. By comparison, UCT’s permanent academics produced 182 doctoral graduates at a ratio of 0.17 graduates per permanent academic.

**Context for analyses of key aspects**

The context at TUT can be summed up as follows:

- TUT’s level of professional administration is low and it offers low levels of professional support to both academics and executive managers. Its ratio of academic executive/management professionals is high, which implies that it emphasises academic rather than executive/management posts.

- TUT’s academic capacity is low. In 2011, it had 136 professors and associate professors who represented only 16% of its total staff, and 499 lecturers who represented 60% of its total staff. Only 20% of its academic staff held doctoral degrees in 2011.

- TUT’s high-level knowledge output totals have been improving but remain low in relation to its total number of permanent academics employed.

Specific aspects of TUT’s case study report will now be discussed within this contextual framework.

**Research organisation and management**

TUT’s research organisation operates at central, faculty board and academic departmental levels. At the central level it has a research and innovation committee, which determines TUT’s research and innovation strategy and which reports to the university’s senate. It also has an external advisory committee which acts as a resource for the senate on the planning, developing, implementing and evaluating of research and innovation. The final research-related committee which reports to the senate is a higher degrees committee. TUT’s research management structure is set out in Figure 6.
The staffing data in the figure shows that TUT had a total of 20 staff in its research management, in 2010, including the Deputy Vice Chancellor. The figure shows further that the posts of the Deputy Vice Chancellor and of the Director of Research and Innovation should be classified at executive/management professional level and that a further ten posts should be classified as support professional posts.

The extent of TUT’s administrative support for research and innovation can be seen in these ratios:

- In 2011, TUT had a total of 836 permanent academics. Its ratio of permanent academics to total staff (professional and non-professional) was $836/20 = 42$. Its ratio of permanent academics to support professionals in its research administration was 84 in 2011. These ratios are considerably higher than those of the other four case study institutions.

The only conclusion which can be reached about the capacity of TUT’s professional research administration is that it is low.
**Research policies and implementation strategies**

TUT relates its research policies to the general mandate of universities of technology in South Africa. It says that the focus of this category of universities has to be mainly on applied research and innovation, as well as on the solving of specific problems that will benefit the development of society and the economy. TUT’s briefing document adds that challenges which universities of technology face are not the same as those of traditional universities, where the research culture is well established and cuts across every key process of the university. Under the current circumstances, the first response of a university of technology to sustainable knowledge production has to be that of cultivating an institutional culture and environment which are conducive to research and innovation.

TUT’s 2008–2010 strategic plan for research placed a great deal of emphasis on developing a research culture, enhancing its institutional research and innovation profile, improving the skills and qualifications of academics, and developing a clear understanding of its research strengths, weaknesses and opportunities.

TUT’s briefing document says that most of its research policies were developed with what it describes as undergraduate and teaching mindsets, and were centrally developed with little room for flexibility. The document adds that, even though TUT’s research culture is evolving slowly, there is still a long way to go. The document lists some institutional policies which it says are not consistent with high-level knowledge production:

- Procurement policies are too bureaucratic and are not supportive of a research intensive institution.
- TUT does not have a culture of valuing postgraduate students more highly than undergraduate students. For example, all student residences are closed during vacations, with no provision being made for postgraduates who would normally use vacations to undertake their research.
- TUT’s physical infrastructure and other facilities were set up to meet the requirements of undergraduate teaching and of a large body of undergraduate students. There are, as a consequence, serious shortages of postgraduate research facilities and other amenities suitable for postgraduate students.

The document says further that while TUT does not have any specific levers to drive knowledge production, it tries to implement its research strategy in the following ways:

- Recruiting outstanding research talent for any externally advertised academic position;
- Setting clear guidelines for appointment as a professor or associate professor, which place heavy emphases on accredited research output and postgraduate student training;
- Promoting the role of research in TUT as often as possible in internal communications;
- Limiting the practice of academic staff offering short courses as a means of generating income;
- Linking international conference attendance with a research output, and not funding staff who are not offering papers; and
• Making the publication of a research paper one of the requirements for the award of a doctoral degree.

Research funding

In its case study document, TUT does not quote any figures dealing with the internal or council-controlled funds which it uses for research funding. It does, however, give details of its external research funding; furthermore, calculations can be made of the government-subsidy funding which its research outputs generated. An estimate of these totals for 2010 are summarised in Table 12.

<table>
<thead>
<tr>
<th>Table 12: Estimate of TUT research income, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government subsidy for research publications</td>
</tr>
<tr>
<td>Government subsidy for research masters and doctors</td>
</tr>
<tr>
<td>Private sector grants</td>
</tr>
<tr>
<td>National Research Foundation grants</td>
</tr>
<tr>
<td><strong>Total research-related income</strong></td>
</tr>
</tbody>
</table>

The total of $7.2 million amounts to 3% of TUT’s 2010 income from all sources. By comparison, UCT 2010 research income amounted to 28% of its total income.

TUT’s research funding total of $7.2 million can be related in a straightforward way to its academic staff complement: in 2010, its total research income per permanent academic was $8 800, which was 53% of NMMU’s average of $16 600 and less than 10% of UCT’s 2010 average of $92 800 per permanent academic.

Research incentives for academic staff members

TUT uses two basic rewards for research outputs:

• 25% of the government subsidies for research publications are paid into authors’ research accounts. Calculations based on 2010 data suggest that the amount to be paid out per research publication unit would be approximately $2 600. This amount would be divided between the authors of a research paper.
• Successful researchers are recognised at a prestigious annual event organised at which awards and medals are distributed.

Summing up of TUT case study

TUT has over the past decade faced two daunting tasks: merging three technikons and transforming these vocationally oriented institutions into knowledge-producing universities of technology. Starting with a lack of a culture of research, the initial aim was to change the governance structure so that research would be regarded as of equal importance with teaching. A key strategic decision taken was that the functions of teaching and learning and research were to be managed separately; and hence two senior
management level portfolios were created, namely Deputy Vice Chancellor for Teaching, Learning and Technology and Deputy Vice Chancellor for Research, Innovation and Partnerships.

This management-engineered and centrally-driven new research culture required a waterfall of new policies and practices. These policies and practices included setting tight guidelines on research output for appointment to senior positions, setting targets for high-level knowledge outputs and for research and innovation capacity development, finding adequate research support funds and selecting niche areas of priority. They also included rewarding for publications, limiting private contract work, looking after researchers and postgraduate students, and even ‘preaching research’ at social functions.

TUT is clearly the weakest institution in the case study sample, both in terms of academic and management capacity and research output performance. It may remain in this weak position because of the major implementation challenges which its centrally-driven research policies and strategies face. These challenges are primarily its low levels of professional support for academics and its executive management, the low academic capacity of its body of permanent academic staff members and its low level of direct research funding.

An overall conclusion which can be reached is that TUT is a clear example of a university in which policy formulation and implementation related to research have been mainly symbolic. Its primary focus has thus been on instilling of a research culture within the institution.

### Synthesis: The professionalisation of research management

**Similar functions, but different emphases**

A first major observation is that all five institutions have become part of the global and national policy context of increasing knowledge production. At the Innovation, Higher Education and Research for Development (IHERD) group meeting in Marseille (July 2013), Olsson and Cooke presented a report called *The evolving path for strengthening research and innovation policy for development* based on studies of four East Asian (Olsson and Meek, 2013) and three African countries (Jowi, 2013). They describe key features that need attention in terms of strengthening research and innovation leadership and management of higher education institutions in the context of developing countries:

* [...] public universities in developing countries usually have organisational structures to support the leadership of research. Typically, these involve the appointment of a member of the institution’s executive team to provide leadership of the research agenda. This position is supported structurally by other appointments across faculties and schools, and administratively by functional departments. In less research intensive universities, effects of these arrangements are however significantly constrained by limited funds. (Olsson & Cook 2013: 20)
The overview of the five SA case studies show that, in concordance with the Olsson and Cooke report, all five universities have research-strengthening policies and practices in place that could be categorised broadly into the following activities and functions:

- **Concentration of research**: themes, groupings, signature themes, centres of excellence and research chairs;
- **Development of researchers**: recruiting for and promoting doctoral studies and post docs, support to junior academics, with different types of programmes to address race and gender equity;
- **Knowledge production skills**: usually involving workshops or training in research methodology, writing skills, meeting publication requirements, fund raising and management;
- **Incentives and rewards for knowledge production**: ranging from direct cash and benefits such as promotion, to indirect incentives and status enhancing rewards;
- **Intellectual property and commercialisation**: providing administrative and legal (contract) advice, facilitating partnerships with industry and government, and grant management assistance;
- **Contribution to policy**: initiating or being involved in new institutional polices about strengthening or expanding research output; and
- **Building and or strengthening research culture**: ranging from trying to build a culture where there is none, to strengthening the existing culture.

Another way of classifying the seven functions identified above is within the three areas of: development, support and incentives. While it is not easy to draw a sharp divide between these three types of functions, they do have different emphases and methodologies. Development deals, on the one hand, with policies that promote research culture and, on the other hand, with broader capacity building, such as further studies and academic advancement. Support is mainly concerned with specific skills, often legal and financial assistance with aspects such as commercialisation, grant applications and funds management. Direct incentives are predominantly output orientated, while indirect incentives are more orientated towards career development and high-status awards. Depending on their academic and managerial capacity, institutions focus more or less on different combinations of the three approaches to strengthen research output.

For example, UCT clearly has a strong emphasis on development, followed by support and indirect incentives, while UKZN and NMMU stress all three, but lean much more towards direct incentives. UFH utilises all three approaches, but places a strong emphasis on development and incentives. With weak academic capacity, TUT seems to lean heavily towards incentives.

An interesting follow-up study could be to develop a matrix of these activities/functions and plot the number and weighting of each. This would allow one to construct comparative institutional profiles of research-strengthening functions.
Different profiles, but similar structures

What the five institutions have in common is that they have increased their research output over the last five years. However, as shown in Section 2 of this report, the institutions have very different institutional profiles. In terms of size, two universities each enrol more than 40 000 students (TUT and UKZN), two enrol between 20 000 and 30 000 (UCT and NMMU), and one (UFH) has below 10 000 enrolments. With regards key factors that contribute to knowledge production, the differences are more even more pronounced, as demonstrated in the findings below:

- Proportion of postgraduate enrolments (masters and PhD) against total enrolments: 19% (UCT) to 3% (TUT);
- Percentage of all staff in senior positions (professor and associate professor): the range is from 68% (UCT) to 39% (UFH);
- Percentage of staff with PhDs: UCT has 59% and TUT only 17%;
- Number of accredited publication units: UCT produced 1 253 in 2010 and UFH only 142; at UCT, the publication per staff member ratio is 1.28 per annum, while it is only 0.13 per staff member per annum at TUT; and
- Government research income per year ranges from $ 99 million for 2010 to $ 8 million at TUT.

With the universities having such vastly different knowledge production profiles, one would expect very different missions, visions and aims. In looking at the aspirational goals of the five institutions, as are contained in their public vision and mission statements, we note that two institutions on the opposite ends of the knowledge production profiles, UCT and TUT, both strive for international recognition. The two merged institutions, UKZN and NMMU, both strive for recognition in Africa while UFH, the historically disadvantaged university, prioritises quality.

The two extremes (UCT and TUT) could be regarded as an example of the assertion of Meek et al. (2010) that while higher education is supposed to be about new knowledge and innovation, it is also about imitation, particularly of high status-institutions and the latest global fads. UCT is placed at number three in the latest Times Higher Education (2013) BRICS and emerging economies ranking of universities in developing countries, while TUT is completely outside the rankings, but this does not stop TUT from aspiring to be like the highest-status university in Africa. This tendency has been evocatively described by David Rieseman (1956) as a serpentine procession in which higher education institutions copy each other not so much on the basis of academic excellence, but in order to survive in economically competitive environments. The problem with this phenomenon is that by the time the tail of the snake has come up to where the head was, the head has moved on in another direction.

Another demonstration of the phenomenon of following the head of the snake is that, despite the vastly different institutional knowledge production profiles of UCT and TUT, there is considerable similarity in the organisational structure of the senior research management levels: in fact, the research management structures are virtually mirror images of each other. Both have deputy vice-chancellors for research; likewise, UCT has a total of five senior (management-level) staff, while TUT has six. NMMU and UFH also have
similar top structures, each with four manager/director-level staff. In line with this, UKZN has a similar top structure, with six full-time professional/management staff; however, it also has an additional eight college vice chancellors and deans who have a part-time research-promotion responsibility.

However, differences do exist in staffing below the management level. At UCT, the ratio of permanent academics to professional research-strengthening staff is 25:1; at TUT, it is 46:1. The ratio of active researchers (academics with doctorates) to research management staff is 17:1 at UCT and 9:1 at TUT. This is where institutional resources and capacity makes a huge difference: UCT can afford, partially due to its much larger research income, a more favourable support staff ratio.

It seems that, at least with regards to this sample of case studies, the South Africa university system is part of this international trend of mimicking, and with participation in professional network exchanges, such as Southern African Research and Innovation Management Association, the expansion and consolidation of the 'managerial professional' strata in the institutions. It could be argued that, as described by Meek et al (2010), mimetic normative isomorphism as part of managerialism has come to South Africa.

**Strengthening research output while advancing professional interests**

In responding to global and national demands, institutional leadership and management have become more important in higher education. This is often referred to as New Public Management (NPM) or managerialism. Not only must institutional leadership organise and administer the institution, it also has to respond to the increased internal and external demands from a growing number of actors. A key aspect in responding is legitimacy; and an important component of legitimacy is a businesslike or unified front by an expanded management core (Reed, 2002).

Analysing transformations within the administration at Norwegian universities, Gornitzka and Larson (2004) argue that university administrations are increasingly moving towards professionalisation. They observe a significant increase of new positions and qualifications, (especially in the middle management segment of university administrations), as well as the emergence of more professionalised modes of knowledge exchange via professional networks and training programmes for university management (ibid.).

According to Reed (2002), the implementation of a managerialist discourse often consists of ‘hybridization’, which is an indiscriminate mixing and matching of seemingly contradictory principles and practices of traditional institutional governance, organisational management and professional (business) practices. This has the effect of bringing about a simultaneous change of methods and status of work, as well as a change in and expansion of tasks and functions (ibid.).

Perhaps the most interesting example of hybridisation is incentives. In these cases studies, with the exception of UCT, incentives seem to be made up of a rather arbitrary mix of very direct (cash) and indirect rewards. Financial amounts are widely differing between
different institutions, and seem rather arbitrary when compared to the actual government subsidy. The majority of the case study authors were very reluctant to reveal in writing their institutions' competitive advantages, and most of the specific data included in this report was collected afterwards from other sources. Direct incentives seems most pronounced at UKZN, NMMU and TUT. The extent and effects of direct and indirect incentives in higher education are both underestimated and poorly understood.

In addition to mimicking and hybridization, another new public management issue that emerges, is standardisation. This implies a dominance of centrally developed and controlled homogeneous rules, regulations, standards, procedures and organisational structures. In contrast, diversification implies a high level of intra-institutional autonomy in developing rules, regulations, standards and procedures, as well as organisational structures (such as centres), all of which need to fit specific academic work requirements (Reed 2002). UCT seems to be oscillating between standardisation and diversification, while the other four institutions are leaning strongly towards standardisation. The question that we did not investigate is how successful the universities are in implementing standardisation. This is an issue which will, in turn, be influenced by how strong the management or the academic core is.

It is true that all professions develop through mimicking structures and standardisation of procedures; however, there are also some serious problems associated with mimetic normative isomorphism. The main one is that diagnosis/assessment of the institution's strengths and weaknesses are disconnected from capacities and structures that can achieve the aspirational goal. In other words, the goal is disconnected from the state of the institution, leaving the tail and the head separate. An organisation mimicking the structure of the high-status institution is basing its actions on the belief that the structure of the successful organisation will be beneficial, regardless of institutional differences. Secondly, a top-heavy management structure is financially and professionally beneficial to the managers, who will employ fewer lower-level administrators during times of resource constraints. UCT and TUT are the most obvious examples of similar management structures within two institutions on different ends of the university sector spectrum.

Managerialism is often accused of permeating the institution with assessment mechanisms and procedures. It is indeed the case that academics are increasingly, and quite easily, empirically assessed according to teaching and supervision loads, graduate throughputs and research outputs. But the performance criteria for the implementers of the new public management systems remain as opaque as ever; and most so-called performance contracts are not worth the paper they are written on. At the same time, the actual empirical criteria used to confirm bonuses remains subjective. This contributes to an interesting observation that we made during the case study writing process. All the authors made favourable comparisons between their institutions and selected other institutions, quite explicitly in some cases, implying that the research office has made a major contribution to this positive improvement. There is clearly some pressure to demonstrate success, even if the methodology for doing so is unclear.

Explaining increases in knowledge production is a complicated matter. In addition to the output incentives initiated by the Department of Higher Education and Training, the
Department of Science and Technology has established a system of Centres of Excellence and the National Research Foundation Research chairs, both which have substantially contributed to an increased research output. But there are also institution-specific factors that influence increases in knowledge production. UFH reports that more than 60% of their accredited output comes from five departments in agriculture and science, and that the bulk of these researchers are foreigners who are on short-term contracts. These productive researchers are in a perpetual mode of job-seeking and strengthening their CVs. At UCT, about 80% of publications come from the Medical School and Science Faculty, but they are not the main users of development and support services. Apart from the institutional comparisons, none of the case studies provided convincing information to allow for a more precise assessment of the exact contribution to knowledge productivity by the research management offices.

In conclusion, this study compliments the impressive range of reports produced by the IHERD programme in that it provides empirical and analytical information about institution specific strategies and practices regarding strengthening research management. In that sense it could also be useful for capacity building in future research management training programmes.
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Riesman D (1956) Constraint and variety in American education. Lincoln: University of Nebraska press


## Appendix 1: Case study institutional contacts

<table>
<thead>
<tr>
<th>Institution</th>
<th>Contact</th>
<th>Position</th>
<th>Email</th>
<th>Phone</th>
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<tr>
<td><strong>Cape Town</strong></td>
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<tr>
<td>VC: Dr Max Price</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:vc@uct.ac.za">vc@uct.ac.za</a></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marilet Sienaert</td>
<td>Director, Research and Innovation</td>
<td><a href="mailto:marilet.sienaert@uct.ac.za">marilet.sienaert@uct.ac.za</a></td>
<td>021 650 4402</td>
</tr>
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</tr>
<tr>
<td></td>
<td>Mignonne Breier*</td>
<td>Manager, Research and Innovation</td>
<td><a href="mailto:Mignonne.breier@uct.ac.za">Mignonne.breier@uct.ac.za</a></td>
<td>021 650 5109</td>
</tr>
<tr>
<td>(author)</td>
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<tr>
<td>Fort Hare</td>
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</tr>
<tr>
<td>VC: Dr Mvuyo Tom <a href="mailto:mtom@ufh.ac.za">mtom@ufh.ac.za</a></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prof. Gideon de Wet*</td>
<td></td>
<td>Executive Dean, Research</td>
<td><a href="mailto:GdeWet@ufh.ac.za">GdeWet@ufh.ac.za</a></td>
<td>040 602 7507</td>
</tr>
<tr>
<td></td>
<td>Anthony Afolayan</td>
<td>Head of Botany</td>
<td><a href="mailto:aafolayan@ufh.ac.za">aafolayan@ufh.ac.za</a></td>
<td>040 602 7507</td>
</tr>
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<tr>
<td>KwaZulu - Natal</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>VC: Prof. Malegapuru makgoba <a href="mailto:makgoba@ukzn.ac.za">makgoba@ukzn.ac.za</a></td>
<td></td>
<td>Deputy Vice-Chancellor, Teaching and Learning</td>
<td><a href="mailto:dvchumanities@ukzn.ac.za">dvchumanities@ukzn.ac.za</a></td>
<td>031 260 2988</td>
</tr>
<tr>
<td></td>
<td>Prof. Cheryl Potgieter*</td>
<td>Deputy Vice-Chancellor, Research</td>
<td><a href="mailto:dvcresearch@ukzn.ac.za">dvcresearch@ukzn.ac.za</a></td>
<td>031 260 2381</td>
</tr>
<tr>
<td></td>
<td>Prof. Nelson Ijumba</td>
<td>Deputy Vice-Chancellor, Research and Engagement</td>
<td><a href="mailto:thoko.mayekiso@nmmu.ac.za">thoko.mayekiso@nmmu.ac.za</a></td>
<td>041 504 2017</td>
</tr>
<tr>
<td>Nelson Mandela Metropolitan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VC: Prof. Derrick Swartz <a href="mailto:vc@nmmu.ac.za">vc@nmmu.ac.za</a></td>
<td></td>
<td>Deputy Vice-Chancellor, Research and Engagement</td>
<td><a href="mailto:thoko.mayekiso@nmmu.ac.za">thoko.mayekiso@nmmu.ac.za</a></td>
<td>041 504 2017</td>
</tr>
<tr>
<td></td>
<td>Prof. Heather Nel*</td>
<td>Senior Director: Strategic Planning</td>
<td><a href="mailto:heather.nel@nmmu.ac.za">heather.nel@nmmu.ac.za</a></td>
<td>041 504 4511</td>
</tr>
<tr>
<td></td>
<td>Pieter van Breda</td>
<td>Director, Research Management</td>
<td><a href="mailto:Pieter.VanBreda@nmmu.ac.za">Pieter.VanBreda@nmmu.ac.za</a></td>
<td>041 504 4536</td>
</tr>
<tr>
<td>Tshwane University of Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VC: Prof. Themba Mosia <a href="mailto:MosiaT@tut.ac.za">MosiaT@tut.ac.za</a></td>
<td></td>
<td>Deputy Vice-Chancellor, Research Innovation and Partnership</td>
<td><a href="mailto:NevhutaluAP@tut.ac.za">NevhutaluAP@tut.ac.za</a></td>
<td>012 382 4733</td>
</tr>
<tr>
<td></td>
<td>Dr Prins Nevhutalu*</td>
<td>Deputy Vice-Chancellor, Research Innovation and Partnership</td>
<td><a href="mailto:NevhutaluAP@tut.ac.za">NevhutaluAP@tut.ac.za</a></td>
<td>012 382 4112/3</td>
</tr>
</tbody>
</table>

* Authors