Strategies for university improvement: The research profile change at a South African non-research-intensive university

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Abstract

Universities worldwide experience continual change in order to achieve what is perceived as improvement. In these changes, there is usually an emphasis on the research function of a university, and the literature contains a number of themes in this regard. We contribute by presenting a detailed case study of a non-research-intensive university which implemented drastic change to achieve improvement, with emphasis on research, research management and interdisciplinarity. The case study provides insight into the processes, restructuring and outcomes, illustrates the selection and implementation of focus areas for research and postgraduate education, identifies supporting factors and provides an example of a university where there was radical restructuring across the full width of the institution. It sheds light on questions concerning outcomes of the use of institutional funds as 'seed money', the change in culture and climate and the operation of research units in a framework of matrix management.

INTRODUCTION AND RATIONALE

Universities worldwide are experiencing continual change to achieve what is perceived as 'improvement'. In many countries, governments require that universities change because these governments have the expectation of economic returns as a result. In other cases, government intervention is weaker but universities themselves initiate change for a variety of reasons. Often universities aspire to achieve prestige nationally and internationally, and hence take into account global tendencies in higher education. In other cases, change is necessary to ensure the very survival of a university.

In these changes, there is usually an emphasis on the research function of a university, since research output is crucial to the standing of a university in the very competitive world of higher education. 'It is research that fires the ambition of the contemporary university' (Connell 2004, 9). Whereas massification was a major force in higher education in many countries during the latter half of the 20th century, competition, driven in part by the research capacity of universities, is playing a similar role in the early 21st century (Hazelkorn 2004a, 119). This aspect, including the different strategies employed to achieve the desired change, is especially important for our investigation.

In this connection, a number of themes appear. In our literature survey, we consider the developed as well as the developing world and attempt to identify such themes, while exploring the relationship with the case study we present.

A first theme concerns the desire of governments to improve *economic competitiveness* in the global arena. For example, Brint (2005, 30) refers to 'the efforts of business, government and education leaders ... to improve US economic competitiveness in the face of challenges from the Far East and Europe'; this led to legislation which encouraged universities to interact with private firms. It also led to the formation of 'centres of innovation' by some American states and support for such centres by research councils. Kim (2007) describes the aim, in a shift to a knowledge-based economy, of a 'peripheral country', Korea, to build a so-called 'world-class' university, and the implications for universities in other middle-income countries. In this case, the Korean government adopted a national priority to invest heavily in research funding for universities in order to build 'world-class research universities that can play a central role in Korean economic development'. The university concerned made an effort to empower itself and to emphasize the pursuit of excellence in research. In a well-funded environment, the changes produced impressive results in both quantity and quality of research output, as well as a strong standing in international ratings.

A related theme concerns *economic efficiency*. For example, according to Neumann and Guthrie (2002; 2004), Western governments perceived a fiscal crisis and made adjustments in the public sector for economic efficiency. This has impacted on Australian higher education, but also on higher education in other western countries, such as the UK, the US and New Zealand. The impact was specifically on research, through central control and managerialist systems, of which the authors are critical.

In an effort to achieve economic efficiency, governments and research councils often promote a theme of '*concentration and selectivity*', leading to selection of areas for focused research and then directing investment to the chosen areas. In Australia, government policy 'encouraged universities to use business oriented strategic plans to determine their research direction, focus for research and resource strengths' (Neumann and Guthrie 2002; 2004). In the UK, the government-driven Research Assessment Exercise (RAE) plays an important role in this regard. According to Barker (2007), the RAE 'has become a dominant phenomenon for UK universities, which devote huge resources to developing their strategies towards

it and managing it ...', leading to strong funding concentration and to selectively directing funding to the highest-rated departments – but there was no attempt to apply selectivity criteria with strategic promotion of different research themes. Brint (2005) discusses 'new directions' in American research universities and some universities pursuing leadership by improving their standing within the disciplines, but others try to achieve this through contributions to new technologies, forms of expression and social relations. A few universities can do both simultaneously, but those below this level make a choice between building strength in the traditional disciplines and creating new foci of interdisciplinary creativity where they can make a major contribution and which are in agreement with national priorities. Altbach (2003) notes that achievement of 'world-class' status for universities should not be overemphasized, but agrees that debating the matter is beneficial, because it directs the attention to improvement of universities. This leads to a recommendation to focus on fields that are of special relevance to the national or regional economy or society.

Selecting research foci is closely aligned with the theme of emphasis on *interdisciplinary research* in contemporary universities, and many view this as a suitable strategy for change. In a special report, the Association of American Universities (2005) notes the growth in number, diversity and complexity of interdisciplinary centres at universities. For the successful creation and continuation of such centres, there is a need for faculty engagement and administrative commitment, an explicit funding plan, suitable arrangements between a centre and a department(s), quality leadership in centres, periodic internal and external evaluations and involvement of postgraduate as well as undergraduate students. According to Sá (2008), interdisciplinarity is a present-day goal or strategy at universities in die US. Interdisciplinary research centres and institutes have grown in number and importance and 'most leading universities boast commitments to fostering interdisciplinary activity on campuses, while some institutions aspire to differentiate themselves as propitious places for interdisciplinarity'. In Europe, the League of European Research Universities provides examples of aspirations and change with a strong emphasis on integrated research, reputation as research centres and the building of internal structures to support interdisciplinarity (Funnekotter 2005). According to Barker (2008) the UK government seems confident that the RAE will provide stronger incentives to work on more relevant and interdisciplinary research, although doubts exist in this regard.

Interdisciplinarity is related to the theme of *Mode 2 knowledge production*, which operates within the context of application and not within a disciplinary framework. An influential monograph, 'The New Production of Knowledge: Science and Research in contemporary Societies' (Gibbons et al. 1994) introduced the concepts of a Mode 1 university (the most familiar and then dominant contemporary type of university) and a new mode, designated Mode 2. The basic characteristic of Mode 2 is that knowledge production operates within the context of application and that problems are not set within a disciplinary framework. This research was termed 'research in application'. Mode 2 universities, through their research and teaching,

are concerned with society primarily by supporting the economy and promoting the quality of life of citizens.

The theme of a new and different *university culture, and associated new structures*, arises during such changes. The change to interdisciplinarity poses special challenges to universities used to departments structured along disciplinary lines over the years, since the existence of such structures is seen to impair this goal for change. According to Feller (2002), interdisciplinarity is a strong thrust in the strategic plans of many universities, both research universities and 'aspiring' universities, but this is not enough to achieve enhanced quality and competitiveness, since the content of a strategic plan often does not take hold on a campus. Sá (2008) points to the managerial problem and a lack of administrative leadership in situations where the most common structures are 'organizational research units', drawing staff from multiple departments. Indeed, only a small number of universities engage in reform of core academic policies and organizational frameworks, leading to the expectation of continued experimentation, but not radical transformation. Thus, structural and conceptual change to governance and management structures do not necessarily lead to improvement.

The relationship between *teaching and research* at universities has been widely studied and also appears in the present context. Taylor (2006) finds that at research-intensive universities, there is a strong philosophical commitment to the integration of teaching and research, but some uncertainty on how to turn this into practice. On the other hand, Robertson and Bond (2005) mention the tension between teaching and research due to government funding policies based mostly on research quality. Hattie and Marsh (2003) even refer to possible antagonism between research and teaching.

The theme of *entrepreneurship* often arises in relation to change, but, according to Brint (2005), American universities rarely favour this term when describing their institutions. Bernasconi (2005) presents an interesting case of entrepreneurship in a developing country. He describes how a university in Chile had to face rapidly declining public funding and became reliant on private funding through various entrepreneurial enterprises, while simultaneously turning itself from a mostly teaching institution to 'finding its way' towards becoming a more research-oriented institution.

Given the importance attached to research, it is no wonder that in recent years there has been a strong growth in the development of *research management* in higher education worldwide (Kirkland 2005), including the developing world (Neave 2006). Important issues in this regard at higher education institutions are the growing significance of the research mission, the strengthening of structures and processes for research management, funding and resourcing of research and the nurturing of the research careers of staff. These lead to the growth of specialisation and the professionalization of research management within institutions, as well as institution-wide strategic planning, including establishing research priorities, internally and externally evaluating research quality, and deciding how to commercialize

university research (Connell 2004; Hazelkorn 2004a; 2004b). Taylor (2006) studied research management at a number of research-intensive universities and found several common characteristics, including a distinctive management philosophy, a distinctive organizational structure, funding for new activities and awareness of cost, use of performance indicators and external peer review.

Drawing together the research contributions from the literature presented here, one sees that the attempts of universities worldwide to improve are characterized by themes as identified above. A number of studies give attention to practices at research-intensive universities, mainly in the US, although some studies concerning other parts of the world and other kinds of universities also appear. One notices the complexities in the processes and structures associated with these changes.

What is missing from the available research are in-depth studies that provide greater understanding of how individual institutions attempt such complex change and how they handle the accompanying tensions, including possible tension between the teaching and research functions. Pertinent questions include 'critical appraisals and assessments of the use of institutional funds as "seed money"', 'the relative hospitability of different campus cultures to interdisciplinary work, as well as the means through which such cultures get established or changed', the use of matrix management in organizational research units and the experience of staff members in these frameworks (Sá, 2008, 548–549). In addition, the position of the many non-research-intensive universities all over the world, which face the challenge of change for improvement needs more attention. Historically they were mostly teaching institutions, but in present times, there is an emphasis on the research function. For understandable reasons, most studies seem to concern research-intensive universities, but for instance in its latest classification, the Carnegie Foundation for the Advancement of Teaching (2005, http://www.carnegiefoundation.org/classifications/index.asp?key=805) indicates that from 4392 institutions of higher learning in the US, only 282 or 6.4 per cent are classified as 'research universities', showing the need for such research.

For these reasons, we present a detailed case study of a non-research-intensive university, which implemented drastic change for improvement with emphasis on research, research management and interdisciplinarity. The case study provides insight in the processes, restructuring and outcomes. It illustrates the selection and implementation of focus areas for research and postgraduate education and the accompanying concentration of funding. It extends the literature by identifying supporting factors that play a role in ensuring successful change. It provides an example of a university where there was radical restructuring across the full width of the institution, contrary to published research, which does not anticipate the broad transformation of university structures (for example, Sá 2008, 550). It sheds light on questions concerning outcomes of the use of institutional funds as seed money, the change in culture and climate and the operation of research units in a framework of matrix management.

The case study is based on a strategic intervention and resulting developments at the North-West University (NWU) in South Africa over a period of approximately the last 10 years. The NWU represents a relevant case, since it shares many similarities with other universities in the world that are not research-intensive, and being an institution that can trace its origins to colonial times in the second half of the nineteenth century. The NWU implemented change primarily for the purpose of improvement of research and postgraduate education, but also with the intention that the new research profile should then lead to a restructuring of undergraduate teaching and learning. This was entirely its own initiative, without the benefit of additional government investment. The NWU case should be of interest to non-research-intensive universities, which aspire to change for the sake of improvement.

THE CASE STUDY

In this case study, we describe and critique the intervention at the NWU. Both authors were closely involved in the change process and had at their disposal all the relevant documents, including minutes of meetings, implementation manuals and review reports from which the data for this study were obtained.

In South Africa, the Department of Education published its White Paper on Higher Education (1997) during a time when it was initiating a far-reaching restructuring of higher education in the country. In the White Paper there was emphasis on the 'key role' of research, and phrases such as 'concentration and selectivity', 'demonstrable strength' and 'number of places to be publicly funded' appeared. All concerned interpreted this as signalling that the usual practice of research at that time was to be replaced by a focused approach and that only focus areas with evaluated strengths would in future be able to qualify for government funding. This was in line with some international trends referred to above. Although the Department did not implement these plans in the form proposed, the intention of the government policy at the time was clear. The South African government then revised the national science and innovation system, leading to new funding modalities (cf. Department of Science and Technology 2002). The concept of Mode 2 knowledge production also exerted a powerful influence on the key policy makers in higher education in South Africa (Jansen 2002; Winberg 2006).

Although South Africa is considered part of the developing world, global tendencies in higher education, including research and research management, have a strong impact on higher education institutions in the country, such as at the NWU. Indeed, according to Neave (2002), the concern of public authorities and international agencies about university-based research systems in Western Europe, has extended into the research systems of developing nations.

Although the South African government encouraged concentration and selectivity in university research, in comparison with the UK and Australia, this was a relatively weak intervention, with individual universities responding each in its own way, if at all. The literature contains little as to the response of the universities, but information

obtained through presentations at meetings and university web sites shows that universities responded in a variety of ways, such as the formation of 'research signature themes' (University of Cape Town), 'research thrusts' (University of the Witwatersrand), 'focus areas' (University of Stellenbosch, Tshwane University of Technology), while others applied more traditional strategies (Lues and Lategan 2006; Pouris 2006). The NWU took a much stronger approach, opting for a drastic new strategy and full restructuring.

We introduce the case with a brief orientation to the NWU and its history and then proceed to describe the implementation of the strategic decisions, linking them to the wider context. We conclude with a discussion and conclusions.

AN ORIENTATION TO THE NWU

The NWU, in its present form, came into existence in January 2004 as a result of a decision of the Minister of Education to merge the former Potchefstroom University (PU) and the former University of the Northwest (Uniwest), situated at Mafikeng, both in the North-West Province, a rural part of the country. This was one of a number of mergers implemented as part of the government policy of restructuring higher education (Department of Education 2002). The situation of the NWU was especially challenging, since the geographical distance between Potchefstroom and Mafikeng is more than 200 km, while the distance between Potchefstroom and the second campus of the former PU, the Vaal Triangle Campus, is about 100 km. The PU initiated the strategy for improvement some years earlier (in 1997) and the NWU eventually took this further. The case study mostly concerns events at the former PU, but these developments became part of the later NWU. (We will use the word 'University' to refer to either the PU or the NWU and it will be clear from the time context which is the relevant one).

It was during the 1990s that research and postgraduate education became a cause for concern to the leadership of the former PU. Both research quality and productivity were perceived to be weak as compared to other universities in the national system. Research was mostly left to the initiative of individual staff members, with the exception of a few pockets of excellence. There was little in the way of research management (Reinecke 1998). Traditionally the University had largely been a teaching institution, but research was gradually becoming part of its profile.

At the same time there was an intuitive drift in the direction of Mode 2 knowledge production and associated interdisciplinarity that had been encouraged at the institution. The PU's policy-makers chose 'an entrepreneurial orientation' as a key phrase in its vision statement, formulated in 1994, and after the merger and formation of the NWU in 2004, the new strategic plan contained the reference 'The NWU as a Mode 2 university'. Examples included several high-level joint-research agreements between the University and large industrial companies, as well as numerous interactions of staff members with institutions in society, government and industry. These formed part of attempts to meet the challenge of being relevant

to communities outside the University and simultaneously to strengthen finances for the academic task. It was policy to re-invest all income generated through Mode 2 activities in research capacity building. Kruss (2005, 123–124) who studied South African university-industry partnerships, defines several categories and designates the PU as 'emergent entrepreneurial', meaning that the University is more explicitly driven by the financial imperatives facing higher education to seek additional income, while attempting to consolidate and expand its research capacity.

INSTITUTIONAL STRATEGY AND ACTIONS

Planning and preparations

The realisation that the research profile of the University was inadequate was especially strongly felt by the Principal as head of the institution at the time. He was an experienced researcher in the field of Biochemistry and had strong ties with universities in the Netherlands. He took the lead in 1997 and, after discussions with the leadership of the Centre for Higher Education Policy Studies (CHEPS), situated at Twente University, contracted the Centre to design and implement the restructuring of research at the University, with the overall purpose of quality improvement. CHEPS was considered ideally suited to the task since it was a well-known advisor for higher education institutions in a variety of countries and had been involved in South Africa before. CHEPS enjoyed respect over a wide front, including among the local higher education authorities. Its quality philosophy of 'quality improvement' rather than 'quality control' was acceptable to the University (Reinecke 1998) and included the principle of self-evaluation followed by external peer review.

In 1997, the Principal, with the assistance of a consultant from CHEPS, took the lead in the process of restructuring the research landscape at the University. They prepared an implementation manual (CHEPS 1997) and then proceeded at a rapid pace, while attempting to ensure the full involvement of the University community. In response to government policy of concentration and selectivity and drawing from the experience of CHEPS, the main feature of the plan was to form a small number of focus areas where research and postgraduate education would be integrated and which would be based on existing strengths, aligned with national priorities and with emphasis on interdisciplinarity. The arguments in favour of this strategy were convincing to the staff: in order to bring strength to its research, the University had to limit research activities to fewer areas and support them more sufficiently, thus leading to concerted team work in order to have a higher impact on both the scholarly world and the wider community.

Implementation and international audit

The process was simultaneously bottom-up and top-down. Still during 1997, faculties had the opportunity to propose focus areas, which resulted in around 55 proposals, which were clearly too many. A small committee, chaired by the Principal and consisting of some of the University's top researchers and senior managers, studied

the proposals, consulted with the deans and succeeded in eventually reducing these to 15. This was done by grouping together related proposals and eliminating some that were not feasible. These were still more than had initially been aimed for, but could at that stage not be reduced further without loss of support. The Principal and his advisors identified interim group leaders to consult with the group members, to prepare documentation on the research record of each of the 15 groups and to propose research plans for the groups according to a prescribed format. Each document was sent to an expert advisor from the international research community and, based on their responses, the group leaders made appropriate adjustments.

Following this, each group prepared an extensive in-depth self-evaluation, again according to a prescribed format and a research plan. In line with the CHEPS philosophy, an external Audit Committee of high international stature then reviewed these self-evaluations and plans together with the process followed to arrive at the proposed focus areas during a weeklong visit to the University. The chairperson of the Committee was a recently retired president of a Dutch university who had acted as advisor to the PU previously, but was sufficiently independent for this purpose. The remainder of the Committee consisted of three members drawn from the international academic community and three national members, one each from industry, the science councils and the universities. The secretariat came from CHEPS, but the Committee operated completely independently of CHEPS. The presence of members from Europe and Australia ensured involvement from developed countries while the presence of a university principal from a neighbouring African country, together with the chairperson of the former National Commission for Higher Education, ensured credibility in the African context. It was especially necessary to command the respect of the University community, because the University leadership anticipated that the Committee would not approve all the proposed focus areas. This could lead to discontent since everyone realised that the approved focus areas would, in future, be privileged as far as central University funding was concerned.

After intensive deliberations, including interviews with delegations from all the proposed focus areas, the Committee presented its findings to an open gathering of staff and students. In its written report (CHEPS 1998, 5), the Committee concluded that the University had followed ‘best international practice in university quality promotion: a combination of self-assessment and external assessment’.

The Committee commended the University for ‘the standard it has developed for future quality evaluation at the University’. Of the 15 proposed focus areas, the Commission recommended the acceptance of the following 12 to the University authorities (a reading of their themes illustrates the drive towards relevance and interdisciplinarity):

- Decision-making and Management for Economic Development
- Communication in South Africa: Language, Literature, Media
- The Teaching Learning Organisation

- Manufacturing, Energy Systems, Material and Mineral Technology
- Reformed Theology, Ethics and Society
- Development in the South African Constitutional State
- Preventive and Therapeutic Interventions
- Pharmaceutical and Biomedical Research and Services
- Business Mathematics and Informatics
- Space Physics
- Chemical Transformation and Separation Technology
- Environmental Sciences and Development.

In addition, the Committee formulated other valuable recommendations on more general, related matters, including aspects of research management, staff development, postgraduate education and community development programmes. The Committee met on campus during June 1998, the written report was completed in August and the University management promptly accepted all the recommendations. The high stature and authority of the Committee was such that there was very little objection against these decisions.

Restructuring into focus areas and schools

By the end of the year, the 12 focus areas were officially approved and a research director, who preferably had to be a researcher with international standing, was appointed for each focus area. (A few years later a 13th focus area was added, namely 'Sustainable Social Development'.) Where useful, external advisors participated in the final shaping of some of the focus areas. At the same time the University management used the opportunity to reduce the number of departments from 87 by merging them into 35 new schools, each consisting of a few subject groups, which handled matters particular to the different disciplines. The guiding principle here was to form the schools in such a way that they would be aligned as closely as possible to the focus areas, given their assigned responsibility for teaching and learning as contained in course work mostly along disciplinary lines. Research and postgraduate education through research would in future be the responsibility of the focus areas, with emphasis on interdisciplinarity and a Mode 2 approach. The implication was that different structures were now responsible for teaching and for research respectively, creating the potential danger of separation or even antagonism.

The University decided to retain its nine faculties with some adjustments, while the structuring of the schools was such that each was located entirely within a faculty. However, in order to encourage interdisciplinary research, the focus areas sometimes crossed faculty boundaries, containing members from more than one faculty. In each case, management determined the faculty in which the 'centre of gravity' of a focus area was situated and the director of the focus area then reported to the dean of this faculty. A school director headed each school and, in order to ensure that the

new research structures would not be subservient to the more traditional structures, research directors and school directors received equal status and empowerment.

The implication was that a staff member would report to both a school director and a research director and receive directions from both, thus creating a 'matrix-like' system of management as explained by Sá (2008, 548) in the context of 'operational research units', which one may loosely identify with the focus areas in the present case. An attempt towards better structure in this somewhat complex situation came with the introduction of a system of written 'task agreements' between each staff member and the relevant school director and research director jointly, with any disputes referred to the relevant dean for resolution. The management model presented some difficulty in practice, as the reports of external reviews often pointed out. For example, one school inherited outside revenue streams from the departments it superseded and then denied access to most of this funding to the focus area where almost its entire staff did their research. In other cases, staff not belonging to the faculty where their focus area resided, felt somewhat isolated and not supported by their own faculty. Fortunately, for the process, these cases constituted a small minority.

Completion of restructuring

Following these rather radical developments, the following significant structures and processes completed the new drive for research:

- A small Department of Research Support was set up, headed by a Dean of Research (the first author of this article), who came from the ranks of the serving deans. His status as colleague on the same level of authority enhanced acceptance of the new office by the deans of the faculties.
- A Monitoring Commission was formed to closely monitor the 12 focus areas to ensure their sound development, as recommended by the Audit Committee the previous year. This is in agreement with the recommendations of the AAU report (2005, 14) 'that regular internal reviews can help new ventures toward their stated objectives and provide feedback supporting effective midcourse corrections'. The Monitoring Commission consisted of five researchers of international stature from within the University, and deliberately excluded senior management and the research directors. In addition, the Dean of Research acted as secretary and was responsible for the final editing of the report. The Commission had the task of studying the annual reports and accompanying strategic plans of the focus areas, as well as to discuss recommendations with the leadership of each focus area together with the relevant dean. These discussions led to an annual report to Senate in which the Commission gave its view on the current state of research at the University and made recommendations on quality improvement for the University as a whole and for each focus area separately. It functioned as a generalist commission, concentrating on sound research practice. Initially some research directors were sceptical and feared

intrusion into their own domains, but this changed when it became evident that the Commission provided sound advice and effectively voiced the concerns of the community of researchers to management.

- A three-year cycle of external peer reviews of the 12 focus areas (1999–2001) was started, reviewing four focus areas per year. The University made funding available to bring external reviewers from the national and international community to the campus for periods of three days in each of these years. Four panels, each typically consisting of one international and two national members, convened simultaneously under the leadership of an independent chairperson for the joint sessions. The chairperson of the Audit Committee of the previous year acted in this new capacity and CHEPS provided the secretariat. (The second cycle took place during the years 2004–2006, with a former Secretary-General of the Association of Commonwealth Universities (ACU) as chairperson and with the ACU providing the secretariat.) The peer reviews followed the format of an extensive self-evaluation, followed by an external review. These reviews were not in any way part of a national review system, but were organised on a voluntary basis by the University for its own quality improvement purposes. Feedback from the research directors whose focus areas were reviewed indicated that they considered the experience valuable. Since the University deliberately gave the reviews the stature of high-profile events, the University community observed the new emphasis on research and saw this as encouragement to participate. Gibbons and Bjarnason (2005) termed the NWU process an example of 'process evaluation', where the evaluation occurs *while* the research is done, as distinct from evaluation *before* research is done and evaluation *after* research is done. In their view, this was a unique way of monitoring the strategic transformation to a Mode 2 university and of obviating any tensions that may arise. This was 'a broader process of quality control than normally occurs in Mode 1. Peer review is used in an expanded form ...'.
- A high-level Executive Committee for Research, chaired by the Principal and consisting of the relevant senior managers, the deans, the dean of research and the 12 research directors, was established. The purpose of the Committee was to decide on policy matters concerning research and to evaluate the management actions in this regard. Thus the Committee was to function at a policy level that was higher than traditional university research committees, which often handle mainly administrative matters.
- The University budget made available significant internal research funding for the first time. This funding came from interest on investments which management had earmarked for strategic purposes. The funding was sufficient only for basic expenses of focus areas, but represented a vast improvement compared with the past. The intention was that focus areas should attract supplementary outside funding to support research projects. In addition, the

Monitoring Commission was entrusted with the responsibility of making recommendations regarding a separate seed fund for innovative approaches within the focus areas.

Mode 2 strategy

A clearly stated aim of the transformation process was the move towards a Mode 2 university, keeping in mind that Mode 2 activities were to include and build upon Mode 1 activities because without basic and fundamental research, applied research or research in application would not be sustainable. The University policy makers knew that, in the South African context, it was very important to be attuned to the needs of society. Steps taken included strong encouragement for the focus areas to choose themes relevant to national priorities, encouragement of interdisciplinarity, evaluation of the movement towards Mode 2 through regular evaluations and an emphasis of interaction with industry and other outside institutions. Boersma et al. (2008) give an analysis of the programme in Business Mathematics and Informatics and its interaction with industry. These steps were intended to bring 'Mode 2 thinking into the heart of one university' (Gibbons and Bjarnason 2005, 178).

The appointment of a Vice-Principal Technology (later Executive Director: Research and Innovation, the second author of this article) in 2001, with the assignment to accelerate the university's innovation drive, stimulated this effort. In 2003 a Director: Innovation was appointed, heading an Innovation Office, for further support in this area.

Improvement of research productivity

As part of the rollout of the new research strategy, the newly appointed Dean of Research compared research output at the University with that of peer South African universities, confirming the University's challenge. The next step was an empirical study (Wissing et al. 2002) to determine the views of staff members on the factors influencing research productivity. The recommendations flowing from the study involved budgeting for more research time for staff, contracting of specific research outcomes in task agreements, training of researchers in writing scientific articles, mentoring young researchers and involving more postgraduate students as researchers. The Executive Committee for Research accepted these recommendations for implementation by the deans and research directors.

Concerning time management, the University adopted the '40:40:20 principle'. In terms of this criterion the average time allocated to teaching, research and other duties was set to be at the ratio of 40%:40%:20% respectively. Studies showed that the average time spent on research at the time was only 20 per cent, or even less. In addition, the University rationalized its academic offering and simplified its timetable by eliminating dormant teaching modules. A restructuring of the academic year created longer uninterrupted time slots for research in such a way that actual time for teaching remained unchanged.

At the same time, the University contracted an external expert to investigate the unsatisfactory publication productivity. The study acknowledged the benefits of the focus area approach, while outlining a number of shortcomings (Mouton 2003). It found that the research culture was ambiguous in view of the historical emphasis on teaching as well as uncertainty as to the commitment of senior management to research improvement, given the relatively low investment in research. Research incentives and support measures were also insufficient. Moreover, some researchers and focus area directors experienced research evaluations as too frequent and time-consuming, and this led to a decision to reduce the frequency of research evaluations, while trying to ensure that there would be no compromise in achieving the purpose.

In 2003 the University instituted a post-doctoral programme allowing successful focus areas to attract post-doctoral fellows. The target set for fellows was a number equal to 10 per cent of academic staff. The target has not been reached but there was significant growth since its inception.

Comprehensive review and merger

Two other events took place in parallel to these developments. The first was a continuation of the external evaluations, this time a review of the University as a whole by the European University Association (EUA), at the time based in Geneva. The Review Commission (EUA 2002) found that there was much that was positive on which to build, including the restructuring of research management in terms of focus areas and schools, but was sceptical as to whether the desired increase in efficiency would be achieved, especially given the danger of overburdening academic staff and the lack of technical support staff. The Commission also recommended that the University, in terms of strategic positioning, involve a broader community of staff and students than the traditional base.

This last recommendation brings us to the second event, which indeed broadened the base of the institution and had a strong impact on its future. This was the merger between the PU and Uniwest, referred to earlier, which occurred in January 2004. At the time, Uniwest had almost no research culture, as was evident from the low publication output and other research benchmarks. Under these circumstances, the interim management of the newly formed institution adopted the strategy of adopting the focus area system for the benefit of the larger institution while entering into a phase of capacity building. Thus, the further development of the focus areas continued and the second round of external evaluations of the focus areas proceeded as planned, with representatives from all campuses participating – in some cases as observers. Academics of all three campuses of the newly merged university accepted the research management system as best practice.

In 2004, the newly merged NWU adopted as one of its three strategic objectives the strategic imperative: ‘Research and Innovation: Developing from a learning/tuition-based university with focused research to a balanced teaching and research university’. This included the development of a strategic framework with measurable

outcomes and its presentation to the three campuses to guide future research plans. A consequence was the formation of 'research entities', thus creating a development trajectory, based on well defined criteria, for research groups to progress from 'Niche Area' to 'Focus Area' to 'Research Unit' and ultimately to 'Centre of Excellence'.

Results of the implementation of the new strategy

The University management viewed the results achieved during the ten years since the initial restructuring of research in a very positive light. For instance, during the preparations for an audit by the national Higher Education Quality Committee it became clear that the approach to research management was largely in agreement with the published criteria of the committee (HEQC 2004, http://www.che.ac.za/documents/d000061/), both being informed by international norms.

A major consequence of the implementation of the strategy was a noticeable change in institutional culture, referred to by Feller (2002, 110) as 'perhaps the most important, yet the most difficult to achieve'. The appointment of 12 research directors on the same level as school directors and dedicated to the research task, together with the entire line management fully accepting responsibility for implementing the new dispensation, inspired participation by those who were serious about research. Even those who were uncertain about their commitment to research chose to become members of focus areas, rather than to be left behind. The research directors welcomed the new opportunity, were enthusiastic about their newly acquired duties, were inspired by the new challenges and were energetic in building their focus areas. They were dedicated researchers who participated in international networks and had their own research cultures and research visions. Hence they were remarkably free from bureaucratic management styles and mostly encouraged an 'adhocracy culture' (Feller 2002, 114), characterized as dynamic, entrepreneurial and creative. Informal comment from researchers at other South African universities was generally positive and reinforced the growth of the new culture.

Related to this was the increase in research time, with the time spent by academic staff on the two campuses of the former PU, where the initiative had been launched, improving to more that 35 per cent on average by 2006.

The active participation of staff led to a significant improvement in research productivity (publication output and doctoral degrees delivered), research income and the ratings of research staff within the national rating system, as is apparent from Table 1, which provides summary information of the change from 1999 to 2006 for some relevant indicators.

Table 1: Research indicators 1999–2006

	Publication output (in article equivalents)*	NRF funding position**	Doctoral degrees	NRF-rated staff***
1999	193	12	48	45
2006	352	7	102	85

* Research publications in 'accredited journals' (the national Department of Education accredits journals with the purpose of subsidising universities according to the number of 'article equivalents' in these journals. An 'article equivalent' is the fraction of co-authors for an article that comes from a specific university.)

** Relative position amongst institutions receiving funding from the National Research Foundation (NRF) (from the NRF website www.nrf.ac.za)

*** Number of staff members rated by the NRF according to its system. (An individual may apply for a rating based on past research track record. Since 2002 the Social Sciences became part of the system, accounting for about 20 of the NWU's rated researchers in 2006).

The strong increase in the number of research publications (measured in 'article equivalents') is especially noticeable. Figure 1 shows the rising trend in publication output since 1999, following a gradual deterioration in research activity at the PU during the period 1988 to 1998, and relates this trend to the interventions described above. The growth in average productivity of individuals becomes clear if we note that the number of staff members where the interventions were introduced remained relatively stable during the period.

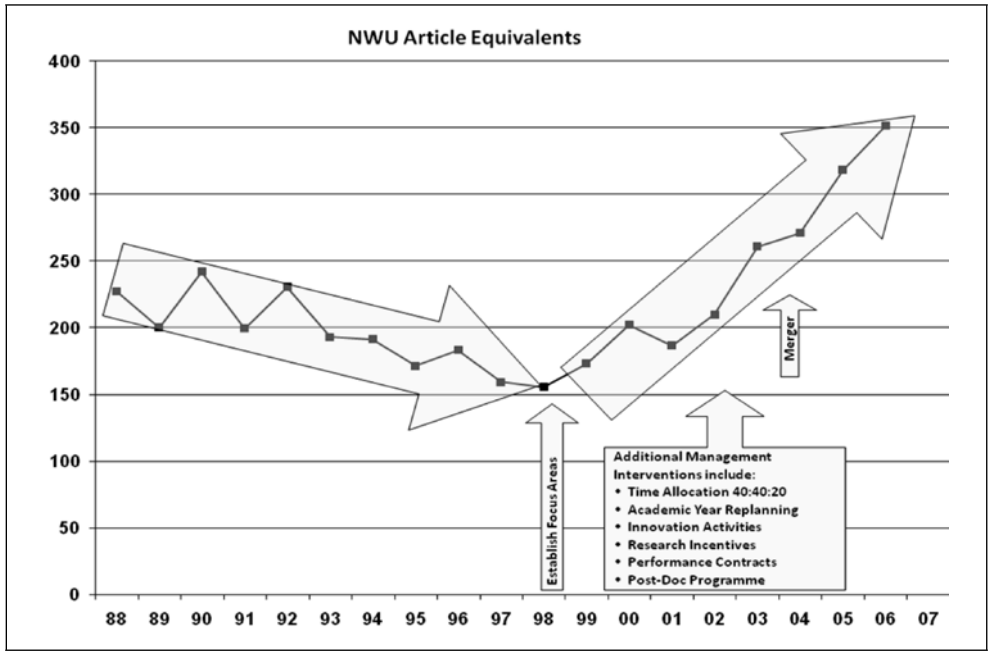

Figure 1: The growth in publications in nationally accredited journals at NWU

A comparison with the publication output of other South African universities shows that the improvement in quantity of publications was significantly higher than that of the tertiary sector as a whole. In fact, available data for the tertiary sector show that the total number of publications reported to the Department of Education increased from 5 072 in 1999 to 7 424 in 2006, an increase of 46 per cent as compared to the 82 per cent increase for the NWU over the same period. Table 2 provides further perspective, showing the distribution of percentage increases in publication output between 1999 and 2006 for those 12 South African universities reporting at least 100 publications in 2006 and which showed an increase. This table shows that the 82 per cent increase of the NWU is in the highest category of percentage increases and significantly higher than the increases for the other universities contained in the table, except for one other university which shares the highest category with the NWU.

Table 2: Frequency distribution of percentage increases in publication output for South African universities (with at least 100 publications in 2006) from 1999 to 2006

% Increase	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	Total
Number	2	0	3	2	0	3	0	2	12

Of course, quantitative improvement of research output does not necessarily mean an improvement in quality. In this case study, partial proof of quality improvement is contained in an analysis of the article output of the University as commissioned by the Higher Education Quality Committee for use in its quality audit of the University (CREST 2009). Although the report acknowledges weaknesses in the publication profile, it notes the 'positive trend' of a general increase in international visibility. It attributes this to increasing international co-authorship which is part of a wider phenomenon of an increase in article co-authorship, which in itself is seen as 'a positive trend'. An analysis shows that the total percentage of single-authored articles declined from 40 per cent in the period 1996–1998 to 29 per cent in 2005–2007. Furthermore, publications in South African non-ISI journals are decreasing – from 57 per cent in 1996–1998 to 53 per cent in 2005–2007, while publications in non South African ISI journals increased from 33 per cent to 36 per cent over the same period. In our view, this percentage increase is significant, since it occurred simultaneously with the drastic increase in total publication output.

On a broader level, the marked increase in the number of NRF rated researchers is a strong indicator of quality improvement, since an applicant earns a rating only on the basis of high-level international peer review of the quality of research output. Similarly, the improved NRF funding position as compared to other institutions can be attributed to judgment of improved quality by the external panels involved.

Concerning quality improvement in general, the final report of the second cycle of external peer reviews (ACU 2006) acknowledged the successful improvement

of the research enterprise through their recommendation 'that senior management begin with a systematic review of the appropriateness of the existing structure to continue to cope with the consequences of the success that is being achieved. In this case the imperative for a review arises from the cumulative effect of success, not the reverse'. Comments related to improvements and weaknesses with respect to individual focus areas are contained in the reports of the external reviewers (ACU 2004; ACU 2005; ACU 2006), and University management followed up on these with efforts to rectify shortcomings. In one instance, the findings even led to the termination of a focus area.

As planned, postgraduate education became increasingly integrated with research as a result of specific managerial decisions towards achieving this goal. The requirement was now that thesis topics must come from the research programmes of the focus areas, instead of being ad hoc topics proposed by students or staff. This integration then led to an improvement in the quality of postgraduate education as well. The strong growth in doctorates awarded appears in Table 1.

A further consequence of the restructuring process was a well-functioning organisational system for research management. The Director of Research Support (formerly the Dean of Research) received a strong coordinating function and executed 'functional authority' to ensure the implementation of accepted policy throughout the institution. Although the central research office was rather small, consisting of only four permanent staff members, the small offices of the 13 research directors formed a decentralised extension of the central office, thus constituting a viable administrative and management structure. An annual strategic plan for research and innovation on a university-wide level as well as strategic planning within each of the focus areas provided direction in the research activities.

An indication of the improvement in the area of innovation as compared to other universities in the country was the award conferred in 2005 in a national competition by the Innovation Fund of the NRF to the NWU for being the 'Most Progressively Innovative Higher Education Institution'. Similarly, the University emerged amongst the top five, and sometimes the top two, institutions in funding received from the national 'Technology and Human Resources for Industry Programme' (THRIP), which promotes interaction between universities and industry. As a result of actively managing its intellectual property portfolio, it has licensed a number of patents to private companies. It has also established a number of spin-off companies from its innovation activities.

DISCUSSION AND CONCLUSIONS

The move from a strategic plan for research and interdisciplinarity to its implementation often fails because of a lack of change of culture (Feller 2002). We identified several supporting factors that contributed to a change of culture and the move to full implementation at the NWU.

- The head of the institution played a pivotal role in being fully committed to and personally driving the process, thereby providing leadership and a climate of trust. Normally one would expect a vice-principal for research to fulfil this function (Feller 2002, 114), but there was not such a position at the time.
- The management principle adhered to was that the restructuring process would be the responsibility of committed line managers, especially the deans of the nine faculties and their school and research directors. This was in agreement with Feller (2002, 111), who emphasizes the behaviour of academic administrators, especially deans and department heads. A series of workshops on the management of change shortly after the initial restructuring was helpful to equip these academic managers for their new role.
- There was almost complete buy-in from the side of academic staff, since it was clear to staff members that management was serious about the process, and the message was driven home that future support for research would be through the focus areas. Existing loyalty and trust based on shared history and ethos (also emphasized by Bernasconi (2005) in the context of a Chilean university), played an important role. At the same time, there was reassurance that there would be a flexible approach and that the themes and programmes of the focus areas would be interpreted rather widely in the beginning, in order to accommodate the maximum number of researchers. However, it was also made clear that the intention was to manage gradually towards a sharper future focus. It turned out that almost all researchers were successfully accommodated in the focus areas.
- The strong involvement of external advisors, including the external review teams, was a key factor. They provided objective expert knowledge, which was not available within the University, and probably not in the country. At the same time they brought credibility to the process. The results of the reviews were very useful to managers on different levels, as discussed in Westerheijden (1997). The AAU report (2005) also refers to the importance of formal external evaluations for possible validation of programmes. Gibbons and Bjarnason (2005) emphasised the important connection of the system of reviews with the effort to transform to a Mode 2 university.
- The strategy was imaginative and radical. It impressed both staff and outside observers. It was clear to all that this was not a small change, but that it went to the heart of matters.
- The drivers of the process rightly took into account the present and future environment of the University and took special note of both the national transformation agenda and international changes in the world of higher education.
- The establishment of a well-functioning organisational framework led to institutionalisation of the new structures and processes.

- The emphasis on relevance contributed to the credibility of the process, both internally and externally.

Contrary to expectations in the literature (Sá 2008; Brint 2005) that disciplinary departmental structures would remain the basic university structure and that full transformation to interdisciplinary structures would not appear, the present case study provides an example of a restructuring over the full width of the University. In this case, it was the intention that the research effort of the University would be contained in the identified focus areas, and eventually the research remaining outside the focus areas was minimal.

The handling of tensions that necessarily arise in such a radical change process requires the special attention of a university management. An important mechanism in this regard was the series of internal and external 'process evaluations', which ensured that any problematic situation that arose during the process could be picked up for attention (Gibbons and Bjarnason 2005). A second mechanism was the requirement that research directors and school directors, under supervision of their deans, take joint responsibility for the ironing out of tensions arising from the new structures of schools and focus areas. This was especially important in order to ensure that the functions of teaching and research do not oppose each other, but rather strive towards mutual support and integration.

An assessment of the institutional funds made available to the focus areas shows that this funding could provide only for their very basic needs. However, this allowed the focus areas to start functioning, thus providing a platform from where the research directors and their staff could access external funding to supplement institutional funds. As reported, the external funding increased strongly, thus justifying the investment of institutional money. The increase in publications, also reported above and which led, in the South African system, to increased government subsidy to the University, provides a further justification. Thus, the 'seed money' played a vital role and led to a measurable return, shedding light on a question raised by Sá (2008). Comparing the NWU case with the cases in Chile and Korea mentioned earlier, one sees that in the Chilean case, the emphasis was on the strengthening of funding for the University, while simultaneously growing its disciplinary research strength. In contrast, the NWU invested available 'strategic funds' in the improvement of interdisciplinary research and innovation. In the Korean case, on the other hand, there was substantial government investment and the aim of benchmarking with top research-intensive universities in the US, while the NWU did not have the benefit of additional government investment and aimed for improvement in selected focus areas only.

The hospitability of the University culture to a Mode 2 approach and interdisciplinarity (Sá 2008) came from stimulation by the University leadership and a history of involvement with outside institutions of government and industry that had developed over the years. It also came from an acceptance of the deep political changes in the country at the time and the will to be of service, realising the close connection of these matters with the survival of the institution.

The formation of a set of focus areas and a parallel set of schools necessitated a system of matrix management, which provides an example of how this kind of management works in practice (Sá 2008). The first mechanism to make this complex system work was the supervision of any two directors of a focus area and a school by the relevant dean. The second, and closely related, mechanism was the explicit use of written task agreements between each director and the dean, as well as the use of written task agreements between individual staff members and the relevant two directors. In spite of smaller problems, the system worked well enough for the focus areas to move forward and achieve the increase in research output reported above.

In terms of the international context of universities attempting change for improvement, the processes and interventions discussed here should provide useful insights, especially to many non-research-intensive universities.

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