

THE MEASUREMENT OF RESEARCH OUTPUT
OF PUBLIC HIGHER EDUCATION INSTITUTIONS
IN SOUTH AFRICA: HURDLE OR HANDLE?

By

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“Those who thank with lips, thank others in part; the full, the true thanksgiving, comes deep from the heart” –anonymous-

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<u>DEGREE AND PROJECT</u>	M.Ed (Education Management and Policy) The measurement of research output of public higher education institutions in South Africa: hurdle or handle?
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DECLARATION

I declare that the research titled “The measurement of research output of public higher education institutions in South Africa: hurdle or handle?” is my own work. I further declare that all the sources that have been used and quoted in research have been acknowledged.

.....

.....

SIGNATURE

DATE

DEDICATION

This research is dedicated to my late beloved parents, Frans Nchimane (Mpaketsane) and Mmaletlape Esther (Meiki) Madue. Although both of them never made it to tertiary education, they made concerted efforts to support the six of us morally, spiritually and materially throughout our educational endeavours.

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ABSTRACT

The measurement of research output is common practice among public institutions internationally, and is increasingly contested and controversial. The term “research” is itself contested and can cover quite a wide range of activities, from carefully designed studies by independent, university-based researchers to analysis of data for particular administrative or political purposes to arguments for specific policy positions that may be more or less well grounded in evidence. Such measurement of research output is needed for decisions about professional staff and resource allocations. Measures of research productivity, covering both quantity and quality at national level, support government decisions on setting priorities and funding.

With increasing competitive allocation of research funding and declining public funds for higher education, institutions around the world are facing increasing pressure to produce research outputs. The revenue generated through published research has therefore come to assume greater and greater significance in institutional budgets and in academic reward systems. Moreover, research in public institutions is funded mainly according to the number and quality of publications of members of staff. On the other hand, the growing international trend towards ranking institutions in competitive terms has assigned considerable value to research output as a measure of institutional standing in the global marketplace.

What counts as an acceptable unit of measurement therefore becomes the subject of considerable debate within and outside institutions as they seek to enhance institutional standing and revenue. Whilst measurable output such as scientific publications and research reports are usually considered for government subsidy, it is difficult to accept that other output types such as patents, software, advisory work for government, consulting, or technical assistance, are not measurable, and do not have any relevance with respect to research subsidy.

This thesis was set out to critically examine the effects that current government policy on the measurement of research output of public higher education institutions will have on the performance of South African Higher Education Institutions (HEIs). The purpose of this study was to trace and explain the differential impact of new government policies on the measurement of institutional research output in four different university

faculties. The study has highlighted key challenges facing the universities in implementing the new research subsidy policy; and made recommendations and proposals on how best can the policy be implemented with the view of increasing or improving the institutions' research output.

KEY WORDS

1. Research output
2. Research support
3. Research information system
4. Research funding
5. Measurement
6. Evaluation
7. Peer review
8. Policy studies
9. Policy gap
10. Higher education institutions

LIST OF ABBREVIATIONS AND ACRONYMS

ASSAf	Academy of Science of South Africa
CESM	Classification of Education Subject Matter
CHE	Council for Higher Education
CI	Citation Index
DoE	Department of Education
DRS	Department of Research Support
GDP	Gross Domestic Product
HEIs	Higher Education institutions
HESA	Higher Education South Africa
HEFCE	Higher Education Funding Council
IBSS	International Bibliography of Social Sciences
ISBN	International Standard Book Number
ISI	Institute of Scientific Information
ISSN	International Standard Serial Number
MIS	Management Information System
NCHE	National Commission on Higher Education
NRF	National Research Foundation
NPHE	National Plan on Higher Education
OECD	Organisation for Economic Co-operation and Development
RESCOMS	Research Committees
R&D	Research and Development
RIS	Research Information System
SADA	South African Data Archive
SET	Science, Engineering and Technology
SSCI	Social Sciences Citation Index
UP	University of Pretoria

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Chapter 1

Introduction: Stage setting

1.1 Introduction

The purpose of this chapter is to set the stage for the research thesis. In this chapter, through the conceptual framework, this study was started by recognising a significant gap between education policy and practice in especially a developing country context. Preliminary reading on the gap between policy and practice has helped the researcher to arrive at the research topic. The chapter is also aimed at highlighting the motivation for the study, the statement of purpose, rationale and the relevance and significance of the study. The research questions and objectives that guide this study form the central part of this chapter. The chapter is concluded by an outline of the main topics that will be discussed in each chapter of the thesis.

1.2 Conceptual framework

This study was started from the perspective of recognising a significant gap between education policy and practice in especially a developing country context. The 'policy gap' reflects the mismatch between policy intentions, policy practice and policy effects (Sayed and Jansen, 2001:6). On a project titled "Closing the gap between policy and implementation in South Africa", Khosa (2003:349) notes that "the discrepancies between policy and implementation are largely caused by unrealistic policies and a lack of managerial expertise". Another key finding is that policy implementation has suffered from the absence of a people driven process. Insufficient co-ordination of policy implementation is cited in virtually all sectors, and has significantly hampered the implementation of policies. In addition, insufficient staffing, and capacity of all three spheres of government, as well as the linkages between them have largely worked against the successful implementation of policies.

Manganyi (2001:27) points out that the nature of public policy, its development and subsequent implementation in real time, is one of the most important features of defining democratic societies and, more specifically, of those in transition. There is a need for understanding concepts such as 'policy' and 'policy formulation' to

conduct public ¹policy analysis. Fox and Meyer (1995:107) define policy as authoritative statements made by legitimate public institutions about the way in which they propose to deal with policy problems. More acceptable, however, is the definition by Anderson (1997:9), as based on the work of Political Scientist Carl J Friedrich. Anderson defines policy as a proposed course of action of a person, group or government within a given environment providing obstacles and opportunities which the policy was proposed to utilise and overcome in an effort to reach a goal or realise an objective.

Given the above, public policy refers to a proposed course of action of government, or guidelines to follow to reach goals and objectives, and is continuously subject to the effects of environmental change and influence. In relation to the research topic, the definition of policy is borrowed from Levinson and Sutton (2001:5) in which they state:

In most of contemporary studies, policy is conceived in terms of multilateral, national, state, or local directives that legislate institutional structures, proper codes of conduct, and academic standards for schools.

To understand the nature of policy change and policy gap in the South African context and, its relevance to the research topic, it is important to review some relevant literature. Recent surveys on policy and practice single out policy implementation as being difficult to put into practice, for example, it is argued that: one of the difficult issues in educational change is policy itself- not this policy or that policy, but the basic ways in which policy is conceived, developed and put into practice (Darling-Hammond, 1998:642).

A number of writers have used policy change and policy reform interchangeably. With the realisation of a wide scope of policy reforms in education, policy analysts have studied the gap between policy and practice by focusing on two issues. The first argument is centred-around the policies themselves. It is said that policies are poorly designed as responses to deeper educational problems. Analysts in this league (Chisholm, 1997; de Clercq, 1997; Christie, 1998; and Sayed and Jansen, 2001) have criticised most reforms for being inappropriately borrowed from other countries and not addressing educational realities on the ground. It is argued that

¹ Participating successfully in policy analysis; advice; and development means having more than just policy content expertise or academic qualifications. All policy analysis practitioners should appreciate the types of skills they need and strive to develop them further.

many implementing agents (including universities and schools) concur by complaining that it is difficult for them to implement current policies due to them being overloaded, unfunded mandates, and the lack of policy alignment and/or strategic prioritisation.

The second argument relates to the implementation process that encompasses problems of capacity and resources that hampers policies from being properly implemented (CEPD, 2000; de Clercq, 2001; Sayed and Jansen, 2001; and Khosa, 2003). A key problem according to Welton (2001:182) is that some of the managers who should be leading feel disempowered; they cannot see their way through, and feel deskilled and, in some cases, lacking acceptance by other stakeholders. With regard to factors that influence implementation, Rogan and Grayson (2001:2) add that all too often, policy makers and politicians are focused on the desired outcomes of educational change but neglect the contextual factors that influence implementation. This argument suggests that in many instances policy failure can be attributed to poor implementation or a lack of insight into the policy process.

From the foregoing discussion, it can be deduced that, over the past ten years the changing processes of policy making and policy reforms in education have, to a great extent, outrun the development of relevant implementation, analysis and conceptualisation. According to Welton (2001:182), the jargon of the new policy framework appears alien and more concerned with theory than practice. Warwick (1982:190) concludes:

Implementation means transaction. To carry out a programme, implementers must continually deal with tasks, environments, clients, and each other. The formalities of organisation and the mechanics of administration are important as background, but the key to success is continual coping with contexts, personalities, alliances, and events. And crucial to such adaptation is the willingness to acknowledge and correct mistakes, to shift directions, and to learn from doing. Nothing more is vital to implementation than self-correction, nothing more lethal than blind perseverance.

My deduction in this regard is that, it is policy and its delivery (implementation) which is the glue that binds and makes sense and directs the different functions, experts, professional staff, administrative procedures, structures, budgeting and other activities of the public sector.

Donn (1995:34) concedes that in education, policy-making in an international context since 1976 in Britain, and in the 1980's in a number of Anglophone countries, has yielded frequent innovations. These are seen mostly in curriculum assessment, in reforms in education administration and even in the philosophical bases of what counts as education and for what it is. Kraak (2000:36) correctly states that every major policy document in science and education since 1994 contains in the preamble bold statements about South Africa's role in the global economy; the importance of economic and educational competitiveness within a globalised community; the growth of new technologies and innovation; demands for new kinds of workers that should be prepared for the globalised realities in the 21st century; the proliferation of new models of knowledge production based on international partnerships and norms, to which South African knowledge industry should aspire.

The changes in policy have served to highlight the international dimension of education policy at two levels: firstly, in terms of substantive changes, we can see similarities in policy innovations across industrialised, developed and developing countries. Secondly, an internationalist perspective helps our understanding of the underlying political and economic forces that drive the policy community. One of the objectives of this research project was to raise the possibilities of understanding current education developments in South Africa in the light of the international substantive and theoretical concerns. The question remains: do these international perspectives continue to make less sense for understanding current education policy in South Africa?

Hüfner, Sadlak and Chitoran (1997:341-342) suggested that, there is little doubt that knowledge generated from research and incorporated into policy-making and its implementation not only facilitates the rational attainment of expressed political or institutional objectives but also adds to their legitimation. The legitimacy of mandated policy change and its take-up (or take-off) crucially connects to public perception and action, whether in favour and /or against (Sayed, 2002:31). Studying and comparing the problems, experiences, and policy options by analysing various enactments at the national, regional, and international levels is becoming an important part of the policy development and also in the field of higher education.

If the reasons for policy success or failure cannot be understood, then attempts to improve programmes and policies or sustain and emulate successful initiatives may be ineffective or even counterproductive. Policy evaluation can only indicate the nature of the changes required if it can explain why a programme or policy succeeded or failed. Much of the evaluation literature has relatively little to say in relation to explanation (as opposed to causality). Sanderson (2000:440) explains that evaluation is concerned more with establishing whether policies and programs achieve their intended effects rather than with understanding how they achieve their effects. In the words of Sayed and Jansen (2001:6) perhaps “policy evaluation in South Africa needs to distinguish analytically between conceptual critique and implementation critique, a process which requires time”. As Sayed (1999:4) points out, the implementation issue has been ignored (at least not foregrounded) and has been a consequence of attempting to create the frameworks for change.

Policy implementation and evaluation is of relevance to this study of the policy on the measurement of research output of public higher education institutions in South Africa. The means for estimating the value of research output of universities have proved to be a controversial topic. Not only is it necessary to capture the quantity of output, which can be quite varied and given weight, but also the quality of the work must be accounted for (Abbott and Doucoliagos, 2003:92). Internationally, several changes and trends at the level of research performance have been identified. Many of these can be distinguished in the South African context and should be accounted for in research evaluation processes and systems.

Public policy does not end in the passing of legislation. It culminates in policy implementation, which involves all the activities designed to carry out policies enacted by legislature (Dye, 1995:312). Similarly, Henry (2001:295) states that implementation is the execution and delivery of public policies by organisations or arrangements among institutions. Although improved accountability has been a major force behind the move to implementing the policy for measurement of research output of public higher education institutions in South Africa, there is an even more important reason: To help institutions improve their output. Research output measurement provides a learning loop that feeds information back into institutions on how well they are doing. It offers findings they can use to adapt, improve, and become more effective.

The process of focusing on research output (on how the institution is doing what it is doing and how it thinks researchers will be better off) gives research managers and staff a clearer picture of the purpose of their efforts. That clarification alone leads to more focused and productive service delivery. It is in this regard that a study how the University of Pretoria is performing in implementing the policy on the measurement of research output of public higher education institutions was chosen.

In South Africa much attention has been focused on policy formulation without indicating how to translate such policy into measurable outcomes (see Christie 1995; Sayed 1996 & 1997; de Clercq 1997). South Africa in fact has an impressive compendium of education policies that were widely acclaimed throughout the world (Sayed & Jansen, 2001:6). However, good policy does not automatically produce good results. Porter (1980:75) argues that the people concerned with creating policy and enacting relevant legislation seldom look down the track of the implementation stage. The question is: does South Africa's new policy for the measurement of research output translate downwards into effective practice? To what extent will the new research policy enhance and increase the research output of the University of Pretoria?

An institution's research output grant for any funding year is dependent on (a) actual totals of research graduates and research publication units for the year, and (b) normative total which it should have produced in terms of national benchmarks² (Ministry of Education, 2004:12). The research topic was chosen in order to compare and contrast the implementation of the new research policy, with its stated goals, and the manner in which such a policy gets interpreted and understood by various implementers in university contexts.

² Benchmarking relates to the definition of an appropriate 'reference' set of entities to which a particular unit under evaluation can be compared. The research university has become the international benchmark and successful research programmes have become the discerning feature of these institutions.

1.3 Statement of purpose

The measurement of research output is common practice among public institutions internationally, and is increasingly contested and controversial. Levin (2004:1) stresses that, the term “research” is itself contested and can cover quite a wide range of activities, from carefully designed studies by independent, university-based researchers to analysis of data for particular administrative or political purposes to arguments for specific policy positions that may be more or less well grounded in evidence. Such measurement of research output is needed for decisions about professional staff and resource allocations. Pouris (2006:23) adds that measures of research productivity, covering both quantity and quality, at national level support government decisions on setting priorities and funding.

With increasing competitive allocation of research funding and declining public funds for higher education, institutions around the world are facing increasing pressure to produce research outputs. The revenue generated through published research has therefore come to assume greater significance in institutional budgets and in academic reward systems. Moreover, research in public institutions is funded mainly according to the number and quality of publications by members of staff. On the other hand, the growing international trend towards ranking institutions in competitive terms has assigned considerable value to research output as a measure of institutional standing in the global marketplace.

What counts as an acceptable unit of measurement therefore becomes the subject of considerable debate within and outside institutions as they seek to enhance institutional standing and revenue. Whilst measurable outputs such as scientific publications and research reports are usually considered for government subsidy, it is difficult to accept that other output types such as patents, software, advisory work for government, consulting, or technical assistance, are not measurable, and do not have any relevance with respect to research subsidy.

Yet the measurement of research output is not a simple matter, for the following reasons: Firstly, one would measure various components of research output, such as journal articles³, books for specialists and published conference proceedings.

³ Articles accepted for publication must be peer-reviewed. Books refer to peer-reviewed, non-periodical scholarly or research publications disseminating original research or current developments with specific disciplines, sub-discipline or field of study. Conference proceedings refer

Such a measure of output can be difficult enough to produce for a single academic department of a faculty, because the allocation of the time of researchers takes place between research and teaching. Secondly, the measurement of research output is the subject of policy debate, since funding is particularly received according to the number of publications produced and published in predetermined ('accredited') journals. Thirdly, senior researchers experience many demands on their expertise, such as ⁴reviewing journal articles, assessing research grants applications, serving on selection and promotion committees and being co-opted to national or institutional review bodies. All these important research related activities are not considered measurable outputs. Fourthly, there is a strong case to be made for what counts as quality research output in South Africa. Quality research helps to build and brand the country's research, attract foreign interest, and identify what research is done and what it means in this part of the world.

It is against this background that this study set out to critically examine the effects that current government policy on the measurement of research output of public higher education institutions will have on the performance of South African Higher Education Institutions (HEIs). The purpose of this study was to trace and explain the differential impact of new government policies on the measurement of institutional research output in four different university faculties.

The thesis brings together the experiences of those involved in the process of measuring research output of higher education institutions in South Africa, as well as those who use and disseminate the information that it provides, including scientists, policy advisers and research administrators. The research objectives and main questions that guide this study are highlighted below.

to the published record of a conference, congress, symposium or other meeting whose purpose is to disseminate original research on current developments within specific disciplines, sub-discipline or field of study.

⁴ Peer Review is the name given to the judgement of scientific merit by other scientists working in, or close to the field of question. Peer review is premised upon the assumption that a judgement about certain aspects of science, for example its quality, is an expert decision capable of being made only by those who are sufficiently knowledgeable about the cognitive development of the field, its research agenda, and the practitioners within it."

1.4 Research objectives and questions

The objectives of this study were to investigate the extent to which the new policy will have on the increasing the quality and quantity of research output of HEIs; identify key challenges facing the universities in implementing the new research subsidy policy; and to make recommendations and proposals on how best can the policy be implemented with the view of increasing or improving the institutions' research output.

This study was guided by the following research questions:

- a) In what ways do new government policies on research measurement impact on faculties within a university?
- b) Is the new policy on research measurement more effective than previous policies from the perspective of institutional stakeholders? In other words, does the new policy improve or retard the measurement of research output when compared with previous policies?
- c) Why are some university faculties more successful than others in managing the measurement of research output in the context of new government policies?

1.5 Hypothesis

With regard to the research questions presented above, it is postulated that, although far from perfect, especially in a rapidly changing higher education landscape, political and technological environment, the new policy for the measurement of research output of public higher education institutions in South Africa is more relevant and encourages research productivity than its predecessors. The current policy is a goal-oriented and performance-related distributive mechanism that explicitly links the allocation of funds to academic activity and output. The current policy arguably serves to improve the measurement of research output of HEIs.

1.6 Rationale

HEIs are extremely complex organisations that seek to achieve a multiplicity of goals. As Moed *et al*, (2004:36) point out, it is often quite problematic to understand and 'unravel' the structure of a research organisation in terms of 'real' units such as departments or research groups. In addition, universities are multi-output entities producing research, teaching and community services. Ashworth & Harvey (1994:109) note that taught programmes of study in a university are designed to transmit, to the students, knowledge, that is already established and is believed to be conventional, i.e., orthodoxy. In contrast, research is an original investigation that is undertaken in order to gain knowledge and understanding. Research investigations may lead to new techniques or artefacts; they may lead, through scholarship, to new or substantially improved insights.

The motivation to engage in this study derived partly from the researcher's previous position as the Research Funding Administrator in the Department of Research Support and Development of the University of Pretoria. At that time, the responsibilities in that position were among others: to co-ordinate the research output for the Faculties of Law, Theology, Economic and Management Sciences, Humanities and Education. Measuring the efficiency of HEIs in the production of research output can play an important role in achieving improvements in the performance of the higher education sector in South Africa. According to the Council for Higher Education (2000:15) report, data analysed reveal that research output of the higher education sector has declined since 1994, thus compromising the research and development agenda of the country. It highlights further by stating that in 1998, about 65% of all publications recognised for subsidy purposes were produced by only six of the 21 universities. An indication of HEIs' research output production rates, and which institutions were the best performers is potentially of value to the providers of funds, i.e government, the clients of HEIs (students and researchers), and managers of HEIs (Deans, Vice-Chancellors and Research Managers).

The higher education sector in any country plays a crucial role both in the advancement of knowledge, through research, and in the training of people for productive roles in society, through its teaching function. ASSAf (2006:98) adds that most of the issues that apply to research in developed countries apply also in South Africa as a developing country of a particular kind. We have many university-

based and other researchers who are competing/ participating in research at a global level, despite significant infrastructure handicaps in many cases, while others wish to enter that league and need help from the managers of the system. At the same time, typical 'developing country' cries of discrimination, needs for better allocation of more research resources, and better dissemination of research outputs can be heard.

In virtually all modern-societies, the public bears a considerable share of the direct costs of higher education. HEIs are an important component of human capital formation. They are also a major expenditure component for taxpayers. The efficiency by which inputs produce desired output is thus an important public policy issue. Moreover, with increased competition for students globally, the efficiency of HEIs in the production of research outputs is an international rankings concern. Part of my motivation to engage in the study is my recognition that research in the higher education sector is of utmost importance to future national and international needs and must be 'defended'. This research has also been partially stimulated by Prof Jonathan Jansen's scepticism about government initiatives. Jansen (2002:86) is concerned about the existing distance between externally mandated policies and practices in South Africa. My analysis of Jansen's concern is that, he is referring to a situation where policies are progressively developed without any sound implementation in practice.

Universities in South Africa perform 98,7% of academic research, in terms of expenditure and produce more than 70% of the academic publications indexed by the Science Citation Index (Whiston, 1994:17). This study will be valuable to the research community and national governments since through comparable performance measures of HEIs' research outputs, ⁵stakeholders may use the findings to:

- a) stimulate policy development by highlighting the effects of implementing research output measurement policies by HEIs ;
- b) assist the resource allocation/budgeting process by providing a means of allocating research funding based on the available data on research

⁵ The term refers to beneficiaries of research and includes: government departments and agencies that are looking for research-based solutions to important practical problems (whether social, technical or in some other domain), and industrial undertakings looking for sources of possible product or process innovation. Research in the social and human sciences is a reliable source of direction and good practice for community-based and non-governmental organizations, international and national development agencies, educational institutions; and civil society at large.

output and, agreed plans for improved performance, rather than on the assumption that performance should equal past levels;

- c) assist managers in the use of performance measurement to identify differences in performance; and
- d) focus attention on other institutions which may be performing better. More detailed comparative exercises may help identify the practices being used by the other institutions.

Identifying major gaps in the production of research outputs can provide the impetus for institutions to fundamentally rethink how they do things.

In order to establish the nature and extent of research in this specific field, numerous sources were consulted. From the sources consulted including the South African Data Archive (SADA), NRF Nexus database, the University of Pretoria's Academic Information Centre and the Department of Education, it has been established that this kind of research on the Higher Education Act, 1997 (Act No.101 of 1997) Policy and procedures for measurement of research output of public higher education institutions 2003 has not been done before.

1.7 The research context

In many countries, the rewarding of quality research output at public higher institutions by the national governments forms the basis for sustaining current research and promoting research and other knowledge outputs required to meet national development needs. In England for example, the most recent plans of the Higher Education Funding Council (HEFCE) intend to strongly reward 'world class' research. The idea is to focus on excellent research, and support, if possible, for the other research (Moed *et al*, 2004:379). In Australia, the link between research funding and higher education research output has been in place for decades. Spanish scientists are directly rewarded with a salary supplement for increasing their output in major English Language international journals (Jiménez-Contreras, Anegón and López-Cózar, 2003). Evaluation, publications, faculty performance, reputation, peer-evaluation, citations, patents, indeed the whole gamut of performance indicators are necessarily the 'order of the day' despite many doubts regarding specific legitimacy of certain measures.

The academic research system in South Africa is currently strongly driven by the Department of Education's (supply-side) subsidy system which pays the institution

a subsidy per publication in one of the peer-reviewed journals listed in the two accredited international databases and in the DoE list of accredited journals (ASSAf, 2006:102). Higher Education institutions are dependent on the government subsidy for research output. The Ministry of Education (2004:12) explains that an institution's research output for any funding year n is dependent on (a) actual totals of research graduates and research publication units for the year $n-2$, and (b) a normative total which it should have produced in terms of national benchmarks. These totals produce different grants for an institution, as shown in Figure 1.1.

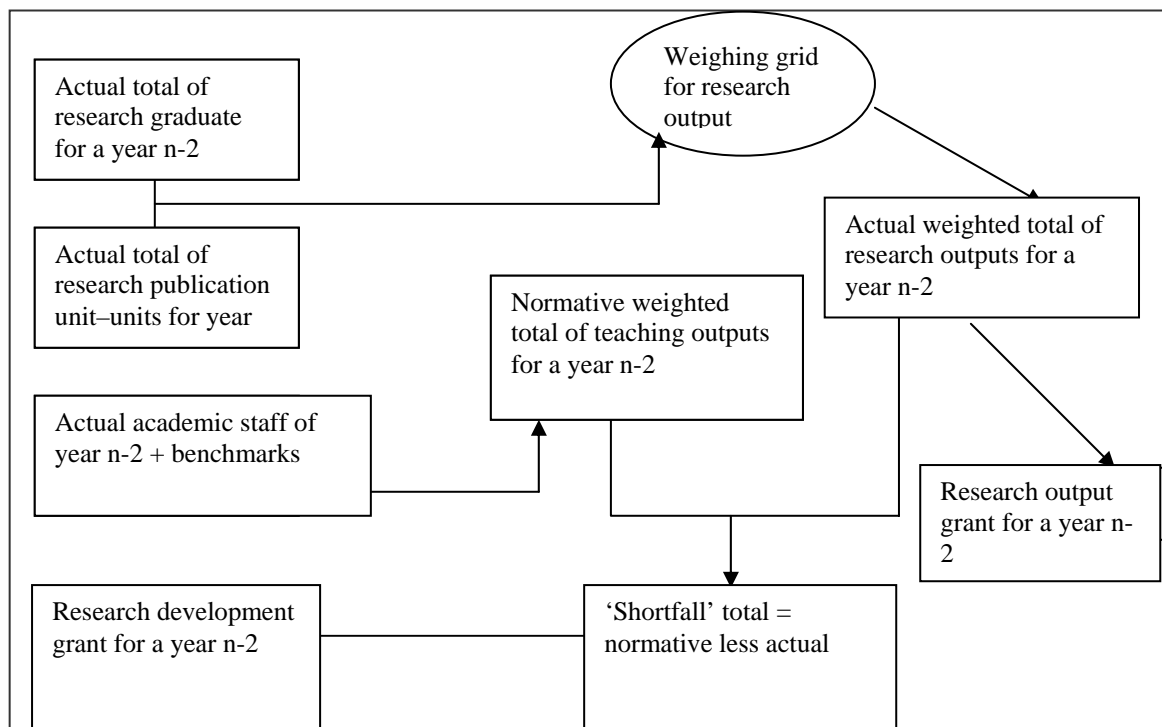


Figure 1.1: Flow chart for the calculation of research output Source: Ministry of Education (2004:13)

In South Africa for example, Pouris (2006:24) indicates that research papers are the most important output and universities receive more than R80 000 for each article they produce. Consequently, researchers in disciplines producing large number of publications can argue for and claim greater resources from their administrations than their less prolific colleagues. ASSAf (2006:102) concurs and states that it is expected to be R70 000 for each "unit" of the 2004 publications. Research output is continuously assessed, and funding is made contingent on the quality of the research performed. Table 1.1 shows details of the subsidy formula used for the allocation of funds to South African universities from 1997/98 to 2003/04 financial years.

Table 1.1 Subsidy formula allocations to universities from 1997/98 to 2003/04 (amounts in thousands of rand). Source: Department of Education, Annual Report 2003.

Institution	1997/98 Allocation (R'000)	1998/99 Allocation (R'000)	1999/2000 Allocation (R'000)	2000/01 Allocation (R'000)	2001/02 Allocation (R'000)	2002/03 Allocation (R'000)	2003/04 Allocation (R'000)
Universities	3 591 089	3 854 455	4 155 323	4 498 399	4 880 623	5 192 495	5 559 072
Cape Town	249 381	268 820	280 820	308 985	350 047	379 021	421 567
Durban Westville	141 472	132 358	143 802	161 945	167 012	188 075	163 286
For Hare	81 923	90 587	93 769	85 794	86 992	87 834	85 227
Free State	155 577	179 515	185 818	190 053	221 343	284 134	320 583
MEDUNSA	99 422	104 111	158 054	154 956	168 911	168 723	164 337
Natal	248 266	275 505	301 978	336 600	355 072	397 326	457 969
North	203 556	209 013	177 826	186 390	181 419	179 789	122 306
North West	101 927	91 646	88 191	100 014	112 449	115 850	108 402
Port Elizabeth	79 315	80 045	105 993	138 837	172 013	140 206	161 173
Potchefstroom	136 323	149 001	168 791	212 697	242 208	254 654	292 447
Pretoria	339 518	448 720	477 027	534 746	584 249	640 352	746 640
RAU	180 333	189 591	212 215	241 523	225 545	246 265	283 430
Rhodes	75 590	78 386	85 659	98 235	100 289	118 536	123 749
Stellenbosch	228 393	258 130	282 296	314 017	361 561	407 284	444 130
Transkei	112 432	109 367	99 743	98 837	102 651	80 008	84 222
UNISA	330 863	402 877	417 884	458 674	488 963	551 646	566 260
Venda	70 406	85 052	90 471	83 594	106 987	117 745	88 750
Vista	185 307	179 681	221 238	231 689	253 767	211 877	192 159
Western Cape	144 478	143 061	159 804	145 469	145 842	163 622	185 223
Witwatersrand	276 643	292 154	309 229	315 496	342 529	385 671	441 853
Zululand	88 964	86 835	95 268	99 846	110 774	109 877	105 359

The transformation agenda in South Africa sought to create a single co-ordinated higher education system through the *Higher Education Act, 1997 (Act No.101 of 1997)*. In line with the Act, the Policy and Procedures for Measurement of Research Output of Higher Education Institutions has replaced the *Information Survey Manual – Research Output of Universities (Report 014/97)*, and *Information Survey Manual – Research Output of Technikons (Report 024/97)*. In Education White Paper 3: A programme for the Transformation of the Higher Education System (June 1997), it was indicated that the transformation agenda required the development of a new funding framework. This was necessary, as the existing funding framework, which was introduced in 1982-1983, is not suitable. Apart from its origin in the apartheid past, it could not be used as a steering mechanism to address national goals and objectives. In line with this, a new funding framework was developed after widespread consultation with the higher education sector. The new funding framework is a goal-oriented and performance-related distributive mechanism that explicitly links the allocation of funds to academic activity and output; in particular the delivery of teaching-related and research-related services, which contribute to the social and economic development of the country.

The extent to which the research activities of universities is supported by the DoE, is determined by the size of the university and includes provision for the staffing or research programme, the provision of the necessary supplies and services within the research programme, the periodic replacement of research equipment, the renewal of building space for research and the acquisition of new equipment as student numbers increase. The DoE's Information Survey Manual (Research Output of Universities, 014(97/10)) further states that in addition, the fact that student numbers on postgraduate level are weighed by certain factors, ensures that recognition is given to the intensification of instruction at these levels and also to the important role which research plays, particularly at doctoral level. Within this framework, universities can be expected to maintain the necessary infrastructure for research and to stimulate staff and students to actively participate in the research activities of the university by, for example publishing research reports, contributing to departmental publications and, presenting research papers at conferences.

1.8 Significance of the study

Scientists who have something important to say do publish their findings vigorously in the open international journal (serial) literature (Van Raan, 2005:2). Van Raan's point of view is the central assumption on which bibliometric assessment of research performance is based. This study was started from the perspective of recognising that focusing on outcomes (publications) of research is not just a matter of observation or measurement. Publishing is a central social process of science across all disciplines because it is through publication that the research findings and results are communicated and exchanged, and that priority of work is established. Roosendaal & Geurts in ASSAf (2006) are of the opinion that researchers are motivated to publish for one or more of the following five reasons:

- a) Registration, which allows claims of precedence for a scholarly finding;
- b) Certification, which establishes the validity of a registered scholarly claim;
- c) Awareness, which allows actors in the scholarly system to remain aware of new claims and findings, and enhances collaborative opportunities;
- d) Archiving, which preserves the scholarly record over time; and
- e) Rewarding which rewards actors for their performance in the communication system, based on the metrics derived from that system.

In revealing their findings, academic researchers are influenced by priority of discovery: the first to openly reveal some findings receives the credit for these findings (think about the Nobel Prize or attaching researchers' name to findings) and the financial benefits attached to it through the academic reward system (tenure, promotion). This 'race to discover' induces academic researchers to be productive and disclose their research findings quickly. Without the link between disclosure and the reward of priority, researchers are more inclined to withhold key information. Priority does not bring a specific prestige and status but also increases the likelihood of greater research support.

Research performance assessment is a matter of evaluation. Most evaluation work worldwide relies heavily or almost completely on expert panels and other forms of peer review. ASSAf (2006:85) is of the opinion that the search for truth through research depends on the willingness and ability of researchers to expose their new discoveries to peer scrutiny for validity and to participate objectively in the scrutiny of the work of others. In principle, this quality assurance process has stood the test of time as essentially (when working well) the best and most robust system there is of ensuring that the fundamental principles of formal research publishing are observed.

The evaluation of research by means of peer review of publications is an important process through which the quality control of research is exercised. According to Moed (2005:229) the aim of a peer review process is not to settle scholarly debate, but rather to contribute to the fulfilment of conditions under which it meets professional standards. Peer review also plays an integral role in procedures to evaluate grant proposals. Undoubtedly, opinions of experts are of crucial importance in evaluation processes.

Nevertheless there are severe often underestimated and even neglected ⁶problems in peer review. For example, ASSAf (2006:68) argues that "blindness" in peer review has become a controversial question in the field, arising from abuse of privileged information, hostility and bias, technical inadequacies of reviews, and transfer of the work to less experienced associates. Martin and Irvine in Moed (2005:232) have identified three major problems in using the outcomes of peer

⁶ For more information on the complexities of the peer review system, see Langfeldt (2001) and Moed (2005).

review in a policy context. Firstly, reviewers may be influenced by political and social pressures within the scientific community, such as the possible implications of their judgements for their own work and that of their colleagues. Secondly, peer reviews tend to evaluate in terms of their own research interests, and may not possess all the knowledge that is needed to form a balanced judgement. Finally, peers tend to conform to conventionally accepted patterns of belief, and may, for instance be influenced by a scientist's reputation rather than his or her actual contribution to scientific progress. The most troublesome consequence of continued reliance on peer review is the harm that this subjective method inflicts, however inadvertently, on aspiring researchers, departments, faculties and institutions.

Peer review processes are normally carried out without documentation of the bases for conclusion. One of the methods used in the study of the measurement of the University of Pretoria's research output is bibliometrics. Veugelers (2005:33) notes that bibliometrics is increasingly being turned to as a feasible, fairly objective methodology that builds on large-scale, standardised data sources to evaluate research output. This has to be compared to the alternative of the peer review process, which is typically much more time consuming and has a larger probability of being subjective.

The study will contribute to the global knowledge base of research measurement by identifying and highlighting the trends in the South African HEIs' implementation and use of the new policy for the measurement of research output of public HEIs in South Africa. The study also brings in the international trends in the measurement of research output of institutions, faculties, academic departments, individual researchers and discipline rankings. This is seen in the emphasis of publishing in international accredited journals as well as cited journals by international organisations such as the Social Sciences Citation Index (SSCI).

This research project is important and relates directly to the restructuring of higher education funding in South Africa. In South Africa, higher education funding is greatly influenced by research output. A study on the efficiency of the University of Pretoria in implementing the measurement of research output of public higher education institutions in South Africa is valuable not only from the researcher's point of view, but will also be of interest to public officials and policy makers who are concerned with expanding higher education while containing costs, other

officials at South African HEIs who wish to compare and contrast their implementation methodologies with those of the University of Pretoria. Pouris (2006:23) is of the opinion that such information is also useful to heads of departments and deans of faculties interested in their performance in relation to their competitors. Lastly, the intention is to share the findings and recommendations of this research thesis with peers, researchers and government officials interested in the measurement of research output through publishing in accredited academic journals.

1.9 Summary of the main chapters

Now that the stage has been set through the research context, objectives and research questions, rationale and the statement of purpose, among others, the literature review conducted for this study will be presented first. This is done in chapter two. Mouton (2001:87) explains that literature review provides substantially better insight into the dimensions and complexity of the problem. The purpose of literature review was to establish what is already known about the effects of the measurement of research outputs in higher education, to evaluate the empirical claims of this published literature and, to identify the weaknesses or limitations of this knowledge as the basis for justifying this particular research focus. The outcome of the literature review has enabled me to focus on the research design and methodology to be followed. Therefore, chapter three is dedicated to explaining the research design and methodology used to obtain and analyse research data. While Babbie (1999:89) defines a research design as a mechanism to address the palling of scientific inquiry, Mouton (2001:94) regards it as a blueprint or detailed plan on how specific research is to be conducted. The three main research questions that guide this study, serve as the highlight of the research strategy.

Cumulative advantages of openly revealing research findings through publications carry the consequence of attracting attention, and enable the recruitment of able associates and students. These effects are described as the Matthew effect. (Matthew 25:29), 'For to every one who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away.' This mechanism concentrates resources in hands of those who have demonstrated the capacity to produce results. In the modern society, production has to be measured before the output thereof can be rewarded.

The study concerns the policy for the measurement of research output that supports the cumulative advantages of revealing research findings. This is done through the recognition of research outputs. In this regard, chapter four focuses on the critical comparison of the two funding regimes in the policy context. A comparison of the previous government policies and the current policy for the measurement of research output is discussed. The identification of major differences between the current policy and its predecessors forms the basis of this chapter.

Upon completion of the comparison of the two funding regimes in chapter four, chapter five focuses the research project on determining ways in which the new policy impacts on university faculties and, examines facts that might explain differences in performance among faculties. The concentration of this chapter is on the implementation of the new policy by the University of Pretoria. The chapter is aimed at answering the research questions: (i) In which ways do new government policies on research measurement impact on faculties with a university; and (ii) why are some university faculties more successful than others in managing the measurement of research output in the context of new government policies? The main findings, recommendations and conclusions are presented as the final chapter of this thesis.

Chapter 2

Literature review

2.1 Introduction

The purpose of this literature review was to establish what is already known about the effects of the measurement of research output in higher education, to evaluate the empirical claims of this published literature, and to identify the weaknesses or limitations of this knowledge as the basis for justifying the particular research focus of this study. The point was not to track down every paper that is somehow related to the research topic, but to avoid missing a useful paper that lies outside the regular purview, thereby ensuring that the habitual channels of communication will not bias the results obtained by the search. The scholarship and research on which the literature review was based come from individuals' diverse professions including education, economic sciences, information technology, engineering, law and social sciences. The review of literature has revealed that, the measurement of research output is a rapidly developing field. Its development is closely linked to the general tendencies in the global and scholarly system, where research institutions are subjected to new influences and pressures emerging from the increasing need for accountability in scholarly research and training of students. For the purpose of this study it was necessary to look at the definition of research output before engaging in a comprehensive literature review.

2.2 Defining research output

In South Africa, the Department of Education (DoE)'s policy for the measurement of research output of institutions of higher education states that, the research output of a university comprises of original research papers, research letters and review articles which appear in approved journals, as well as books for the specialist and patents that comply with the DoE criteria. Higher Education South Africa (2005:03) states that for the purposes of DoE subsidy, recognised research output comprises journals, books and proceedings. Van Raan (2005:4) defines research output as the number of articles of the institute, as far as covered by the CI indexes. As articles, He considers the following publication types: normal articles (including conference proceedings and articles published in journals), letters, notes, and reviews (but not meeting abstracts, obituaries, corrections, editorials, etc.). Van

Raan's (2005:4) definition of research output is not inclusive of other output such as books, chapters in books, patents and artefacts. This study has argued that research or scholarship-based textbooks and monographs are also important transmitters of knowledge. Furthermore, scholarly text as in the case of books for specialists allows a more laborious or lengthy examination and synthesis of an issue than is allowed in journal articles. In the following diagram, the different types of research output are presented:

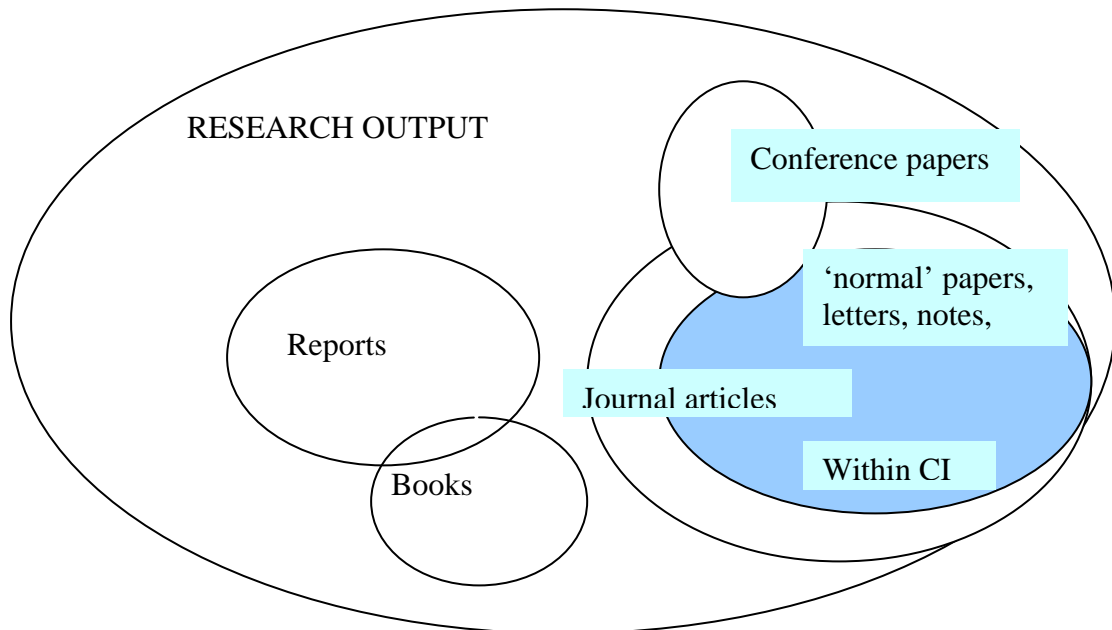


Figure: 2.1. Types of research output

The above definition of research output suggests that an array of indicators might be offered as evidence of research output: faculty research and publication productivity, articles in accredited journals, books for specialists, and published conference proceedings.

It can thus be concluded that the DoE listing is intended to be indicative rather than comprehensive- it is designed to compare relative output between institutions of higher education, across a selective sample of publications that meet prescribed criteria. In complementing the DoE policy, Ashworth (1994:110) indicates that publications, which are clear evidence of research activity, are usually taken to include, in order of their importance, publications in academic journals, professional journals, books, reports, edited works and proceedings.

Scientific publications and contributions to conferences are not only meant to present research findings, but also to evoke comments, improvements, comparison

with other work, etc. Through publishing in refereed journals and scholarly books, the academic's research outcomes and ideas are circulated amongst peers and subsequently contribute to debates in the relevant field. Work of at least some importance provokes reactions of colleagues. They are the international forum, the 'invisible college', by which research results are discussed (Moed *et al*, 2004:26).

Apart from the DoE, publication in refereed journals and scholarly books is the main criterion used by the National Research Foundation (NRF) for evaluating researchers for the purposes of rating and research funding. ASSAf (2006:94) adds that many funders and employers rate applicants for promotion and research funds by their publication record; citation by other researchers is the most accepted indicator for research impact. Brown (1997:41) concludes that studies have shown that faculty members who publish, perceive themselves and are perceived by others as more effective teachers, and that small positive correlations between teaching effectiveness and research productivity are evident.

However, there are criticisms levelled against an emphasis on publication. One such criticism concerns a possible proliferation of trivial work. Effendi and Hamber (1999:173) argue that obsession with publication can become a source of stress for individual researchers and can lead to the proliferation of trivial work published in journals and books. Le Grance (2003:130) also notes that trivial work might be the outcome of the pressure to produce sufficiently large numbers of publications to meet the bureaucratic requirements for the procurement of subsidy income from the DoE or the performance of appraisal systems. This kind of pressure might lead the academics to engage in a ⁷game of publication and consequently publish same articles under different names in different publications. However, it should be noted that what is perceived to be trivial by one research community might be perceived to be acceptable research by another. In view that literature review can be a daunting task, the search has to be limited and in this case the inclusion and exclusion criteria technique was used to focus the literature review.

⁷ The pressure of publishing which is also known as the salami-style of publishing i.e. cutting slices from an integral piece of work that could be published in a single paper and publishing each slice in a separate paper with the aim of increasing research output.

2.3 Inclusion and exclusion criteria

In conducting literature review, candidate articles were limited to those having the terms “measurement, assessment and evaluation of research outputs” in their titles and sub titles. From these articles, only those that were published from 1991 to the present were selected. Letters, editorials, reviews, and articles that are not written in English were particularly excluded. Lastly, the list of articles reviewed was limited to 20 prominent journals. A summary of the inclusion and exclusion criteria is shown in Table 2.1.

Inclusion criteria	Type
The term “research output” in titles published from 1991 to the present.	Content
English language	Publication date
In about 20 prominent journals	Publication language
	Journal
Exclusion criteria	Type
Letters, editorials, review articles	Research design
Articles that are not published in English	Content
	Language

Table 2.1: Inclusion and exclusion criteria

The inclusion and exclusion criteria listed above have helped in identify the starting point for the literature review. The criteria led to the decision of looking at the history of measuring research output as the starting point for literature review.

2.4 History of measuring research output

Van Raan (2005:2) reveals that scientists have communicated (and codified) their findings in a relatively orderly, well defined way since the 17th Century. Crucial is the phenomenon of serial literature: publications in international journals. Thus, communication- that is, exchange of research results- is a crucial aspect of the scientific endeavour. Publications are not the only elements, but certainly are very important ones in this process of knowledge exchange.

Measuring research output and impact analysis has a relatively long history. The most common approach is bibliometrics, a research method using quantitative

analysis to measure research output and impact within or between a given field or discipline (Macauley, Evans, Pearson and Tregenza, 2005:190). Moed *et al*, (2004:26) concede that bibliometrics has been used as early as 1917 but it gained popularity after the introduction of the Science Citation Index in 1961. The measurements of individual and departmental research accomplishments are often based at least in part on the number of publications produced over a specific time period. Measuring national research performance with the use of bibliometric indicators is also an activity with a long tradition. Moed (2005:272) notes that Narin (1976), Prize (1978), Prize (1980b), Braun, Glänzel and Schebert (Braun *et al.*, 1988), and many others made important contributions to the topic of measuring research performance.

In South Africa, measuring research output has been well documented. Steyn (2002:253) mentions that the South African research subsidy formula has been used by the state for almost twenty years to fund universities and technikons. He further states that during the last half century only three funding formulae were used in South Africa for the funding of universities. These were the Holloway formula, the van Wyk de Vries formula and the SAPSE formula. Steyn and Vermeulen (1998) gave an exposition of the evolution of these formulae since 1951. Although the need to develop a new funding framework for the measurement of research output was first clearly articulated in the 1996 report of the National Commission on Higher Education (NCHE), a framework for transformation and then codified in the 1997 Education White Paper 3, A programme for the transformation of higher education the change was most pronounced after 2001 Mubangizi (2005:1120).

Interestingly, studies that address institutional-level productivity often base their analysis solely on teaching activities, and thus overlook the research activities of an institution (Toutkoushian, Robert, Porter, Stephen, Danielson, Cherry, Hollis, and Paula, 2002:3). Many analysts have argued that at the higher education level, the teaching and research functions are mutually synergetic. Each informs the other and in particular an active presence in the research mileau assists to improve the quality of teaching (Whiston, 1994:163).

Toutkoushian and Danielson (2002:48) point that “The goal of advancement of knowledge through research is especially underrepresented among the sets of indicators that are used in higher education”. Information on the research output of

institutions has not been readily available to those interested in assessing and comparing institutions. According to Toutkoushian *et al.* (2002:4) the lack of attention given to research accomplishments is of concern because the resulting assessments and rankings of institutions may overlook an important facet of their mission. The question is “what is meant by measuring research output”?

2.5 Measuring research output

In the words of Van Raan (2004:3), there is no final theory of science providing a methodology of measurement. It is a recurring hype in the social studies of science to incite the scientific community with this observation. Measuring research output is often equated with journal publications. Ashworth and Harvey (1994:110) argue that also relevant, particularly in departments in which a significant portion of the work is practical and applied, are patents and licenses. It is likely that groups of staff that are involved in this form of innovative research activity are disadvantaged if publications in journals are used as the main criterion in judging research performance. It was indicated in the previous chapter that, the new policy does not mention patents and artefacts as other categories of research output. Fox (1992:103) stresses that research productivity and publication productivity are not strictly equivalent. Rather, the one (publication) is an indicator of the other (research). It is the outcomes of research that are observed; the research is not directly observable.

Measuring research output is associated with its utility- that is, the extent to which the research conducted is useful outside its own field. In the South African context, the pertinent research policy goal to be borne in mind relates to responsiveness, that is, “... enhanced capacity (because of the broader range of expertise and foci) to respond to the social and economic needs of the region in general and of industry and civil society in particular” (Department of Education 2002:24). In his analysis, Weinberg (1989:4) identified the three external criteria for research output utility: technological merit, social merit, and scientific merit. He explains that technological merit measures the degree to which research advances technology; social merit, the degree to which the research helps achieve various social goals, such as better health, better schools, better international relations; scientific merit, the degree to which the research illuminates the neighbouring scientific fields in which the proposed research is embedded. Apart from the three external criteria identified by Weinberg (1989:4), HEIs across the globe and in South Africa in

particular, generate research output data for state subsidy, accreditation, peer review and benchmarking purposes. For the purpose of this study, the University of Pretoria as was selected as a model of a South African HEI that makes concerted efforts to successfully implement the new policy to fulfil the abovementioned purposes.

2.6 Common measures of research productivity

The most commonly used measure of individual and departmental research productivity is the number of faculty publications in selected outlets such as academic journals (Fox, 1992; Johnes and Johnes, 1995; Creamer, 1998; Dundar and Lewis, 1998; Toutkoushian, Dundar, and Becker, 1998; and Porter and Umbach, 2001;) or counts of ⁸conference papers, ⁹accredited journals publications and ¹⁰books (Noser, Manakyan, and Tanner, 1996; Bellas and Toutkoushian, 1999; Buchmueller, Dominitz, & Hansen 1999; Perry, Clifton, Menec, Struthers, and Menges, 2000). However, it should be noted that journal articles are not in all fields the main carrier of scientific knowledge. According to Moed *et al*, (2004:26) journals are not 'equivalent' elements in the scientific process, - they differ widely in importance; and they are challenged as the 'gold standard' by new types of publication behaviour, particularly electronic publishing. Also relevant, particularly in departments in which a significant portion of the work is practical and applied, are patents and licenses.

Publications offer usable elements for 'measuring' important aspects of science: author names, institutional addresses, journal (which indicates not only the field of research but also status!), references (citations), concepts (keywords, keyword combinations) Moed *et al*, (2004:25). Kenway, Gough and Hughes (1998:9) argue that the main reason for publishing is to contribute to the advancement of knowledge in the relevant field. According to Whiston (1994:219) South Africa has 0.4% of the world's researchers, who produce 0.5% of the world's scientific output. Pouris (2003) has examined South Africa's publication record in the last two decades. Table 2.2 outlines South Africa's performance in 25 scientific disciplines

⁸ The most current information in the sciences, the social sciences, and the arts and humanities is often revealed at conferences.

⁹ In the natural sciences, it appears to be increasingly the case that journal articles are the primary recognised form of scholarship, with rewards to faculty and to departments following journal performance.

¹⁰ Research/scholarship-based textbooks and monographs are also important transmitters of knowledge.

by showing its share of the world's publications. Three disciplines exhibited substantial growth over the period: immunology by 80%, education by 51%, and psychology and psychiatry by 50% (Pouris, 2003:427).

Table 2.2: South Africa's share of the world's publications; activity indices (1990-94 and 1996-2000); and changes in major scientific disciplines. Source: South African Journal of Science September/ October 2003:427

Scientific discipline	1990-1994	1996-2000	%change
1 Agricultural sciences	0.42	0.52(1.09)	20.9
2 Biology and biochemistry	0.35	0.33(0.70)	-5.7
3 Chemistry	0.39	0.34(0.69)	-12.8
4 Clinical medicine	0.59	0.46(0.89)	-22.0
5 Computer sciences	0.30	0.20(0.42)	-33.3
6 Ecology/environment	1.18	1.14(2.40)	-3.3
7 Economics and business	0.38	0.40(0.85)	5.2
8 Education	0.57	0.86(1.81)	50.8
9 Engineering	0.33	0.32(0.67)	-3.0
10 Earth sciences	1.19	1.12(2.35)	-5.8
11 Immunology	0.20	0.36(0.78)	80.0
12 Law	0.07	0.05(0.12)	-28.5
13 Materials science	0.42	0.30(0.62)	-28.5
14 Mathematics	0.38	0.42(0.88)	10.5
15 Microbiology	0.52	0.58(1.23)	11.5
16 Molecular biology and genetics	0.30	0.28(0.59)	-6.8
17 Multidisciplinary	1.25	1.16(2.44)	-7.2
18 Neurosciences	0.13	0.15(0.31)	15.3
19 Pharmacology	0.36	0.41(0.86)	13.8
20 Physics	0.29	0.26(0.53)	-10.3
21 Plant and animal sciences	1.75	1.53(2.98)	-12.5
22 Psychology/psychiatry	0.34	0.51(1.07)	50.0
23 Social sciences (general)	0.52	0.53(1.13)	1.9
24 Space science	0.98	0.92(1.93)	-5.1

This thesis seeks to establish the extent to which academics at the University of Pretoria use their publication records toward attaining the goals of the policy for the measurement of research output of public higher education institutions. Moreover, publications currently serve as chief criterion for the procurement of research grants, career advancement and for the evaluation of scientists for the purpose of rating by the National Research Foundation (NRF). Active research and the dissemination of the outcomes thereof are therefore a very important part of the responsibilities of academics. Kenway *et al.* (1998:10) summarises this by saying, “Your career security and advancement will, in part depend on it”.

Zheng and Stewart, (2002), use data on faculty publications, citations, and research dollars awarded to rank public research universities using envelopment analysis. Data envelopment analysis is a linear programming technique that calculates the efficiency of an organisation within a group relative to observed best practice within that group. Their analysis relies on a casual model to predict research output, and institutions are then ranked according to their efficiency in producing output. The contribution of each of the publications to the overall research effort is weighted in accordance with its perceived level of importance. Comparisons within an institution are less of a problem than comparisons between institutions where rankings can be sensitive to the weightings. Ashworth and Harvey (1994:111) argue that the movement of staff and multi-authored publications also cause difficulties. Much work has been done to measure the quality of work based on the frequency of citations; however, care has to be taken when considering examples of self-citation, uncomplimentary citations and staff mobility.

Other kind of research studies relies on institutional-level data to explain variations in costs per unit of output in higher education (de Groot, McMahon and Volkwein, 1991; and Koshal and Koshal, 1999). Such studies are relevant to the current research since they have recognised earlier on that the institutions of higher education produce their outputs in the areas of teaching and research, and as a result had to address the measurement of institution-level research output. An important dimension of institutional quality is the successful completion of individual research programmes by postgraduate students.

Toutkoushian *et al*, (2002:9) made two vital observations. First, in contrast to departmental-level studies, studies that attempt to evaluate and rank institutions often overlook the research activities and accomplishment of the faculty. When studies do acknowledge research, it is usually through metrics that can be readily obtained, such as total spending on research. These measures, however, often represent the resources available for producing research rather than the quantity or quality of research actually produced by the institution. Second, the wide variation in measures used to examine institutional quality suggests that developers of measures are not relying on a theoretical framework for the selection of measures to evaluate institutions. Such a framework would suggest that the measures be related to the goals and objectives of the organisation, and accordingly research measures should be included along with teaching measures in the analysis. What then is research output?

2.7 Conclusion

In the above literature review, particularly in the South African context, concentration has been on the importance of publishing in scientific journals as well as the visibility of South African journals in the international arena (Effendi and Hamber, 1999; Glänzel and Moed, 2002; Le Grance, 2003; and Pouris 2003, 2004;). Pienaar, Schirge and Von Groenewald, (2000) only concentrated on South Africa's system of evaluating and rating individual researchers. Quantitative studies of research output explore and apply methodologies that enable policy makers to carry out their research and innovation policies; and they also provide tools to critically assess the effectiveness of such policies. As a result of such quantitative studies, the measurement of research output is increasingly important in research policy. The measurement of the research output of public higher education institutions in South Africa has not received a thorough academic evaluation. Against this background, this thesis represents the first attempt to systematically study South Africa's current policy on the measurement of research outputs of public higher education institutions.

Chapter 3

Research design and methodology

3.1 Introduction

The purpose of this chapter is to highlight the design and methodology that was followed to obtain data. The chapter starts by explaining the research strategy that uses mixed methods of both qualitative and quantitative techniques. The three main research questions guiding this study serve as the compass of the research strategy. A sampling design and the justification thereof is tabled and discussed. The chapter gives full details of the data collection processes and data collection techniques employed in this research project. An account of the selection of data analysis procedures, actual procedures used, as well as sampling justification will be discussed. The shortcomings, limitations and significance of the study are addressed at the end of the chapter.

3.2 Research strategy

This is a mix methods study on the institutional measurement of research outputs in a single university – the University of Pretoria, using four faculty case studies as illustrative of the broader quest to understand how the new government policy on the measurement of research is understood and implemented. A combination of a qualitative approach (integrating expert-opinion) and the quantitative methods is required if one wants to systematically evaluate the impact of policy implementation in areas like education and strategic research, because it is long-term and cannot easily be attributed to certain measures or programme activities. It should be noted that no single method of collecting data is inherently better or has more quality than another. The preferred method in this study is therefore the qualitative method.

Qualitative researchers study human or social conditions and problems in their natural settings and attempt to make sense of these conditions and problems in terms of the meanings people bring to them (Fink, 1998:143). It is in this context that the qualitative research method was adopted for collecting and analysing data on the measurement of research output. The techniques that have been used included participant observing since the researcher was an active participant in the organisation being studied, document analysis, interviews as well as critical

incident analysis. McMillan and Schumacher (2001:41-42) state that “a technique fundamental to most qualitative research is field observation – direct, eyewitness accounts of everyday social action and settings taking the form of field notes”. The following table provides a summary of a research strategy that was used in this project:

Table 3.1: Summary of the research strategy

Research Question	Method/ Instrument	Purpose
1. In which ways do new government policies on research measurement impact on faculties within a university?	Structured and telephonic interviews, participant observation	To determine ways in which the new policy impacts on university faculties.
2. Is the new policy on research measurement more effective than previous policies from the perspective of institutional stakeholders? In other words, does the new policy improve or retard the measurement of research output when compared with previous policies?	Review of statistical records and previous government policies, analysis of research information databases, interviews	To measure the effectiveness of the new policy.
3. Why are some university faculties more successful than others in managing the measurement of research output in the context of new government policies?	Case study (four faculties)	To examine factors that might explain differences in performance among faculties.

A number of strategies were used to collect information to answer the research questions. The strategies included structured interviews (face-to-face and telephonic interviews), analysing databases (such as the University of Pretoria’s Research Information System, and Citation Indexes), observation and, review of statistical records. The aim of observation in this study was to find out how usable the new policy is, when used by the target audience.

The collection and analysis of data was done simultaneously. That is, notes, comments, observations and queries were systematically recorded throughout the process. The interviews were conducted to check the accuracy of, verify or refute impressions gained through other methods. Interviews with users of the new policy have been useful in determining the understanding and interpretation of the policy. Each interview- conversation was audio taped and then transcribed verbatim.

Data collection was also done by means of focus groups (interviews and discussions) with two different groups of end users. Firstly, structured interviews were used to collect data from the Research Information System Coordinators, data capturers, researchers and administrative officers in the Department of Research Support and Development, to solicit their understanding of the DoE policy. Secondly, a selection of officials who are directly involved in the implementation of the new policy from the DoE were engaged in structured and personal interviews.

The study was concluded by two case studies of university faculties (Education and Law) that has demonstrated a reasonable degree of compliance with the previous policies and the new policy, and two other faculties (Humanities and Economic and Management Sciences) that were previously not as effective in implementing the policies on the measurement of research output. Patton (1990:174) differentiated critical cases as “those that can make a point quite dramatically or are, for some reason, particularly important in the scheme of things”. He further noted that a clue to the existence of a critical case is the statement to the effect that “if it happens there, it will happen anywhere,” or vice versa, “if it doesn’t happen there, it won’t happen anywhere”. The case studies involving the four faculties served to examine a range of factors (Research Information System, size, co-ordination of the submission process, commitment, etc.) that might thoroughly explain the differences in performance among faculties of the University of Pretoria.

The methodology adopted in this thesis also addressed the demands of quantitatively measuring excellence in the production of research output. There are severe often underestimated and even neglected problems in the peer review system. Peer review undoubtedly is and has to remain the principal procedure of quality judgement. But peer review and related expert-based judgements may have serious shortcomings and disadvantages (Horrobin, 1990; Moxham and Aderson, 1992). Van Raan (2005:3) identified subjectivity as one example, that is, dependence of the outcomes on the choice of individual committee members- is one major problem. It has also been argued that peer judgements are influenced by factors other than the scholarly merits of the research under evaluation. Moed (2005:55) points that peer evaluators may be influenced by political and social pressures within the scientific community, tend to evaluate in terms of their own research interests and activities, and may conform to conventionally accepted

patterns of belief. It is against this background that in this study, one of the methods used in evaluating the measurement of the University of Pretoria's research output is bibliometrics. Bibliometrics was originally defined as the application of mathematical and statistical methods to books and other means of communication. According to the Royal Academy of Engineering (2000:15) bibliometrics techniques may include the number of papers issued by a country, by institution, by author, or the number of citations or co-citations. The bibliometric database gives an important analytical tool for studying developments in publication records and journal articles.

Veugelers (2005:33) notes that bibliometrics is increasingly being turned to as a feasible, fairly objective methodology that builds on large-scale, standardised data sources to evaluate research output. Bibliometrics has been used in this study as a tool to quantify publications in particular scientific fields and disciplines, and to make international comparisons. The use of bibliometrics in the study of social sciences and humanities is fairly new, especially in South Africa. Only in the last couple of years have systematic attempts been made to develop quantitative indicators that can be used within the social sciences and humanities, in close consultation with scientists in those fields (Luwel, *et al*, in Moed, *et al*, 2004:383). Bibliometric analysis is essentially a quantitative measure of scholarly communication.

Successful measurements and evaluations heavily depend on the choice of the methods (i.e., surveys, bibliometrics, econometric studies, comparisons, and peer review) that are most appropriate for a particular policy or institution to be evaluated or measured. The use of bibliometrics has to be compared to the alternative of peer review process, which is typically much more time consuming and has a larger probability of being subjective. Peer review, including acknowledged experts from industry as well as academia, is a well-respected method of assessing those aspects of research that are not readily amenable to quantitative measures and should therefore form part of the measurement and assessment process.

3.3 Data analysis

As indicated in the research strategy, the collection and analysis of data was done simultaneously. Types of data analysis used in this study included (but was not

restricted to) document analysis, content analysis, and case studies. As the starting point, document analysis has included past and current DoE policies on the measurement of research output. The differences in past and current policies were identified and analysed. An application of systematic observation was employed in the content analysis of previous and current DoE policies. Content analysis was also done in analysing the contents of structured and unstructured interviews. This has involved the contents of the sources that were being examined to systematically record the relative incidence (frequency) of themes and of ways in which these themes are portrayed.

Raw data from interviews and discussions was voluminous, which had to be processed, analysed and reduced to manageable sample sizes. The interviews and discussions were recorded on tape and transcribed into text and, at this stage the reduction and analysis thereof begun. The transcribed interviews were labelled as primary documents. The data was then classified, a process that involved breaking up data into small units and bringing it together in a new way. This process constituted organising and assigning data into categories or classes and identifying formal connections between them.

Data was arranged into small units of meaning, coded according to their meaning and then grouped together into categories that contained related codes. For example, data on the Institute of Scientific Information (ISI), Social Sciences Citation Index (SSI), and the International Bibliography of Social Sciences (IBSS) was categorised and coded as Citation Indexes (Cis). The ISI database is often used to measure research output or productivity– the number of publications produced by academics- and also research impact- how academics' works are cited (Macauley *et al*, 2005:191).

Phrases and sentences were coded and labelled by units of meaning or marked by different colours (colour coding). The coding process was used to generate categories or themes such as 'journals' that included academic journals, professional journals and popular journals. Data was also organised into chronological, topical (research output, i.e., books, journals, conference proceedings, patents and intellectual property), and stakeholder groups (RIS coordinators, data capturers, research administrators, deans of faculties, and DoE officials).

Managing the coding process took the form of cutting and pasting (from electronic references), colour coding, the use of word processing such as Microsoft Excel, Microsoft Access and the use of Computer Assisted Qualitative Data Analysis Software (CAQDAS) such as Atlas.ti, identifying patterns and connections within and between categories. In case of larger categories, several categories with clear relationships were combined and their relationships were shown.

In order to enhance the collection, management and analysis of data, two separate files were kept. Hard copies of relevant documents, newspaper cuttings, books and journals were filed in a box file and marked 'DoE policy research' for easy reference. An electronic file marked 'My dissertation' was also kept in which data from electronic references such as journals, books, DoE policies, e-mails and other relevant documents were saved. The two files also contained information on the researcher's "experiences, ideas, mistakes, confusions, breakthroughs, and problems" (Spradley, 1980:71) encountered during the research process.

In presenting the themes, a list of key points and/ or important findings discovered from the analysis were made to determine what is new, whether the analysis has answered the research question, what should be used or left out and how should the data be presented. Findings and recommendations were recorded throughout the research project and marked accordingly, and then presented as the last chapter of the thesis.

3.4 Sampling justification

Policies such as the measurement of research output cannot exist without specific goals. They have to address specific questions, and thus they have to be formulated to gauge important 'forces'; for example, how scientific progress is related to specific cognitive as well as socio-economic aspects? Higher education funding through the measurement of research output of institutions of higher education in South Africa, is driven by specific goals such as to stimulate research at the highest level thereby to encourage the development of centres of excellence for research at universities. The research output, for this reason should present a worthy profile of high-level research at South African universities.

The focus of this thesis is on the measurement of the research output of a single institution, i.e., the University of Pretoria. In comparison with other South African

universities, the University of Pretoria has since 1999 registered a significant growth in its research output, while other universities have experienced fluctuations and decreases in their output for the same period. Until recently, the University of Pretoria was the largest contact higher education institution in South Africa, produced the largest research output of HEIs in South Africa and, had a great diversity in terms of faculty research output.

The following graph (Figure 3.1) illustrates the research outputs of eight South African universities since 1989. The graph and research output history (Tables 3.2 and 3.3) obtained from the University of Pretoria’s Bureau for Institutional Research and Planning) serve to justify the choice of the University of Pretoria as a model for this study, since it has managed to register an increase in its research output since 1999.

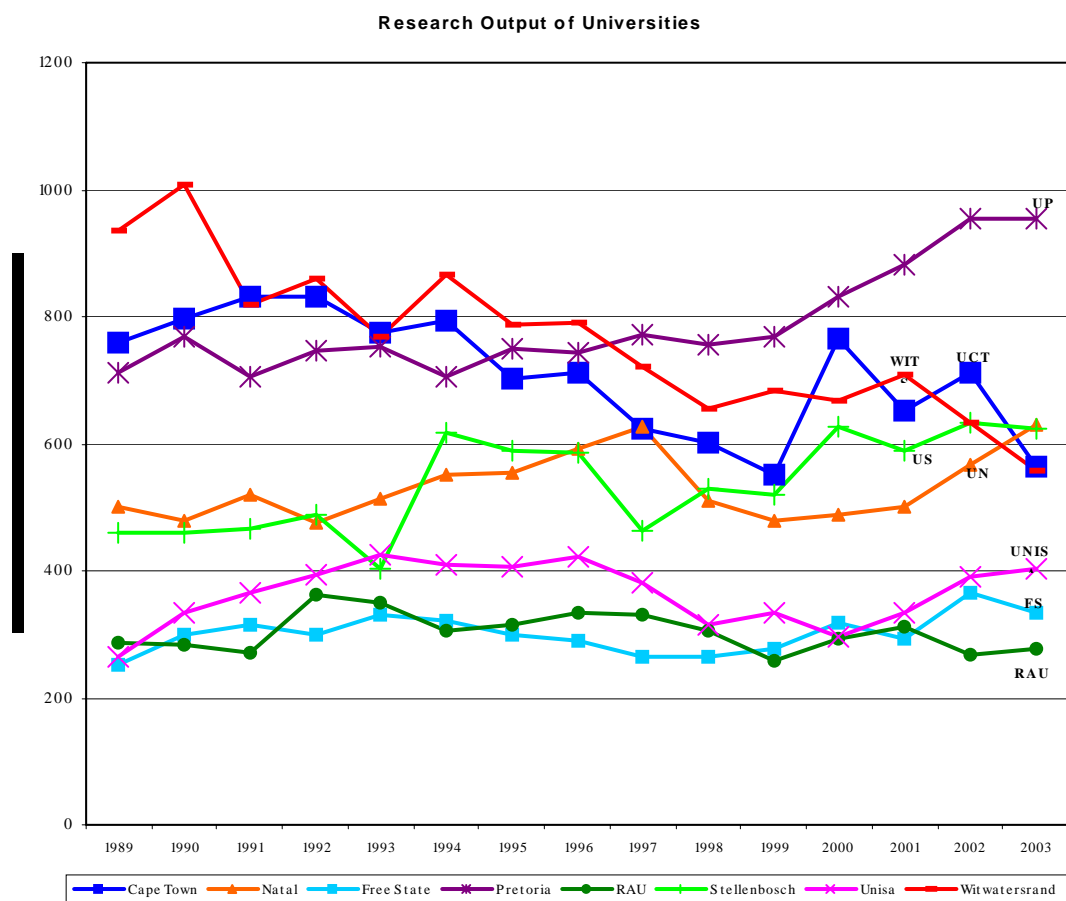


Figure 3.1: Research output of South African ¹¹universities

¹¹ At the time of publication, several higher education institutions in South Africa had recently merged or were in the process of merging. This thesis uses the names by which they were known at the time of data collection.

Research Output	Units		
	2001	2002	2003
Books for Specialists	12.44	13.16	19.78
Conference Proceedings	30.33	8.37	13.47
Patents	6	2	4
Articles in Approved Journals	833.44	948.16	916.07
Total	882.21	971.69	953.32

Table 3.2: UP research output 2001 –2003

Journals	2002		2003		2004	
Number of DoE units earned	930.65		916.55		1016.34	
ISI Journals	369.66	39.72	357.65	39.02	473.17	46.56
IBSS Journals	60.41	6.49	72.48	7.91	62.13	6.11
Local Journals	480.34	51.61	453.41	49.47	481.04	47.33
Journals not indexed	20.24	2.17	33.01	3.6		
Total	930.65	100.00	916.55	100.00	1016.34	100.00

Table 3.3: UP research output in indexed journals

From the above illustrations, it was therefore compelling to study how the University of Pretoria had managed to maintain an increase of its research output and how it implements the new policy to maintain its successful record.

3.5 Limitations of the study

The measurement of research output of public higher education institutions in South Africa, affects all the universities in the country. This study has only concentrated on the University of Pretoria. This in itself has limited the scope of the study in that universities use different systems, methodologies and interpretations in implementing the new policy. The University of Pretoria is a complex organisational system that comprise of nine faculties and, as a limitation to this study, only four faculties (Education, Law, Humanities and, Economic and Management Sciences) were targeted for research.

The limitation of the study also concerns the data analysis methods that were used, the first being qualitative content analysis. Although qualitative content analysis is the preferred choice of the researcher, it may lead to naively realistic findings. This is due to the fact that it captures what is presumed to be the real meaning of the “word” in a direct or formulaic way. Henning, Van Rensburg and Smit (2004:102)

argue that the assumption is often made to you to arrive at a set of findings, due largely to the stringent application of the method of coding and categorising.

The measurement of research output requires measurements along many dimensions. To date, no ideal 'catch all' variable for measuring research output or innovation has been developed. In many cases, multiple indicators such as journal articles, books and conference proceedings, have been used. There is a need for a single widely accepted method applicable to all aspects of the measurement of research output. The use of isolated measures, such as bibliometrics can be misleading and can lead to an over-emphasis of one element of quality in research outputs, to the neglect of others. On the other hand, the peer review system has been severely criticised for being more time consuming and its larger probability of subjectivity. Van Raan (2005:3) argues that in any judgement, there must be room for the intuitive insights of experts. For substantial improvement of decision-making, advanced bibliometric methods have to be used in parallel with a peer-based evaluation procedure (Rinia, van Leeuwen, van Vuren, and Van Raan, 1998).

The other limitation is that, the output measured in this research project is concentrated on publications in journals, books, reports, edited works and proceedings. This of course excludes the student enrolment within the year under review. An important dimension of institutional quality that was left out in this research project is the successful completion of individual research programmes by postgraduate students. However, the successful graduation of higher degree students (student throughput) is not considered to be "research output" but is considered to be corporate information.

3.6 Significance of the study

Research performance assessment is a matter of evaluation. Most evaluation work worldwide relies heavily or almost completely on expert panels and other forms of peer review. Undoubtedly, opinions of experts are of crucial importance in evaluation processes. Nevertheless there are severe often underestimated and even neglected problems in peer review. The most troublesome consequence of continued reliance on peer review is, the harm that this subjective method inflicts, however inadvertently, on aspiring researchers, departments, faculties and institutions. One of the methods used in the study of the measurement of the University of Pretoria's research output is bibliometrics. Again, Veugelers

(2005:33) notes that bibliometrics is increasingly being turned to as a feasible, fairly objective methodology that builds on large-scale, standardised data sources to evaluate research output. This has to be compared to the alternative of the peer review process.

The study will contribute to the global knowledge base of research measurement by identifying and highlighting the trends in the South African HEIs' implementation and use of the new policy for the measurement of research output of public HEIs in South Africa. The study also brings in the international trends in the measurement of research outputs of institutions, faculties, academic departments and individual researchers. This is seen in the emphasis of publishing in international accredited journals as well as cited journals by international organisations such as the Social Sciences Citation Index (SSCI).

This research project is important and relates directly to the restructuring of higher education funding in South Africa. In South Africa, higher education funding is greatly influenced by research output. A study on the efficiency of the University of Pretoria in implementing the measurement of research output of public higher education institutions in South Africa is valuable not only from the researcher's point of view, but is also of interest to public officials and policy makers who are concerned with expanding higher education while containing costs, other officials at South African HEIs who wish to compare and contrast their implementation methodologies with those of the University of Pretoria. Lastly, the findings and recommendations of this research thesis will be shared with peers, researchers and government official interested in the measurement of research output through publishing in accredited academic journals.

3.7 Conclusion

This chapter has addressed the research design and methodology adopted for this research thesis. The research methodology has employed various techniques including among others desk and on-line research, structured personal and telephonic interviews with selected stakeholders, a series of focus groups conducted with selected end-users, case studies and regular discussions with colleagues in the Department of Research Support of the University of Pretoria. The use of the University of Pretoria as a research sample was justified on the

bases of its successful track record as compared to other Higher Education Institutions in South Africa.

Chapter 4

A critical comparative analysis of two research funding regimes

4.1 Introduction

This chapter examines the complex relationship between the current South African policy for the measurement of research output of public higher education institutions and its predecessors in the context of international debate on the subject of measuring research quality. The chapter gives a brief background of the policy framework that led to the enactment of the new policy for the measurement of research output of public higher education institutions in South Africa. A comparison of the previous and current government policies is conducted to highlight policy changes and continuities. Major differences between previous policies and the current policy are identified and evaluated. The chapter is aimed at answering the research question: Is the new policy on research measurement more acceptable than previous policies from the perspective of institutional stakeholders? In other words, does the new policy improve or retard the measurement of research output when compared with previous policies?

It was earlier claimed that the measurement of research output is common practice among public institutions internationally, and is increasingly contested and controversial. Various definitions of ¹²research (which largely concur) are used by those organisations which have impact on research output at South African higher education institutions. According to the DoE, research refers to original investigation that is aimed at gaining knowledge and understanding. It does not include routine work which is designed to establish conventional conclusions, but includes innovative work and consultancy, that may lead to new techniques or artefacts; and new or substantially improved insights. The National Research Foundation (NRF) regards research as “original investigation undertaken to gain knowledge and/or enhance understanding”. It further elaborates, that research specifically includes:

¹² Any activity classified as research and experimental development is characterised by originality; it should have investigation as a primary objective and should have the potential to produce results that are sufficiently general for humanity's stock of knowledge (theoretical and/or practical) to be recognisably increased.

- a) the creation and development of the intellectual infrastructure of subjects and disciplines (e.g., through dictionaries, scholarly editions, catalogues and contributions to major research databases);
- b) the invention or generation of ideas, images, performance and artefacts where these manifestly embody new or substantially developed insights; and
- c) building on existing knowledge to produce new or substantially improved materials, devices, products, policies or processes.

The Organisation for Economic Co-operation and Development (OECD) states that “research and experimental development (R&D) comprises creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications”. The Council for Higher Education (2005:08) argues that in countries like South Africa, research often has understanding social change as a specific focus and collective and individual developmental objective. ASSAf¹³ (2006:06) further states that the fundamental principle of research publishing is that reported findings must be original, in the sense that they are the first report of such findings. A broad definition of research that is not narrowly scientific has to include all endeavours that add to society’s creative outputs, self-reflection and understanding.

The measurement of research output should take into account quantity and quality (in other words, output and input). However, there is no automatic consensus of indicators of research output. Various issues need to be borne in mind, amongst others, discipline specific practices and the stage of development of the individual researcher. It is under these circumstances that the measurement of research output of educational institutions is controversial. My starting point for answering the research question is to review the Department of Education’s policy framework.

¹³ The Academy of Science of South Africa (ASSAf) was inaugurated in May 1996. It was formed in response to the need for an Academy of Science consonant with the dawn of democracy in South Africa: activist in its mission of using science for the benefit of society, with a mandate encompassing all fields of scientific enquiry in a seamless way, and including in its ranks the full diversity of South Africa’s distinguished scientists.

4.2 Conceptual framework: the policy-practice problem

Policy touches most of our lives; some in ways we appreciate and, some in ways we do not appreciate (Edmondson, 2005:2). Taylor *et al.*, (1997:35) concur by explaining that “Policy” may be defined as “whatever governments choose to do, or not to do” and “policy analysis” may be considered as “the study of what governments do, why and with what effects”. Policies are drawn to bring about change of the status quo. They contain broad guidelines, methods and procedures to encourage concerted efforts toward the attainment of stated goals. David (2002:242) elaborates by stating that policies set boundaries, constraints, and limits on the kinds of administrative actions that can be taken to reward and sanction behaviour; they clarify what can and cannot be done in pursuit of an organisation’s objectives.

The purpose of ¹⁴implementing new policies in the education system is often associated with the need to effect new changes. Therefore, there is an assumed direct link between policy implementation and change (Ball, 1990:14). Hargreaves (1998:6) stresses that policies are useful when they can influence the allocation of resources, the structure of schooling and the content of practice. Public policy-making does not end with the passing of legislation. It culminates in policy implementation, which involves all of the activities designed to carry out the policies enacted by the legislature (Dye, 1995:312). Henry (2001:295) further states that implementation is the execution and delivery of public policies by organisations or arrangements among organisations.

The discrepancy between policy and practice is a recurring theme in education policy studies, especially in developing countries where implementation enjoys considerable attention in the literature (Malen & Knapp, 1997; Elmore, 1980). South Africa is no exception in this regard. In South Africa, much attention has been focused on policy formulation without indicating how to translate such policy into measurable outcomes. Recent surveys on policy and practice single out ¹⁵policy implementation as being difficult to put into practice, for example, it is argued that: one of the difficult issues in educational change is policy itself- not this policy or that policy, but the basic ways in which policy is conceived, developed

¹⁴ Implementation of policies can be viewed as the actual task of putting theory into practice.

¹⁵ There is a widely observed discrepancy between a policy’s stated aims and its actual effects. Also see Sayed & Jansen, 2001:78; and Malen & Knapp, 1997:30).

and put into practice (Darlington-Hammond, 1998:642). Rogan & Grayson (2001:2) argue that all too often policy-makers and politicians are focused on the desired outcomes of educational change but neglect the contextual factors that influence implementation.

4.3 The research context

The development of the current policy of the measurement of research output of public higher education institutions in South Africa was driven by the imperatives for transformation of the higher education system contained in ¹⁶White Paper 3, a Programme for the Transformation of Higher Education (1997) and the National Plan for Higher Education (2001). The transformation agenda in South Africa sought to create a single co-ordinated higher education system through the *Higher Education Act, 1997 (Act No.101 of 1997)*. In line with the Act, the Policy and Procedures for Measurement of Research Output of Higher Education Institutions 2003 has replaced the *Information Survey Manual – Research Output of Universities (Report 014/97)*, and *Information Survey Manual – Research Output of ¹⁷Technikons (Report 024/97)*.

The Minister of Education gazetted The Policy for Measurement of Research Output of Public Higher Education Institutions (Government Gazette No. 25583.) in September 2003. The purpose of the policy is to encourage research productivity by rewarding high quality research output at public higher education institutions. However, the new funding framework is not intended to measure all output, but to enhance productivity by recognising the major types of research output produced by higher education institutions and by using appropriate proxies to determine the quality of such output. As a general rule, research output emanating from commissioned research or contracts paid by contracting organisations would not be subsidised by the Department of Education.

The new funding framework is a goal-oriented and performance-related distributive mechanism that explicitly links the allocation of funds to academic activity and output; in particular the delivery of teaching-related and research-related services,

¹⁶ Support instrument that include: National Plan for Higher Education, New Academic Policy (replacing Report 115 & 150), and the New Funding Formula.

¹⁷ Technikons are currently merged with major universities or with other technikons and are now known as universities of technology.

which contribute to the social and economic development of the country. Through linking the allocation of funds to academic activity and output, the new policy arguably serves to improve the measurement of research output of HEIs. Research output is the corner stone on the new funding framework. A comparison between the current policy and its predecessors will therefore, shed light on the similarities and differences that might influence HEIs in their quest to improve their annual research output. The Information Survey Manual – Research Output of Universities (Report 014/97) is hereafter compared against the current Policy and procedures for measurement of research output of public higher education institutions.

4.3.1 Information survey manual – research output of universities (Report 014/97)

It is perhaps very appropriate that an analysis of the state of South African scientific research is conducted exactly 20 years after this rather unique incentive/reward scheme was introduced by the then National Department of Education in 1985. A few studies have been conducted over the years to review the effectiveness and appropriateness of the scheme. Despite these studies, many perceptions about the quality or lack thereof remain (ASSAf, 2006:29). Every year each university submits information regarding research output together with its supporting documents and material relating to its research output to the Department of Education in Pretoria.

The Information Survey Manual – Research Output of Universities (Report 014/97) (hereinafter referred to as the Information Survey Manual), contains the subsidy formula that was used as the basis for the annual allocation of funds to universities. The subsidy formula as described in the Information Survey Manual was used as the basis for the annual allocation of funds to universities.

Although the Information Survey Manual regarded student numbers of prime importance, the research output of a university was also taken into consideration. According to this policy, the research output of a university comprises of original research papers, research letters and review articles which appear in ¹⁸approved journals, as well as books for the specialist and patents that comply with predetermined criteria. The format and forms used for the submission of different

¹⁸ Approved journals refer to International Journals (Includes SA), Master list of the Institute of Scientific Information (ISI)- SCI, SSCI & A&HCI and International Bibliography of Social Sciences (IBSS).

categories of recommended research outputs are tabled in Annexure A – E. It should be noted that in the case of research articles, only articles published in the approved ¹⁹list of journals appearing in Annexure E were considered for subsidy purposes.

Section 2 of the Information Survey Manual states that the funding formula for universities, as in the case of previous subsidy formulae, gives recognition to the very significant and fundamental role played by research at universities, and ensures that research activities are placed on a sound basis. According to the Information Survey Manual (1997:5), the published research material which can be regarded as the research output of universities, should satisfy the highest scientific standards and requirements. University councils, senates and research committees are expected to jealously apply this principle when determining research output.

The Information Survey Manual (1997:5) further states its general purpose as “to stimulate research at the highest level and thereby to encourage the development of excellence for research at universities. For this reason the research material which may be considered as part of the research output of universities should include only the very best of their research achievements”. It should be noted that with this policy, the DoE has used different procedures for subsidising universities and technikons. In case of the universities, the Information Survey Manual – Research Output of Universities (Report 014/97) was used, while for the technikons, the Information Survey Manual – Research Output of Technikons (Report 024/97) was used. How different then is the current policy from its predecessors? Why was it necessary to introduce the new policy?

4.3.2 Policy and procedures for measurement of research output of public higher education institutions

In line with the White Paper 3, a Programme for the Transformation of Higher Education (1997) which outlines a single co-ordinated higher education system, this policy applies to all public education institutions, and thus does not differentiate between universities and technikons (DoE, 1997(a):1). The National Plan for

¹⁹ This list was originally completed in July 1986 and at that stage consisted of all the journals that appeared in the three citation indexes of the “Institute for Scientific Information (ISI)” namely the “Science Citation Index” the “Social Sciences Citation Index” and the “Arts and Humanities Citation Index” as well as the journals which appeared in the so-called “Supplementary list” of high standard journals.

Higher Education (1997:70) stresses that this policy aims “to sustain current research strengths and to promote research and other knowledge outputs required to meet the national development needs”. A distinguishing characteristic of the current policy is that, the policy has also taken into consideration the changing modes of disseminating research output, such as ²⁰electronic publications and further outlines processes and procedures that are appropriate to the purpose and commensurate with best practice. A consideration of the major differences between the current policy and the previous policies is worth noting.

4.3.3 Major differences between previous policies and the current policy

The previous policies under discussion, that is, the Information Survey Manual - Research Output of Universities (Report 014/97), and the Information Survey Manual – Research Output of Technikons (Report 024/97), as funding frameworks, have their origin in the apartheid era as their predecessors were introduced in 1982-1983 where increasing attention of research was paid to the importance of meeting social and economic demands and policy became more oriented towards supporting research and development to these demands- the so-called “demand-pull” perspective. Apart from their origin in the apartheid past, the policies could not be used as steering mechanisms to address current national goals and objectives. The Higher Education White Paper 3 (1997:1.14) stipulates one of its goals as “to contribute to the advancement of all forms of knowledge and scholarship, and in particular address the diverse problems and demands of the local, national, southern African and African contexts, and uphold rigorous standards of academic quality”.

In the South African context where for decades research production and postgraduate education merely reproduced the apartheid system, the management of research now requires the ability to make the connections between research output and the social, economic and cultural needs of a developing democracy and to create mechanisms of support for building new generations of black and women scientists in all domains of science (HEQC 2005:4). In order to highlight these concerns, the Council on Higher Education (CHE) conducted a survey of the South African higher education sector in the 1990s. According to the CHE (2004:108),

²⁰ In the past years publishers of scientific and scholarly information have made their journals and articles available through the Internet to universities, corporations and government institutes. See Moed (2005:313).

with respect to the higher education sector specifically, studies in the early 1990s revealed that:

- a) Research and Development (R&D) was undertaken by South African HEIs in relatively equal shares with government and industry;
- b) HEIs received about 40% of state expenditure on R&D – which totalled around 0.8% of gross domestic product (GDP) between 1989 and 1994;
- c) Funding of research was directly allocated to universities through the Department of National Education on the basis of numbers of students and research publications with different weightings for the natural and human sciences (technikons did not receive direct research funding). In effect, research funds were allocated 'blindly' in that there were no measures to ensure that the 15% of subsidy funding allocated to universities for research infrastructure was in fact used for research purposes. Research funding was also indirectly allocated via contracts from government departments and science councils.
- d) South Africa was undertaking approximately 0.5% of the world's scientific research in 1994, with the balance of output favouring social sciences and humanities rather than natural sciences. Universities performed 98.7% (by expenditure) of academic research – with the balance of expenditure by technikons. While universities produced 70% of South African indexed research publications, nearly 80% of these were concentrated in five institutions (Cape Town, Natal, Pretoria, Stellenbosch, and Witwatersrand).
- e) Despite awareness of the need to shift resources towards the science, engineering and technology (SET) fields, there appeared to be a lack of adequate discrimination regarding funding across disciplines; this was consistent with the absence of central direction as to academic research output. Thus for example, South African universities were spending only one third as much as their international counterparts on engineering research (5% compared to 15%) and almost twice as much as other countries on the social sciences, arts and humanities.

Against the above background of the previous policies, a new funding framework was developed after widespread consultation with the higher education sector. HEIs play a vital role in addressing the country's social and economic development. The contribution of HEIs is done through extensive social research projects, the production and patenting of new knowledge and other creative outputs. In order to

enhance the economic development of a country, innovation in terms of patents and artefacts has to be recognised.

4.3.3.1 Recognition of patents and artefacts

A fundamental difference between previous policies and the current policy is, previous policies have recognised ²¹Patents and ²²Artefacts (only technikons) as research outputs, while the current policy does not make mention of patents and artefacts as categories of research output. In this case, institutions stand out to loose substantive amounts which in the previous policies were originally generated through patents and artefacts. That is, in the Information Survey Manual (Report 014/97:9), it is stated that, “patents that were granted during the reporting year and which fulfil the requirements, are allocated two units if all the inventors were affiliated with the same technikon or university” and for artefacts, “a particular artefact can earn a maximum of two units where it is evidently new technology”.

In view of the non-recognition of patents and artefacts, the new policy is not user friendly when compared with its predecessors. HEIs, particularly the universities of technology (formerly technikons), place a high premium on patents and artefacts in a quest to foster innovation among its researchers and students. In this regard, other forms of research outputs such as articles and books might take precedence over patents and artefacts even though patents generate more money for HEIs than any form of research output. Together with other HEIs worldwide, the South African universities of technology have recognised the importance of not only generating new technology through research and development programmes, but also actively participating in applying and utilising knowledge and technology for new products, processes and services.

Patents are public documents to describe and protect a technological invention (product or process). Davis (1997:127) stresses that patents protect ideas as they are put into practice as machines, manufacture, processes, or composition. Economically, patents provide monopoly rights to an invention in return for publicly disclosing the invention. The Council for Higher Education (CHE) (2005:14) concludes that patents are documents issued by a government office, that describe

²¹ Patents are public documents to describe and protect a technological invention (product or process). Patents provide monopoly rights to an invention in return for publicly disclosing the invention.

²² Artefacts include all man-made objects, e.g., machines and designs.

an invention, and create a legal situation in which the patented invention can normally be exploited (made, used, sold, imported) only by or with the authorisation of the patentee.

The following diagram illustrates the use of patents and inventions that resulted from research activities of HEIs:

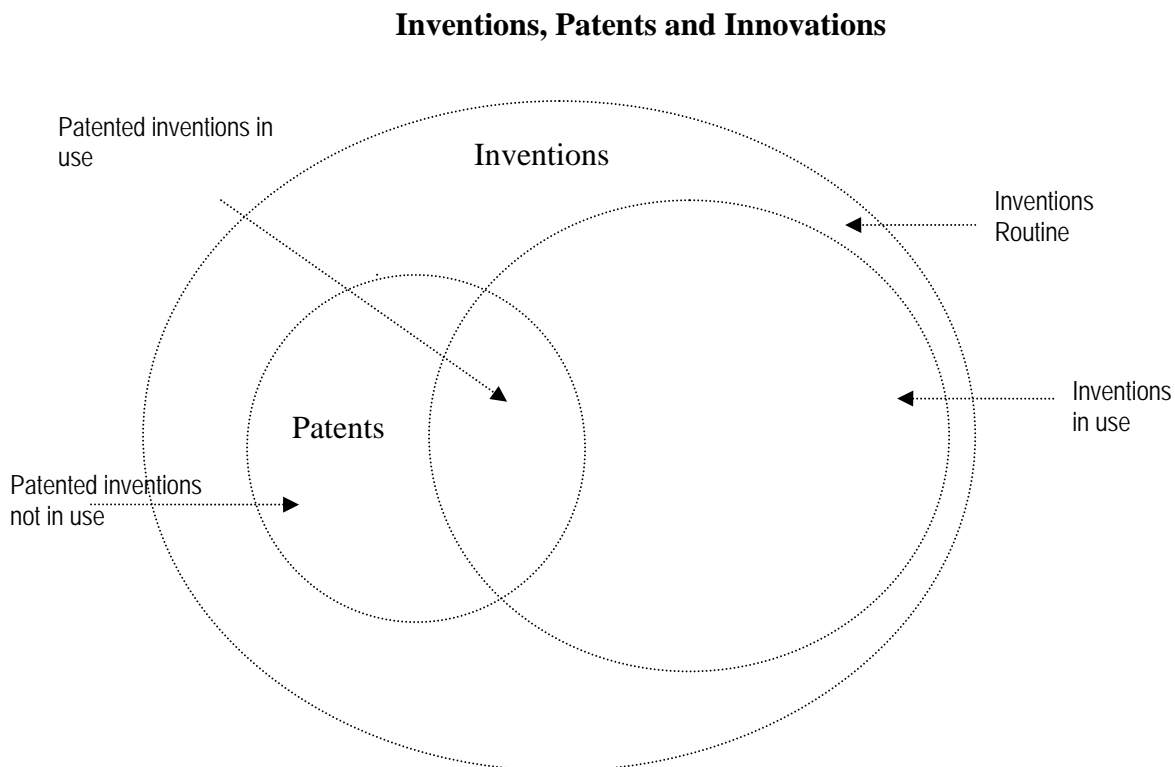


Figure 4.1 Inventions, patents and innovations: (Propp, 2004)

Apart from patents and artefacts, other forms of research output such as electronic publications were not promoted by the previous policies. No mention of electronic publications is made and catered for in the previous policies.

4.3.3.2 Electronic publications

During the past few decades, more and more scholarly documents have become available in electronic form and stored in electronic archives. ASSAf (2006:86) reports that twenty-first century researchers will likely expect to find their journals online and many young people already subscribe to the idea that *if it's not on the internet, it might just as well not exist*. According to Moed (2005:313), electronic

archives may contain either peer reviewed or non-peer reviewed documents. They may even include a non-refereed reprint version and a final, accepted, and possibly revised version of the 'same' document. Moreover, electronic publications may offer ²³open or toll access. A study by ASSAf (2006:90) revealed that on 16 September 2005 there were 1763²⁴ journals listed in the Directory of Open Access Journals (<http://www.doaj.org/>), of which 439 were searchable at article level. Whereas the current policy has taken into consideration the technological developments in the dissemination of research output as in electronic publications, the previous policies only considered submissions made in hard copy format. Moed *et al*, (2004:35) has already noticed that journal publications are challenged as the 'gold standard' in science as the worldwide web has changed scientific communication.

Researchers use the web for information seeking, and in addition to the traditional journal publications, there is an enormous number of further publications and data included in institutional and personal websites. The new policy has also taken into consideration the changing modes of disseminating research and research output, such as electronic publications and further outlines processes and procedures that are appropriate to the purpose and commensurate with best practice, while previous policies only considered the use of hard copies. According to the Ministry of Education (2003:4), research output published electronically may be recognised if they meet specified criteria.

In keeping with the technological developments, the DoE issues on/or before 31 January of each calendar year, an official list of approved journals for each reporting year on its web site <http://www.education.gov.za>. Currently, 197 South Africa journals appear on the DoE list. In comparing the current policy with its predecessors, it is worth noting that there is also a great procedural difference in the consideration of journal research output.

²³ Open access allows anyone, anywhere, with a connection to the Internet to read, download, print, copy and redistribute any deposited article. Toll access means that only subscribers paying subscription fees are permitted to use an archive. The term Open Access encompasses a specific online publication business model as well as a range of channels for making research literature available to everybody at no cost. It is based on the philosophy that the research literature, which is not written for profit but for the advancement of science and which is largely funded by public money, is a public good and should be accessible to everyone who has a need for the information.

²⁴ They include 77757 articles. Other OA journals are listed under free full-text journals on the Japan Science and Technology Information Aggregator, Electronic (J-STAGE) site at Meiji University Library Online (SciELO) project.

4.3.3.3 Procedures for journal research output

The research output categorised journal articles refers to ²⁵peer-reviewed ²⁶periodical publications devoted to disseminating original research and new developments consisting of a substantial work of scholarship within specific disciplines or field of study. The journal, which must be published regularly, must have an international Standard Serial Number (ISSN) or International Standard Book Number (ISBN). The previous research policies had only one ²⁷list (the Index of the Institute of Scientific Information) of approved journals that were considered for subsidy purposes. According to ASSAf (2006:30), this entailed that articles published by South African academics (with an address at a university or technikon) in any of the accredited journals as stipulated by the then Department of National Education would qualify for a subsidy to be determined each year as part of the “block subsidy” granted to each of the public higher education institutions. The original list of accredited journals was compiled by including all ISI-journals, and adding South African journals to an “Accredited List²⁸”. The new policy has five separate lists. The consequences being that, it is cumbersome to use five lists that are continually updated and could not be entirely relied upon when compared to the use of a single list.

It is argued by some cynics that most papers appearing in the huge research literature are in any case written to be published rather than to be read with enthusiasm, since only a small minority is cited in respectable journals. In practice, the argument goes, the role of high-impact foreign journals in South African academe is seen as providing the quality and kudos that grow a scientist’s reputation, whereas the role of ‘local’ journals, suitably ‘accredited’, provides little more than an outlet for subsidy-earning articles (Pouris 2004:508). There are but just a few South African journals (about 20) in the international Thomson ISI lists.

There are currently at least 255 South African scientific or scholarly journals recognised by the DoE as meeting the minimum requirements for state subsidy under the policy of supply-side support for authors (and their institutions) who

²⁵ Peer review is the benchmark by which quality is determined, and it is in this venue that we can build academic community — a place where we can be helpful to one another.

²⁶ The journal, which must be published regularly, must have an international standard serial number (ISSN) (or ISBN number).

²⁷ Also see footnote 3 for the approved DoE list.

²⁸ Due to regular submissions of successful proposals for additions of new journals, the List of accredited South African Journals grew to 210 by the end of 1997.

publish in these journals. Twenty-three of these journals appear in one of the ISI Citation Indexes, 14 are indexed in the International Bibliography of Social Sciences (2 journals appear in both), while the remaining 220 journals are “accredited” separately by the Department (2003 list and 2004 supplementary list) (ASSAf, 2006:29). The new policy for the measurement of research output of public HEIs in South Africa states that, for purposes of subsidy, only qualifying journals in the following categories are recognised:

(1) Journals appearing in the following international indices are included in the list of approved journals;

- a) The ²⁹Sciences Citation Index of the Institute of Scientific Information (ISI).
- b) The Social Sciences Citation Index of the ISI.
- c) The Arts and Humanities Citation Index of the ISI.
- d) The International Bibliography of Social Sciences (IBSS).
- e) The Department of Education (DoE) List of Approved South African Journals.

(2) South African journals not appearing in the above indices, but whose seat of publication is in South Africa and which meet the DoE minimum criteria are also included in the list of approved journals. These journals are included in a separate index of Approved South African Journals maintained by the Department of Education (DoE) and subject to an annual review (Ministry of Education 2003: 5-6). The criteria that these journals had to meet in order to be accredited by the DoE were the following:

- a) The required purpose of the journal is to disseminate research results, and the content has to support high-level learning, teaching and research in the subject area concerned;
- b) The journal requires an ISSN (International Standard Serial Number);
- c) The journal has to be published regularly (frequency of publication);
- d) The journal requires an editorial board that was reflective of expertise in the subject area covered;
- e) The members of the editorial board are required to have standing in their respective subject areas in terms of their own peer-reviewed research, through their publications and citations;

²⁹ The Science Citation Index (SCI) covers several thousands of journals from literally every scientific discipline.

- f) Articles accepted for publication in the journal require to be peer-reviewed; and
- g) The journal requires to be distributed beyond a single institution [holdings of South African and/or international Libraries were taken as the standard against which this criterion was measured (ASSAf, 2006:29)].

The list of approved South African Journals (excluding the ISI-listed titles) which was appended to the new policy, numbered 197. A supplementary List, containing the names of a further 23 South African journals titles, was added in 2004. This brought the total of South African journals titles (still excluding those on the ISI-list) accredited by the DoE to 220. For the 2004 audit to be submitted in 2005, the DoE has indicated that HEIs should use the ISI Science Citation Index that contains only 3370 journals. On the ISI website, there is also the ISI Science Citation Index Expanded that lists 6375 journals. A comparison of the two ISI journal lists clearly shows a difference of 3005 journals, which means that HEIs are to lose on their subsidy earnings if the DoE will not consider the use of the ISI Expanded list.

There are numerous perceptions regarding the quality of the South African Journals appearing on the ISI-indexes. ASSAf (2006:29) reports that many perceptions about the quality or lack thereof of South African journals remain, and include these questions:

- a) Are the South African journals in the ISI-indexes automatically superior compared to those which are not? If this is the case, would it imply that the vast majority of the humanities and social sciences – which are not indexed in the ISI – are to be regarded as being of inferior quality? Does it mean that those South African journals that at some point in time, were included in the ISI lists but were subsequently removed from them (e.g., the South African Statistical Journal), should now be regarded as inferior?
- b) Are all journals not included in the ISI-indexes of similar (accreditable) quality? Technically, they are viewed as such, since the DoE retained most of them on their revised list dated September 2003. How do we establish whether the 220 non-ISI and non-IBSS South African journals are all of “adequate” quality?
- c) Has the DoE scheme not led to a compromise in quality anyway? Any article-irrespective of length or content – which appears in any of these lists, qualifies for subsidy. Many commentators have viewed this as a recipe for lowering the standards of these journals. In fact, there are many cases (e.g., the South

African Journal of Higher Education) where the number of articles per issue has escalated over the past few years – seemingly to meet the increasing demand for publication outlets. And since there is no reliable, audited data on the “success rates” (exemplified, by their frequent citation in more recent articles) of submitted articles to South African journals, it is impossible to establish whether the increase (in some cases) in the number of articles per issue has coincided with a decline in rejection rates. Table 4.1 serves to highlight the impact factor of using the ISI Science Citation Index as opposed to the ISI Science Citation Index Expanded:

Journal Title	Publisher	Country	On Old DoE list	Start date	Units 2004
Aircraft Engineering and Aerospace Technology	Emerald Publishing	UK	No	1930	1.00
Tropical Doctor	Royal Society of Medicine Press	UK	No	1980	1.00
Reviews in the Neurosciences	Freud & Pettman Publishers	UK	No	1986	2.00
Journal of Food Composition and Analysis	Academic Press-Elsevier Science	USA	No	1987	0.83
Mechanical Systems and Signal Processing	Academic Press- Elsevier Science	UK	No	1987	1.00
IEEE Antennas and Propagation Magazine	IEEE Inst Elect Eng	USA	No	1990	1.00
Journal of Sustainable Agriculture	Haworth Press	USA	No	1990	1.00
Acta Parasitologica	Witold Stefanski Institute	Poland	No	1992	0.33
Breast	Churchill Livingstone Publishers	Scotland	No	1992	0.43
Haseltonia	Cactus Succulent Society	USA	No	1993	0.50
Internet Research-Electronic Networking Applications and Policy	Emerald Publishing	UK	No	1993	1.00
Wildlife Biology	Wildlife Biology	Denmark	No	1995	1.00
International Journal of Life Cycle Assessment	Ecomed Publishers	Germany	No	1996	1.07
Asia-Pacific Journal of Operational Research	World Scientific	Singapore	No	1997	0.33
Animal Conservation	Cambridge University Press	USA	No	1998	0.58
Chemeecology	Birkhauser Verslag	Switzerland	No	1998	0.33
Fungal Diversity	Fungal Diversity Press	China	No	1998	1.84
Gondwana Research	International Gondwana Research	Japan	No	1998	0.33
IEE Proceedings-Software	IEE Inst Elect Eng	UK	No	1998	1.00
Experimental Heat Transfer	Taylor & Francis	USA	No	1999	0.33
Journal of Electronic Packaging	ASME-American Soc Mech Eng	USA	No	2000	1.00
Acta Crystallographia Section E-Structure Reports Online	Blackwell Publishing	UK	No	2001	1.00
Fitoterapia	Elsevier Science	Netherlands	No	2001	1.00
Journal of Evolution Equations	Birkhauser Verslag	Switzerland	No	2001	1.00
Molecular Ecology Notes	Blackwell Publishing	UK	No	2001	1.84
African Entomology	Entomological Society of Southern Africa	SA	Yes		4.26
American Journal of Forensic Medicine and Pathology	Lippincot Williams	USA	Yes		1.00
American Mathematical Monthly	Mathematical Association of America	USA	Yes		0.50
ASLIB Proceedings	Emerald Publishing	UK	Yes		2.00

Australian Plant Pathology	CSIRO Publishing	Australia	Yes		3.70
Biochemical Engineering journal	Elsevier Science	Switzerland	Yes		0.75
Bothalia	National Botanical Institute	SA	Yes		6.59

Table 4.1: Impact 2004 Audit- Only ISI Science Citation Index used: Journals that would have not qualified for subsidy.

The journals identified above do not appear in the ISI Science Citation Index which is said to be used by the DoE. HEIs are set to loose on subsidy that was supposed to be generated through articles published in such journals. The University of Pretoria stands to loose out on a total of 41.51 units that could have been earned for the 2004 audit, should the DoE use the ISI Science Citation Index Expanded.

A research article published in an approved journal will be subsidised as a single unit (1 unit), if all the authors are affiliated to the claiming institution. In the case where authors are affiliated with two or more institutions, the subsidy is shared between the claiming institutions. Apart from the use of five different lists of journals, the current policy has instituted the classification of research output by education subject matter.

4.3.3.4 Procedure for submission of books

Neither research methods nor tacit knowledge, nor technical artefacts can be communicated and transferred in full through research papers in refereed journals only. Books and chapters in books can be used to pinpoint important agents and actors in the transfer of knowledge and utilisation process of codified knowledge. With regard to 'research quality', on one hand, research quality is not merely a social construct. It does not coincide with what scholars define or decide upon as quality, even if they have reached a consensus. It relates to quality intrinsic to the research itself. On the other hand, the concept cannot be defined and measured in the same way as in physics or other areas of science (Moed, 2005:25).

Books refer to peer-reviewed, non-periodical scholarly or research publications disseminating original research on developments within specific disciplines, sub-disciplines or fields of study (Higher Education South Africa, 2005:04). The emphasis here is that the target audience must be specialists in the relevant field or discipline. The new policy states that to be included in this category the publication must meet all of the following requirements:

- a) A major work of scholarship bound (or if in electronic format, such as a CD-ROM, packaged) and offered for sale;

- b) Has an International Standard Book Number (ISBN);
- c) Written entirely by a single author, or by joint authors who shared responsibility for the whole book (i.e., individual chapters are not attributed to different authors);
- d) Consists mainly of previously unpublished material, and made some substantial contribution to a defined area of knowledge; and
- e) Has been published by a ³⁰recognised commercial press or publisher.

Books will include among others:

- a) Major monograph- i.e., a substantial body of research published as a monograph, which contains several substantial chapters and contains original thematic ideas. Length should generally exceed 60 pages;
- b) Minor research monograph- i.e., a body of research published as a monograph, which contains several substantial chapters. Length would be more than 60 but less than 100 pages (excluding references, bibliography, appendices);
- c) Critical scholarly texts (for example music, medieval or classical texts);
- d) New interpretations of historical events; and
- e) New ideas or perspectives based on established research findings.

However, this category excludes among others: textbooks and study guides, edited books; creative works such as novels, which depend mainly upon the imagination of the author rather than upon a publicly accessible body of agreed fact (but an accompanying critical scholarly text may be quoted if it is a major work in its own right); books published by private individuals, university departments and centres and privately funded companies; dissertations and theses; and translations (unless incorporating a critical scholarly text which is a major work of scholarship in its own right).

With regard to the procedure of submitting claims for books for specialists, there is only one notable difference in the new policy. The new policy states that “in addition to the standard required information, each physical copy of the book must be accompanied by two independent assessments (to be carried out by peers of

³⁰ A recognised commercial press or publisher is an entity for which the core business is producing books and distributing them for sale. For this purpose university and other self-supporting higher education institution presses are regarded as commercial publishers, provided that they have responsibility for the distribution of the publication and not only its printing.

the authors) of the book and contribution as a research output. The report of the independent assessors must contain the following:

- a) Name of institution;
- b) Name and institutional affiliation of the independent assessor (the assessor should be a peer of the author and should not be affiliated to the claiming institution);
- c) The title of the book;
- d) The authors of the contribution; and
- e) The assessment of the book and contribution as a research output, with reference to the provided criteria for evaluation of books (Ministry of Education 1997:9).

The previous policies did not require reports by independent assessors or peer review in the submission of claims for books.

4.3.3.5 Classification of education subject matter

The current policy distinguishes itself from its predecessors in the sense that it has categorised research output into the Classification of Education Subject Matter (CESM). The CESM provides a single, coherent system for classifying subject matter regardless of the level of instruction, type of institution, or source of support and represents a necessary step toward the improvement of existing data collection, recording, and reporting procedures (DoE 1982:1). Although the CESM was initiated in 1982, the implementation thereof was only done through the current policy as opposed to its predecessors.

The previous policies did not classify the submission of research output into specific subject matters. The current policy has made provision for distinguishing research output according to first and second order CESM codes (see Annexure E). As an example, code 07 refers to Education (encompassing all related fields of education such as foundations of education, systems of education, teaching - subject matter, teaching – training, special education programmes and, educational evaluation and research). The provision renders the current policy more effective than its predecessors in that, the capturing and retrieving of research information has become user friendly for both data capturers and individuals seeking information on specific research output. A uniform terminology and structure provided by the CESM is highly essential in the collection and recording of data, which is the first step of the reporting process. The CESM as one of the

fundamental differences between the previous policies and the current policy brings this chapter to a conclusion.

4.4 Conclusion

The chapter on a comparative analysis of the two regimes has compared two sets of policies for subsidising research output of HEIs. It was started with the revision of the policy framework that led to the enactment of the new policy and also singled out the major differences between the current policy and the previous policies. It is important to reiterate the fact that policies are designed to bring about change of the *status quo*.

The development of the new funding policy for HEIs in South Africa was necessary as its predecessors (Report's 014/97 and 024/97) which were introduced in 1982-83 could not be used to address the national goals and objectives. In this regard the new policy is considered to be more effective than previous policies in that, it is a performance-related distributive mechanism that explicitly links the allocation of funds to academic activity and output, thereby positively contributing towards the HEIs' efforts to assist the government in the economic and social development of the country.

From the analysis of current and previous policies, it can be concluded that in line with the transformation agenda, the new policy has effectively contributed towards the creation of a single co-ordinated higher education system in South Africa as epitomised in the Higher Education Act, 1997 (Act No.101 of 1997). The new policy does not differentiate between universities and technikons. Previous policies have used different procedures for subsidising universities and technikons. The major differences between the current policy and the previous policies can be used by HEIs to leverage their research output, improve their annual output production as the new policy improves the measurement of research output by among others recognising the move towards electronic publications and the recognition of patents and artefacts.

Although the current policy is intended to encourage research productivity and to increase research output, it is not intended to measure all output but to recognise major types of research output produced by HEIs. In terms of the journal articles, research has revealed that the DoE has recommended the use of the Science

Citation Index of the Institute of Scientific Information (ISI) for the 2004 audit and onwards. The use of this index has proven problematic since it leaves out 3005 journals in which South African researchers publish their output. It is recommended that the DoE consider the use of the ISI Science Citation Index Expanded, which lists 6375 journals instead of the 3370 journals as listed by the ISI Science Citation Index.

Chapter 5

How one University- and its Faculties - respond to new national policies on the measurement of research output

5.1 Introduction

The production of research output has become a complex and competitive pursuit. Basic, experimental and strategic research competes for scarce state and donor funding, and universities compete for PhD students. In South Africa, research output is recognised through government subsidy-earnings guided by the policy for the measurement of research output of public higher education institutions. In this context, the management of research output at higher education institutions has become a highly professional task that requires the ability to understand and translate national policies and directives at the institutional level into opportunities for individual researchers and postgraduate students to pursue their interests and achieve their potential. However, in order to manage this task efficiently, research managers need to be able to develop and use management information systems for monitoring, evaluating and planning purposes in relation to national objectives as well as in following up individual careers (HEQC, 2005:3-4). Although institutions are expected to measure their research output according to the DoE predetermined criteria, each institution uses its own management information system to capture, monitor, and report on its research output.

This chapter pursues answers to the following research questions: in what ways do new government policies on research measurement impact on ³¹faculties in a university? Why are some university faculties more successful than others in managing the measurement of research output in the context of new government policies? The point of departure in pursuit of answering the research questions is to explore what drives higher education funding.

5.2 Measuring research output at the institutional level

Higher education funding through the measurement of research output of institutions of higher education in South Africa, is driven by specific goals such as

³¹ This term has taken on many different labels- schools, faculties, clusters, departments – after the restructuring of Higher Education institutions in the past 10 years.

to stimulate research at the highest level and thereby encourage the development of centres of excellence for research at universities. The research output, for this reason should present a reliable profile of high-level research at South African universities.

The focus of this thesis is on the measurement of the research output of a single institution, i.e., the University of Pretoria. Since 1997 the University of Pretoria has had the highest research output among universities in South Africa as determined by the DoE's subsidy for research publications. The following graph illustrates the research outputs of eight South African universities since 1989. The graph (Figure 5.1) and research output history (Tables 5.2 and 5.3) obtained from the University of Pretoria's Bureau for Institutional Research and Planning) serve to justify the choice of the University of Pretoria as a model for this study, since it has managed to register an increase in its research output since 1999.

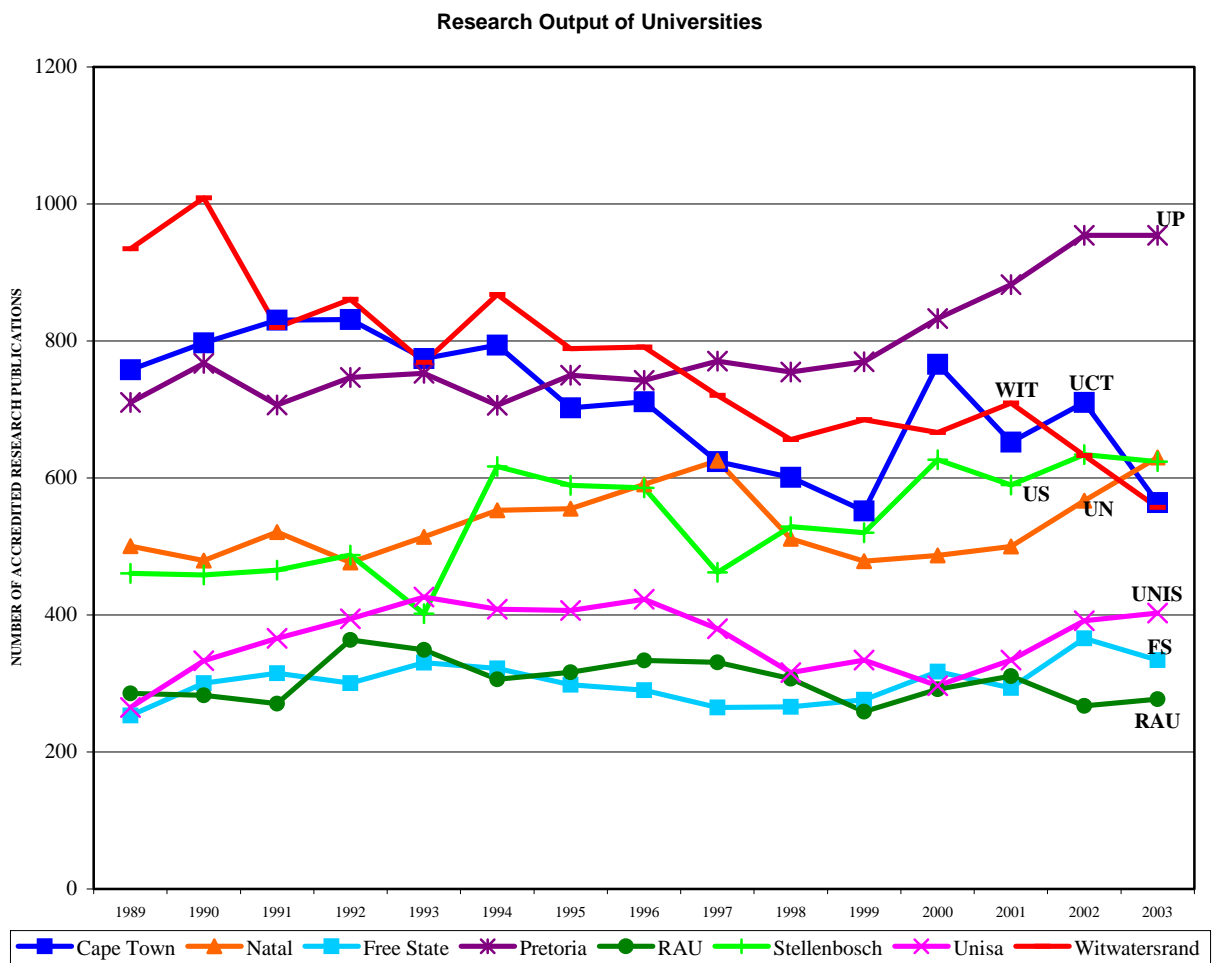


Figure 5.1: Research output of South African universities

In comparison with other South African universities, the University of Pretoria has since 1999 registered a significant growth in its research output, while other universities have experienced fluctuations and decreases in their output for the same period. Until recently, the University of Pretoria was the largest contact higher education institution in South Africa; produced the largest research output of HEIs in South Africa, and had a great diversity in terms of faculty research output.

Research Output	Units		
	2001	2002	2003
Books for Specialists	12.44	13.16	19.78
Conference Proceedings	30.33	8.37	13.47
Patents	6	2	4
Articles in Approved Journals	833.44	948.16	916.07
Total	882.21	971.69	953.32

Table 5.2: UP Research Output 2001 –2003

Table 5.2 corresponds with the findings by Pouris (2006:24) in which he reports that the University of Pretoria is the largest in terms of research output. The university tops the list with 954 units for 2003. Second is the University of KwaZulu –Natal with 630 units followed by the University of Stellenbosch with 624. The following table paints a picture of the University of Pretoria's research output in the indexed journals.

Journals	2002		2003		2004	
Number of DoE units earned	930.65		916.55		1016.34	
ISI Journals	369.66	39.72	357.65	39.02	473.17	46.56
IBSS Journals	60.41	6.49	72.48	7.91	62.13	6.11
Local Journals	480.34	51.61	453.41	49.47	481.04	47.33
Journals not indexed	20.24	2.17	33.01	3.6		
Total	930.65	100.00	916.55	100.00	1016.34	100.00

Table 5.3: UP Research Output in Indexed Journals

In the 5-year period from 1997 to 2004 the University of Pretoria strengthened its position as the premier research institution in the country by increasing its publication units by 30%. Although the academic aspects of research programmes are the responsibility of the various faculties, the management of research output at the University of Pretoria is centrally coordinated by the Department of Research Support (DRS). From the above it is clear that the University of Pretoria

employs the ³²systems theory in the coordination of its research output. Figure 5.4 depicts an information management system for research output management. A typical system receives inputs (by data capturers and RIS Coordinators), acts upon them (processing by the DRS) and converts them into outputs in order to meet the objective of the system as shown in Figure 5.4. The DRS plays a pivotal role in ensuring that the research output is submitted according to the criteria set out in the new DoE policy.

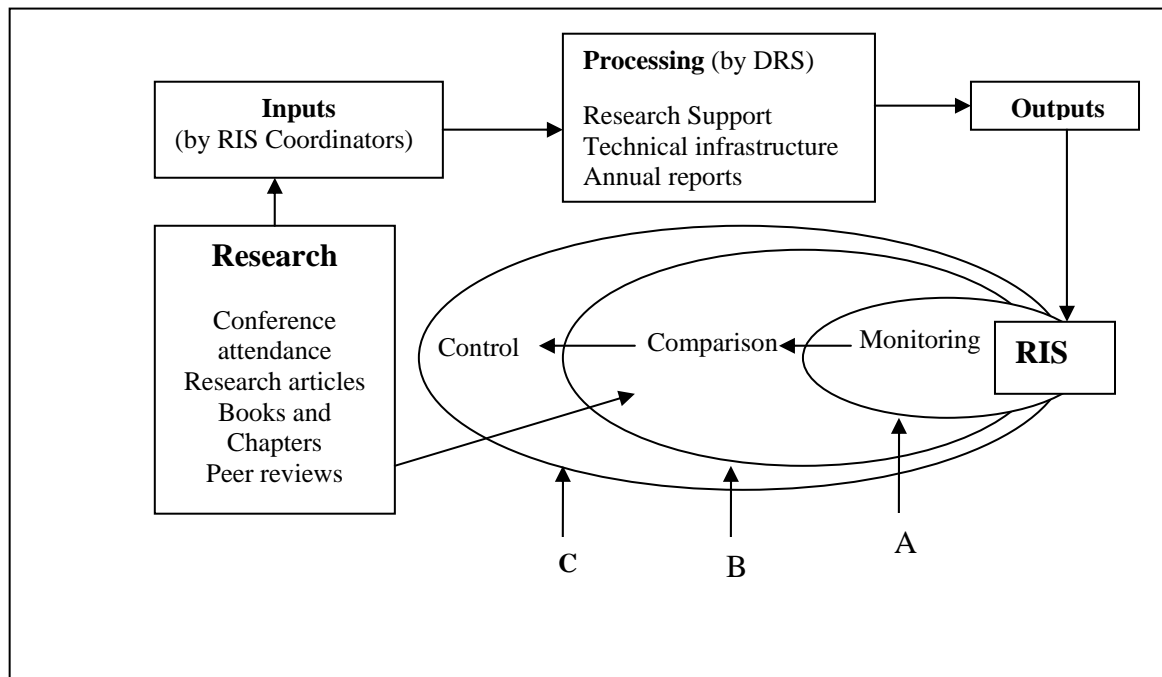


Figure 5.4: Information management system: Adapted from Van der Walddt, *et al.* (2002:137)

The University of Pretoria uses the ³³Research Information System (RIS) database to capture and monitor its research output data. The Council for Higher Education (2005:13) defines a research information system as a computerised information system (electronic database) that stores up to date and accurate information about the research and innovation activities, resources (research personnel, funding and equipment) and outputs of the HEI. It continues to state that such a

³² Daniels (1994:111) defines systems theory (also called; systems thinking) as 'the idea (is) to view any business activity as a whole system of information, perception, values and activities'. A system comprises a number of elements which are connected or related and which are organised, either naturally or by design, to achieve some purpose (Bentley, 1998:61).

³³ The term refers to a management information system (MIS) used by higher education institutions to capture, monitor and retrieve research information. Management information systems can be defined as information systems that provide reports which assist the managerial monitoring and control of institutional functions, resources or other responsibilities. Smit and Cronjè (1992:166) define MIS as an integrated system of procedures, people and methods for the regular, planned collection of information, designed to enhance decision making effectiveness.

system should provide for easy retrieval of information and the production of appropriate research management reports that can support the planning, monitoring and implementation of the institution's research goals. This data are used to serve the following important purposes:

- a) They are used to develop submissions to the Department of Education for the research subsidy on the University of Pretoria's publications (including journal articles, papers in conference proceedings, books and chapters in books).
- b) The entries on "Highlights from Research Findings" are used for the Faculty Reports in the University of Pretoria's ³⁴annual research report.
- c) Projecting an up-to-date, consistent and accurate set of information to end-users.
- d) Replacing the vast amount of paperwork with sufficient and usable information.

The coordination and capturing of the university research output is made possible by the data capturers. The data capturers in faculty departments play a pivotal role not only in entering data on the RIS system but also in the collection of hard copies of the research output in the form of books, chapters in books, conference published conference proceedings and journal articles for submission to their respective Research Coordinators. Apart from the faculty data capturers, the RIS system is used by various stakeholders within the institution. A discussion on the institutional use of the RIS is of relevance in this regard.

5.2.1 Institutional use of the research information system

The management of research output is a complex process that includes activities and processes that are geared towards creating an enabling environment for research to flourish and encouraging a culture that fosters imaginative, creative, innovative, high quality research. It also encompasses processes to ensure that resources are allocated and managed, and that research projects are executed and monitored. An important element of the management process is to ensure that research projects culminate in appropriate research output. This is made possible thorough the effective use of the Research Information System (RIS).

³⁴ The annual research reports can be viewed at <http://www.research.up.ac.za/>.

Information is a fundamental resource to both government and the private sector alike. Without access to relevant information, many institutions would lose their comparative advantage over others (Van der Waladt, *et al.* 2002:129). In the context of research information, data is entered by Data Capturers in Departments under the supervision of the RIS Coordinators of the Faculties/Schools appointed by the Deans. A list of the current incumbents is published on the university's ³⁵intranet. The RIS Coordinators are appointed by the faculty deans and serve the following purposes:

- a) Contact persons for the Division of Research Support (DRS) in terms of all research output related queries. To avoid confusion and conflict with internal faculty processes, the DRS staff does not liaise directly with the departments;
- b) Responsible for the completeness of data and the submissions of books and conference proceedings to the DoE (the RIS “³⁶check list” is a valuable tool in this regard);
- c) Responsible for the system of scientific quality assurance in his/her faculty or school for the research articles included in the subsidy claim. RIS Coordinators are responsible to ensure that a system is in place to ensure that UP fulfils this requirement of the DoE policy; and
- d) Quality of data for the annual Research Report.

Apart from the above responsibilities, the RIS Coordinators are the contact persons for senior management to request various research reports from the DRS. Central to its monitoring and control roles, the RIS as a management information system (MIS) produces reports. Van der Waladt, *et al.* (2002:145) stresses that these reports are mainly what managers expect from a MIS since these are its tangible outputs.

In order to ease the burden resting upon the shoulders of data capturers, the DRS has drafted and uses an Operator's Manual that guides Faculty RIS Coordinators and data capturers on effective data capturing techniques. For the convenience of researchers, data capturers and the RIS Coordinators, the Operator's manual is available as a hard copy and can also be accessed on the ³⁷intranet. To

³⁵A detailed list is available at the following UP intranet address: [RIS Coordinators / Data Capturers](#),

³⁶For examples of detailed check lists, see annexure A.

³⁷The University of Pretoria has a research intranet dedicated to its personnel, and the data capturers can access the Operator's manual at: <http://www.research.up.ac.za/>

complement the Operator's manual, the DRS has also drafted the check lists for the research output for data capturers and RIS Coordinators to manage the technical requirements of each submission (see Appendix 5, an example of the check lists that should accompany the faculty output).

5.2.2 Management of research output by faculty RIS Coordinators

The University of Pretoria has nine Faculties and for the purpose of this study, only four were identified to study the differences in their publication records. The Faculties involved are Economic and Management Sciences, Education, Humanities and Law. The focus was on the articles published in accredited journals for the 2005 and 2006 reporting years (n) with the publication date of the preceding year (n-1) being 2004 and 2005. According to Van Raan (2005:2), scientists who have something to say do publish their findings vigorously in the open international journal (serial) literature. He echoes Davis (1997:73) who states that in science credit goes to the person who convinces the world, not to the person to whom the idea occurs. He continues to say that every scientist dreams of making a ground-breaking discovery in research and publishing an article that will be considered the classic of the discipline.

Management of research output at the institutional level within higher education institutions has become a highly specialised and professional task. The vast majority of South African higher education institutions employ dedicated quality assurance officers and research (and innovation) directors or managers who preside over research management and administration offices. In addition, the coordination of research output in the faculties rests on the shoulders of RIS Coordinators who are full-time academic members of staff. The point of departure is to highlight the fact that the four faculties in this study employ different strategies to manage the submission of their research output.

5.2.2.1 Faculty of Human and Social Sciences

In the Human Sciences, the RIS Coordinator holds preliminary meetings with all the departmental Research Coordinators who are also the heads of their respective departments. The first meeting serves to discuss guidelines, templates and terms for the submission of the research output as provided by the Department of

Research Support (DRS). According to ³⁸Prof A Van der Merwe, the guidelines, terms of reference and the DoE templates are usually sent out at least two weeks before the meeting. Each departmental research coordinator is responsible for the collection of the output from all researchers in his/ her department and to assess the quality of the output submitted.

The DoE templates are not the only tools that can be used to manage the technical and quality requirements of the research output data. In addition to the DoE templates and guidelines, in order to ease the burden of data capturing as well as technical control of the research output, Van der Merwe has drawn the following guidelines for articles published in accredited journals:

“The requirements for subsidy are:

- a) The article must be published in a journal that appears in one of the following *indices*: the Approved South African Journals or the ISI or the IBSS list;
- b) The contributions to the journal must originate from *more than one institution*; and
- c) If a journal is *published late*, (dated in a previous audit year), the article must be accompanied by a letter from the editor stating the actual date of publication and the reasons for the late publication.

The following types of articles appearing in journals are *not subsidised*:

- a) Correspondence to the editors
- b) Abstracts or extended abstracts
- c) Obituaries
- d) Book reviews
- e) News articles
- f) Advertorials”

Van der Merwe (in an interview) concludes by stating that:

If a researcher invests time in writing an article, a chapter or a book, that person should make sure that he/she and the University of Pretoria will benefit from it by receiving subsidy. The guidelines can also be used during the preparation of a publication.

³⁸ Prof Anita Van der Merwe (RIS Coordinator, Faculty of Human and Social Sciences): Interviewed on 30 March 2006.

The meetings held by the RIS Coordinators often reveal some challenges faced by researchers in procuring research funds and government subsidy for research output. Van der Merwe has singled out the following challenges:

- a) Guiding and convincing the academics to comply with the DoE guidelines long before preparing for publication. It is very important for academics to make informed decision before choosing a particular journal or publisher.
- b) There are few educated administrative support personnel to help with the technical evaluation of the output submitted.
- c) The NRF and the DoE guidelines are not aligned in that the NRF does not emphasise the importance of publishing in accredited journals.

5.2.2.2 Faculty of Law

For audit purposes and procurement of research funds from the DoE, the DRS supply the RIS Coordinators with DoE templates drawn from the RIS ³⁹database for completion and attaching to the output submitted. In the Faculty of Law, the DoE research output templates are electronically distributed by the RIS Coordinator to the heads of departments and data capturers for coordination and control. ⁴⁰Prof C Nagel, RIS Coordinator for the Faculty of Law states that the quality control of the research output is primarily done by the heads of department who then forward their approved research output to his office for final analysis and submission to the DRS.

A discussion on quality is usually incomplete without the inclusion of ⁴¹quality control. Quality control is usually associated with the need for products to conform to predetermined standards and specifications. In the South African higher education context, the products are therefore, research output that is expected to conform to specifications detailed in the government's policy for the measurement of research output of public higher education institutions. The departmental Research Coordinators rely on their secretaries for collection of data form academic members of staff and data capturing. Nagel emphasises that the

³⁹ Database administration is the function in an institution that is responsible for more technical and operational aspects of managing the information contained in institutional databases. Database administration functions include defining and organising database structures and contents, developing security procedures, developing database and database management systems.

⁴⁰ Prof Chris Nagel (RIS Coordinator, Faculty of Law): Interviewed on 26 March 2006.

⁴¹ Quality control is a term used to describe the operational techniques or systematic procedures which are carried out to check that the products conform to specification (Ashworth and Harvey, 1994:13).

technical and quality requirements of the captured data remains the responsibility of the departmental Research Coordinators.

In its discussion document Higher Education South Africa (2005:03) states that the measuring of research and innovation output should take into account quantity and quality (or in other words, output and impact). However, there is no automatic consensus of indicators. Various issues need to be borne in mind, among others, discipline specific practices and the stage of development of the individual researcher. In line with the measurement of research output, it is expected of academics throughout the world to continuously improve their research work and make it known to their peers. According to Le Grange (2003:132), this is done through publishing in different forums but mainly in refereed journals and scholarly books.

In line with Van der Merwe's guidelines as discussed above, Nagel adds that in the faculty of Law's guidelines for research and conference funding, the main condition states that:

“Your attention is drawn to the University policy as set out in Rt 931/02, in terms of which you will only receive further support for conference attendance once an article in a professional journal (preferably, though not necessarily, on the same topic as your paper) has either been published or at least accepted for publication”.

5.2.2.3 Faculty of Education

Although each faculty uses its own method to coordinate the submission of its research output to the DRS, the differences are not that remarkable. The Faculty of Education uses a method which is almost similar to that used in the Faculty of Human and Social Sciences. ⁴²Dr Riaan de Villiers, the RIS coordinator for the Faculty of Education highlights the point that he holds preliminary meetings with Departmental Research Coordinators (Heads of Departments) to discuss the important deadlines as well as the technical requirements of each category of research output as detailed in the DRS templates. Coordinating the faculty research output requires several meetings with Research Coordinators and/ or data capturers. Such meetings comprise of individual sessions with the departmental

⁴² An interview with Dr Riaan de Villiers was held on 04 April 2006.

Research Coordinators to establish the progress registered, to identify some problem areas and, to agree on remedial strategies.

De Villiers stresses that he encourages academic members of staff to submit accurate data and hard copies of their research output on time since faculty research funds are dependent among others on their research output. De Villiers explains that the faculty raises its research funds through a very simple process whereby a portion of the subsidy earned by each staff member for an accredited publication is paid into the fund. Each faculty is funded from a central fund that is administered by the Vice Principal responsible for research matters. The amount allocated to each faculty, is calculated according to a set formula as indicated in the table below:

Table 5.1: Faculty research fund allocations

Category	%
Masters and Doctoral graduates	40
Doctoral enrolled students	10
Accredited publication units	40
FTE C1 personnel	10
Total	100

The above table gives an indication that the bulk of funds emanate from subsidy earned through articles published in accredited journals. The Faculty Research Committees (RESCOMS) are in this light, encouraging researchers to make their research findings known to their peers by publishing widely in the accredited journals. Moreover, the most common vehicle for communicating with other scientists is the scientific journal.

5.2.2.4 Faculty of Economic and Management Sciences

In comparison with the three faculties discussed above, the Faculty of Economic and Management Sciences employs a unique system. The coordination and data capturing is in other departments not done by administrators and or secretaries. For example, in the School of Public Administration and Management, the Department of Auditing and the Department of Taxation, data is collected, controlled and captured by key academic members of staff. Since these academic

members of staff are well conversant with the technical and quality requirements of the output, the coordination thereof becomes effective.

The faculty RIS Coordinator employs the services of a contract worker (in most cases a postgraduate student) to assist in the verification and packaging of each department's research output before forwarding the output to the DRS. An interview with ⁴³Prof P.A. Brynard, RIS Coordinator for the Faculty of Economic and Management Sciences has revealed that convincing the academics to comply with the DoE even before preparing for a publication and to make an informed decision before choosing a publisher or journal is a great challenge.

5.2.3 Comparison of research output production by the four faculties

The following data on the composition of UP authors in 2004 serves as a starting point for analyzing research output of four faculties:

Table 5.2: 2004 DoE Audit: Composition of UP authors Source: University of Pretoria RIS database 2005

Total Number of articles:	1207 (involving 2996 authors)
If all authors were UP affiliated, total units would have been:	1207 units
Actual number of units: (82.5%)	996.77 units
1653 authors listed as UP personnel	involving 767 individuals
325 authors listed as M+D students	involving 262 individuals
201 authors listed as Associates	involving 130 individuals
Total UP authors	1159 individuals
813 authors Not UP	
2996 persons (authors/co-authors)	

The new policy states that the subsidy for research output is also influenced by the affiliation of authors. The claiming institution accrues full subsidy if all the authors are affiliated to the claiming institution (Ministry of Education 2003:2). In the above table, it should be noted that the total number of articles (1207) includes articles that were co-authored with colleagues from other HEIs, science councils as well as from industry. Actually, the total amount of units earned by the University of Pretoria is 996.77, which makes 82.5% of the 1207 units. Of the 2996 authors who published articles in 2004, 813 were not affiliated with UP.

⁴³ An interview with Prof Brynard was conducted on 29 March 2006.

Now that the broader picture of the total university authors in the preceding table has been clarified, the following table shows personnel versus authors in the four faculties under study:

Table 5.3: Personnel versus Authors 2004

Faculty	Total Personnel listed in database	Total Personnel authoring articles	% of total
Economic and Management Sciences	363	83	22.86%
Education	169	95	56.21%
Humanities	671	154	22.95%
Law	125	120	96%

In comparison with the other three faculties, the Faculty of Law leads with 96% of authors followed by Education with 56%. The Faculties of Humanities and Economic and Management Sciences appear to be lagging behind with an average of 23% of their personnel authoring articles in 2004 (n-1) for the 2005 (n) reporting year. It is therefore recommended that Research Managers in the faculties of Humanities and the Economic and Management Sciences encourage their personnel to actively engage in publishable research activities. Publishing in accredited journals is of vital importance not only for the generation of subsidy for the university but for the procurement of research funds and the rating of individual researchers by the National Research Foundation (NRF).

The university block grants for the NRF International Science Liaison are also decentralised to faculties according to the units earned for the (n-1) year. The above discussion on a comparison between the personnel listed in the RIS data and the total personnel authoring articles has paved a way for an analysis of each faculty's total units earned for articles published in 2004 and 2005. Although research output is a broad concept, there is wide agreement among academics that its most important component consists of publications in academic journals, and that the more visible and highly esteemed a journal, the higher the standing of its publications.

According to the Ministry of Education (2004:2) recognised research output comprises of journals, books and proceedings. It can thus be concluded that this

listing is intended to be indicative rather than comprehensive. It is designed to compare relative output between institutions of higher learning, across a selective sample of publications that meet prescribed criteria. It is against this background that journal articles have been singled out to compare the output levels of the four faculties. Table 5.4 presents a summary of the units earned per ⁴⁴faculty for the n-1 reporting year.

Table 5.4: Journal Article Units 2004

Faculty: Education	units
School of Teacher Training	7.25
School of Educational Studies	<u>32.06</u>
Total units for Education	<u>39.31</u>
Faculty: Economic and Management Sciences	units
School of Management Sciences	31.58
School of Economic Sciences	15.67
School of Financial Sciences	<u>13.00</u>
Total units for Economic and Management Sciences	<u>60.25</u>
Faculty: Humanities	units
School of Arts	17.33
School of Social Sciences	65.75
School Languages	<u>56.83</u>
Total units for Humanities	<u>139.91</u>
Faculty: Law	units
School of Law	<u>93.83</u>
Total units for Law	<u>93.83</u>

In terms of the total units earned per Faculty for the 2004 journal articles, the Humanities have registered the highest total. In comparing the production level of each faculty, one needs to consider the above discussion on the total number of personnel versus the total number of personnel authoring articles. For example, in comparison with Law, only 23% of personnel in the Humanities are authoring

⁴⁴ Upon completion of the audit process, the DRS forwards the detailed tables on the units earned (per department) for articles published in the reporting year to all faculty RIS Coordinators and the Deans.

articles and have registered a total of 139.91 units for the 2005 reporting year while a whopping 96% in the faculty of Law authored articles and only managed to register 93.83 units. The 2005 audited journal articles units paint a different picture as detailed in Table 5.5.

Table 5.5: Journal article units 2005

Faculty: Education	units
School of Teacher Training	9.08
School of Educational Studies	<u>39.92</u>
Total units for Education	<u>49.00</u>
Faculty: Economic and Management Sciences	units
School of Management Sciences	40.66
School of Economic Sciences	15.34
School of Financial Sciences	<u>6.33</u>
Total units for Economic and Management Sciences	<u>62.33</u>
Faculty: Humanities	units
School of Arts	14.20
School of Social Sciences	63.25
School Languages	<u>39.50</u>
Total units for Humanities	<u>116.93</u>
Faculty: Law	units
School of Law	<u>82.50</u>
Total units for Law	<u>82.50</u>

An analysis of the above table shows that in comparison with the 2004 articles (2005 reporting year), the Faculty of Education has in 2005 (for the 2006 reporting year) increased its output by 10.31 units. Published research output in scholarly journals has increased by a margin of 25% in one year and by 76% (28 units) against the 2001 baseline.⁴⁵De Villiers explains that:

The dramatic increase in the Faculty's research output can be credited to setting high and uncompromising standards for performance for every scholar

⁴⁵ Faculty of Education RIS Coordinator interviewed on 28 July 2006.

in the faculty. Again, the establishment of such a highly productive research culture was achieved by recruiting some of the most talented young scholars in education from around the world and, by investing major funds in the development of new academics.

The Faculty of Economic and Management Sciences managed to register an increase of only 2.08 units in 2005 for the 2006 reporting year. ⁴⁶Brynard is of the opinion that:

Even though the increase registered is not that substantial, an increase in the number of new staff members who participated in research and research activities is particularly encouraging. This increase indicates that a research culture is becoming more entrenched in the Faculty and that our research capacity is expanding.

The Faculties of Law and Humanities have registered a decline of 11.33 and 22.98 units respectively. In acknowledging the decline in the Faculty of Law's journal output for the 2006 reporting year, ⁴⁷Nagel argues that:

In the legal profession, although publishing in accredited journals is of paramount importance, academics are encouraged to publish and participate in national and international conferences. Conferences are used as platforms for academics to share their research findings with their peers in the legal practice.

The University of Pretoria has remained the institution that has produced the largest number of research publication units in the country. While continuing with the use of this measure as an indicator of research performance, the university is increasingly focusing in the publication of the research results of its research activities in international journals, the rate of which is in the order of 6% per annum. In recognising the University of Pretoria's continuing research output growth, it will be of benefit to analyse its share in the national publications by discipline and highlight the performance of the four faculties under study. The analysis is derived from table 5.6.

⁴⁶ Faculty of Economic and Management Sciences RIS Coordinator: Interviewed on 01 August 2006.

⁴⁷ Faculty of Law RIS Coordinator: Interviewed on 01 August 2006.

Table 5.6 The University of Pretoria's share in national publications by discipline 2000–2004 Source: Pouris (2006:25).

Discipline	Percentage of papers (UP/SA) (%)
Agricultural sciences	21
Biology and biochemistry	14
Chemistry	12
Clinical medicine	7
Computer science	34
Ecology/environment	16
Economics and business	17
Education	19
Engineering	21
Geosciences	10
Immunology	6
Law	0
Materials science	22
Mathematics	8
Microbiology	14
Molecular biology and genetics	17
Multidisciplinary	14
Neurosciences and behaviour	10
Pharmacology	13
Physics	12
Plant & animal sciences	23
Psychology/psychiatry	6
Social sciences	7
Space science	1

Table 5.6 shows the University of Pretoria's share of publications in the national totals of 24 scientific disciplines. An analysis of table 10 shows that the University of Pretoria has produced 19% of all articles in education, 17% of the articles in the economic and management sciences, 7% of the articles in human and social sciences, and 0% of the papers in legal sciences. It might be argued that legal and social sciences disciplines deserve more attention to increase their impact in national publications. It can thus be deduced that in the measurement of research output, various challenges may be encountered. A discussion on the key challenges in the measurement of research output will shed light on how the above situation can be managed and improved.

5.3 Key challenges in the measurement of research output

Managing the measurement of research output is never a smooth ride, but is a complex and challenging task. Challenges facing research managers and policymakers in measuring and the use of research output are voluminous and the study has thus concentrated on only three fundamental ones being:

- a) measuring at the university level as opposed to faculty or departmental level;
- b) using standardised appropriate measures for a specific or intended audience;
and
- c) comparing faculties or schools that are not comparable.

In addition to the above fundamental challenges, the CHE has identified the following trends within South African higher education, that also directly or indirectly affect the management of research:

- a) The high-level goals for transforming the science system in the country from the point of view of both the profile of its human resources and the relationship between its output and the needs of a democratic society. (This imperative cuts across higher education and science and technology policy).
- b) The national policy imperative (as contained in the National Plan on Higher Education) to increase research output (including the output of postgraduate students) while maintaining standards of excellence.
- c) The increasing shift within public sector research in the country towards more strategic and applied research, to the possible detriment of fundamental research.
- d) The growing demands for the commercialisation of research and the concomitant implications as far as intellectual property considerations are concerned (CHE, 2005:17).

Gater (2003:3) is of the opinion that of particular importance, data that measure an institution's performance at the university level (such as total research expenditures) is fundamentally different from data that measures the productivity of the faculty of that institution (such as average faculty research productivity). She argues that the first takes the institution as the unit measured whereas the second takes the faculty as the unit measured.

There is also a challenge that relates to the focus on publications when measuring research output. There are criticisms levelled against an emphasis on publications. One such criticism concerns a possible proliferation of trivial work. Effendi and Hamber (1999:173) argue that obsession with publication can become a source of stress for individual researchers and can lead to the proliferation of trivial work published in journals and books. Le Grance (2003:130) also notes that trivial work might be the outcome of the pressure to produce sufficiently large numbers of publications to meet the bureaucratic requirements for the procurement of subsidy income from the DoE or the performance of appraisal systems. This kind of pressure might lead the academics to engage in a game of publication and consequently publish same articles under different names in different publications. However, it should be noted that that what is perceived to be trivial by one research community might be perceived to be acceptable research by another.

A recommendation may be that If quality is determined by the quantity of publications and the number that appear in traditional disciplinary journals, one logical strategy will be to hire and promote individuals who are most likely to enhance the reputation of the university or academic department through their publications. A suggestion by Mixon and Otto (1994:473) is that law schools should "restrict hiring to law review officers from national law schools," because, as they point out, "these graduates tend to network and support each other in formal and informal ways" Unavoidably, strategies such as these reinforce social similarity in that they tend to construe differences as signs of inferiority. Quality also plays a crucial role in publications and scholarly work.

Kenway, Gough and Hughes (1998:9) argue that the main reason for publishing is to contribute to the advancement of knowledge in the relevant field. Through publishing in refereed journals and scholarly books, the academic's research outcomes and ideas are circulated amongst peers and subsequently contribute to debates in the relevant field. In relation with the quality of publications, the following basic assumptions can be drawn:

- a) Research is the central professional endeavour and the focus of academic life;
- b) Quality in the profession is maintained by peer review and professional autonomy. That is why it is of paramount importance to publish;
- c) Reputations are established through national and international publications and professional associations; and

- d) Research output, professional rewards and mobility accrue to those who persistently accentuate their specialisations.

The complex interrelatedness of the above basic assumptions is built towards contributing to an extraordinary advancement of knowledge. It is indeed correct to argue that publications have an impact on increased levels of specialisation, rigorous exchange of ideas and knowledge, and the new levels of research funding by government. In addition, there is increased pressure on authors to publish in top-tier journals early in their careers in order to receive positive tenure and promotion decisions. Le Grange (2003:132) concludes by stating that publishing enhances the reputation of the individual researcher, the faculty and the university.

5.4 Conclusion

This chapter has addressed the ways in which new government policies on research measurement impact on faculties within a university. Four faculties within the University of Pretoria were used to highlight the differences in managing the measurement of research output by the faculties. The study was limited to research articles published in accredited journals because the journal publications are used internationally as a measure to compare institutional and individual research performance. Another factor that led to the choice of research articles is that articles attract more government subsidy than books and conference proceedings. The chapter was concluded by identifying key challenges in the measurement of research output. In conclusion, “not everything that can be counted counts and not everything that counts can be counted” (Einstein, 2002).

A point of departure for this chapter was the justification of selecting the University of Pretoria as a leading research institution. The University of Pretoria is a research university in a true sense of the word. During the last decade, the University of Pretoria has sharpened its focus on research significantly. This has led to a substantial increase in the emphasis on research at the University of Pretoria, which has in turn resulted in the University becoming a leading research university in the country. It produces more accredited research output than any other institution of higher learning in South Africa. Its research output per academic member of staff also compares favourably with that of the other leading universities in the country.

The role of the DRS together with its utilisation of the RIS in the coordination and processing of the university's research output was outlined. One of the findings of this chapter is that, the University of Pretoria uses the systems theory in its management of research output. The RIS system generates inputs from the faculty RIS Coordinators, processing is done by the DRS to produce the output which is used by the DoE to determine the annual subsidy to be allocated to the university. The chapter has explored different ways in which the four faculties coordinate and manage their research output. The key challenges in the measurement of research output also enjoyed attention and has shed light on how to manage such challenges.

Chapter 6

Making sense of emerging findings on the measurement of research output in South African Universities: Implications for theory, research and practice

6.1 Introduction

Higher education institutions in South Africa generate their income from various sources including student fees, donations from public and private institutions, investments, public and private contracts, consulting activities and other grants. However, universities in South Africa and throughout the world are mainly funded by government subsidies based on their research output. Considerable government funds are spent on research funding activities at universities and institutions, yet researchers and research funding agencies constantly argue that more is needed. With increased government funding, new socio-economically useful knowledge is created and distributed through the tradition of public disclosure in science by way of publications such as journals, books, conference proceedings and patents. At the same time, governments across the world face numerous competing demands for public funding. Those responsible for deciding how the limited public funds are to be distributed, and for ensuring public accountability should therefore be familiar with the policy for the measurement of research output and other related public policies.

The goal of the study was to compare and contrast the implementation of the new research policy, with its stated goals, and the manner in which such a policy gets interpreted and understood by various implementers within a university context. The objectives of this study were to investigate the extent to which the new policy will have on increasing the quality and quantity of research output of HEIs; identifying key challenges facing the universities in implementing the new research subsidy policy; and to make recommendations and proposals on how best can the policy be implemented with a view to increasing or improving the institutions' research output.

6.2 Emergent findings

Measuring research output production of HEIs (quantitatively and qualitatively) supports both government and HEIs decisions on setting priorities in the allocation of resources and funding. This investigation's emergent findings revealed:

6.2.1 That the policy gap, also referred to as the discrepancy between policy and implementation, is caused largely by unrealistic policies, and a lack of managerial expertise. Policy implementation has suffered from the absence of a people driven process, more especially in the South African context. Insufficient co-ordination of policy implementation is cited in virtually all sectors, and has significantly hampered the implementation of policies. In addition, insufficient staffing, and capacity of all three spheres of government, as well as the linkages between them have largely worked against the successful implementation of policies.

6.2.2 That the measurement of research output is a rapidly developing field. Its development is closely linked to the general tendencies in the global and scholarly system, where research institutions are subjected to new influences and pressures emerging from the increasing need for accountability in scholarly research and training of students. The measurement of research output is common practice among institutions internationally, and is increasingly contested and controversial. What counts as an acceptable unit of measurement becomes the subject of considerable debate within and outside institutions as they seek to enhance institutional standing and revenue.

6.2.3 That the means for estimating the value of research output of universities has proved to be a controversial topic. Not only is it necessary to capture the quantity of output, which can be quite varied and given weight, but also the quality of the work must be accounted for. With regard to 'research quality', on one hand, research quality is not merely a social construct. It does not coincide with what scholars define or decide upon as quality, even if they have reached a consensus. It relates to quality intrinsic to the research itself. On the

other hand, the concept cannot be defined and measured in the same way as in physics or other areas of science

6.2.4 That, although the new policy for the measurement of research of public higher education institutions in South Africa has shown some significant improvement from its predecessors, there are many flaws or gaps in its implementation as well as its relation with other policies such as the Science and Technology policy. The evolutionary approach to the economics of publicly funded research suggests that informational view of knowledge substantially undervalues the extent to which knowledge is embodied in specific researchers and institutional networks within which they conduct their research. It also misrepresents the nature of the innovation process, implying that scientific knowledge is “on the shelf, freely available to all comers”. Thus, it can be argued that scientific knowledge is not freely available to all, but only to those who have the right educational background and to members of the scientific and technological networks.

6.2.5 That the university faculties have varying capacity and procedures for managing research outputs, even within the same institution. The four faculties in this study employ different strategies to manage the process of submitting their research output, and such different methods have an impact on the production rate of each faculty's research output.

6.3 Interpreting the findings

If the reasons for policy success or failure cannot be understood, then attempts to improve programmes and policies or sustain and emulate successful initiatives may be ineffective or even counterproductive. Policy evaluation can only indicate the nature of the changes required if it can explain why a programme or policy succeeded or failed. Governments are in this regard encouraged to get out there and engage with relevant stakeholders, not only to help co-construct policy knowledge (probably) primarily in a bottom-up inductive fashion, but also perhaps to improve policy legitimacy, and hence to help improve governing capacity, in this case through building relevant networks. At the very least, what is required are institutional processes of consultation, debate, dialogue and mutual learning, and

ways of incorporating the fruits of such processes into policy. One of the objectives of this research project was to raise the possibilities of understanding current education developments in South Africa in the light of the international substantive and theoretical concerns. The question is: do these international perspectives continue to make less sense for understanding current education policy in South Africa?

The current policy for the measurement of research output of public higher education institutions indicates that it does not measure all output, but rather recognises the major types of research output produced by higher education institutions. According to the policy, recognised research outputs comprise of journals, books and conference proceedings. This listing is indicative rather than comprehensive. It is designed to compare relative output between higher education institutions across a selective sample of publications that meet prescribed criteria.

In South Africa, research output is recognised through government subsidy-earning guided by the policy for the measurement of research output of public higher education institutions. In this context, the management of research output at higher education institutions has become a highly professional task that requires the ability to understand and translate national policies and directives at the institutional level into opportunities for individual researchers, postgraduate students and research teams to pursue their interests and achieve their potential.

Although far from perfect, especially in a rapidly changing higher education landscape, political and technological environment, the new policy is more relevant and encourages greater research productivity than its predecessors. The current policy is a goal-oriented and performance-related distributive mechanism that explicitly links the allocation of funds to academic activity and output. The current policy arguably serves to enhance effective measurement of research output of HEIs.

The current policy of the measurement of research output of public higher education institutions in South Africa is seen as promoting star players and the need to produce publication quantity. The policy proposes benchmarking of institutions by measuring refereed research output of its academic staff members. There appear to be few rewards for academics who take part in many of the other

research related activities that are excluded by the current measurement system (e.g., referee for journals, research seminar participation, supervision of PhD students, cross discipline and institutional research projects, etc.).

In the natural sciences, it appears to be increasingly the case that journal articles are the primary recognised form of scholarship, with rewards to faculty and to departments following journal performance. In this scenario, the rewards to the scholars in research oriented departments who undertake textbook projects are elusive, and yet academics can still be found undertaking this activity. Scholarship includes an individual's pursuit of learning and understanding through formal research, reading, reflection, discussion, and writing. The value of scholarship is generally established through its dissemination, by means such as teaching, workshops, conversation, conferences, and of course, publication. The assumption that scholarship is only that which is disseminated can be justified on the grounds that personal erudition which is not shared in any way risks being merely sterile and self-referential.

However, to equate scholarship only with publication, although this may have its attractions, carries attendant risks. It denies the erudition of the outstanding teacher, the generous colleague acting as advisor and informed critic, the journal article or book referee and the unpublished research degree thesis.

The management of research output is a complex process that includes activities and processes that are geared towards creating an enabling environment for research to flourish and encouraging a culture that fosters imaginative, creative, innovative, high quality research. An important element of the management process is to ensure that research projects culminate in appropriate research output. This is made possible through the effective use of the Research Information System (RIS) maintained by the Department of Research Support which plays a pivotal role in the production of the university's research output. The University of Pretoria uses the systems theory in the process of coordinating its research output. The RIS system generates inputs from the faculty RIS Coordinators, processing is done by the DRS to produce the output which is used by the DoE to determine the annual subsidy to be allocated to the university.

The University of Pretoria remains a leading university, and is one of the major producers of high level intellectual capital in South Africa. The University of Pretoria

produces more accredited research output than any other institution of higher learning in South Africa. Its research output per academic member of staff also compares favourably with that of the other leading universities in the country. The output is also used by DRS and university management for generating the University of Pretoria's Annual Research Report. The Annual Research Report is used both for accounting for public funds entrusted to the university through government subsidy, and for marketing the university through highlighting research achievements for the reporting year. For example, the University of Pretoria's 2005 Annual Report has highlighted the following research achievements:

- a) The development of a technique to produce synthetic graphite – not from petroleum coke, but from coal – to be used in pebble bed modular reactors;
- b) The design, characterised and ballistically tested range of 13 advanced performance armour plate steels that will allow a significant reduction in sickness;
- c) Research aimed at finding a solution to the challenge of welding nitrogen-alloyed stainless steel without resulting in porosity and nitrogen losses that significantly weakens the welded joints;
- d) The development of the Rotoscope used to monitor biofilm formation in real-time without interfering with industrial processes; and
- e) The development of a new approach – incorporating belief systems, social structures and their connection to air pollution and subsequently low productivity to tackle problems emanating from poverty.

6.4 Significance of the study

The changes in policy have served to highlight the international dimension of education policy at two levels: firstly, in terms of substantive changes, we can see similarities in policy innovations across industrialised, developed and developing countries. Secondly, an internationalist perspective helps our understanding of the underlying political and economic forces that drive the policy community. One of the objectives of this research project was to raise the possibilities of understanding current education developments in South Africa in the light of the international substantive and theoretical concerns.

The study will contribute to the global knowledge base of research measurement since it has identified and highlighted the trends in the South African HEIs'

implementation and use of the new policy for the measurement of research output of public HEIs in South Africa. The study has brought in the international trends in the measurement of research output of institutions, faculties, academic departments, individual researchers and discipline rankings. This is seen in the emphasis of publishing in international accredited journals as well as cited journals by international organisations such as the Social Sciences Citation Index (SSCI).

The measurement of research output forms an integral part of the management of higher education institutions in South Africa and throughout the world. Governments and university managers are both highly interested in the measurement of research output for purposes of reporting and disbursement of funding subsidy. For the government, the measurement of research output of HEIs helps in making informed decisions in the allocation of public resources, while for the universities reporting on the research output production helps to manage the allocation of resources. Every higher education institution has some form of reporting in terms of its research output.

6.5 Implications of this study for theory and practice

The purpose of this section is to present the contributions made by the research to the existing body of knowledge with regard to the policy for the measurement of research output of public higher education institutions in South Africa. Although improved accountability has been a major force behind the move to implementing the policy for measurement of research output of public higher education institutions in South Africa, there is an even more important reason: to help institutions improve on their research output. Firstly, research output measurement provides a learning loop that feeds information back into institutions on how well they are doing. It offers findings they can use to adapt, improve, and become more effective.

Secondly, the process of focusing on research output (on how the institution is doing what it is doing and how it links researchers will be better off) gives research managers and staff a clearer picture of the purpose of their efforts. Identifying major gaps in the production of research output can provide the impetus for institutions to fundamentally rethink how they do things. That clarification alone leads to more focused and productive service delivery.

The study has concentrated on one higher education institution, the University of Pretoria as a leader in research output production. The study was also limited to only four Faculties within the University of Pretoria and could not cover all nine Faculties due to time constraints and limited resources. Further comparative research of other institutions of higher learning needs to be conducted to identify and remedy the causes of lower production of research output.

The current policy for the measurement of research output of public higher education institutions in South Africa could be further exploited to allow universities with strong research infrastructure to offer more postgraduate qualifications, for example doctoral qualifications, since the weighted subsidy is four times greater than masters qualification for which the weighted value is one. A basic feature of the current research output policy is that it links the awarding of public higher education grants to national and institutional planning. The second feature of the policy is that it lays great emphasis on research output.

The study has revealed that measuring research output is not a simple issue. The conduct of research measurement is a complex activity. There is no single measure, however sensitively designed and implemented, that can address all categories of research output. While the DoE categories remain the primary reference point for research output, it must be recognised that a myriad of outputs can result from research (including development and innovation), scholarly and professional undertakings. It can be concluded that, a suite of indicators have to be applied to reach a fair and reasonable measurement of research output. However, there is no automatic or sufficient consensus of indicators.

A basic premise of this thesis is that the ideal measures to be applied in any context will vary according to institutional setting, government priorities, as well as the primary purpose of the exercise in which they are deployed. National governments and research institutions need systematic evaluations for optimising their research allocations, re-orientating their research support, rationalising research organisations, restructuring research in particular fields, or augmenting research productivity. The major important feature of the current policy for the measurement of research output of public higher education institutions in South Africa is that it lays great emphasis on research output.

The study suggests a further comparative analysis of at least four South African Universities on how the current policy for the measurement of research output impacts on their production of research output. Research on how public Higher Education Institutions are managing their research output in response to the current research policy will benefit government departments and agencies that are looking for research-based solutions to important practical problems, whether technical, social or in other domains, and industrial undertakings looking for sources of possible product or process innovation. Research in the human and social sciences is a reliable source of direction and good practice for community-based and non-governmental organisations, international and national development agencies, educational institutions and civil society at large.

6.6 Conclusion

There is little, if anything that is simple at all levels of reality. Measuring research output is no exception. Managing the measurement of research output is never a smooth ride, but is a complex and a challenging task. Challenges facing research managers and policymakers in measuring and the use of research output are voluminous. For example, convincing the academics to comply with the DoE even before preparing for a publication and to make an informed decision before choosing a publisher or journal is a great challenge.

Although the new policy for the measurement of research output of public higher education institutions in South Africa has shown some significant improvement from its predecessors, there are many flaws or gaps in its implementation as well as its relation with other policies such as the Science and Technology policy. The evolutionary approach to the economics of public funded research suggests that informational view of knowledge substantially undervalues the extent to which knowledge is embodied in specific researchers and institutional networks within which they conduct research. It also misrepresents the nature of the innovation process, implying that scientific knowledge is “on the shelf, and freely available to all comers’. It can be argued that scientific knowledge is not freely available to all, but only to those who have the right educational background and to members of the scientific and technological networks.

The study has shown that the University of Pretoria has remained a leader in implementing the current policy of the measurement of research output of public

higher education institutions in South Africa. This is epitomised by an increase of the university's research output since 1996 to date. The study has concentrated on one higher education institution, the University of Pretoria. A further comparative research on other institutions of higher learning needs to be conducted to identify and remedy the courses of lower production of research output.

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Annexure A: Total output of South African Universities: 1998- 2003

UNIVERSITY	1998	1999	2000	2001	2002	2003	
Durban-Westville	124.47	120.00	120.30	106.53	126.68	74	1.4%
Fort Hare	36.54	34.40	46.15	0.00	54.94	79	1.5%
Cape Town	601.07	552.00	766.01	652.18	710.27	564	10.5%
Medunsa	38.33	36.00	45.22	31.08	37.48	50	0.9%
North	84.52	84.50	82.27	98.38	72.5	63	1.2%
Natal	511.22	478.66	487.01	499.89	566.99	630	11.7%
North West	8.91	27.30	4.33	0.50	11.99	1	0.0%
Free State	265.8	276.00	317.38	293.42	365.73	334	6.2%
Port Elizabeth	99.54	96.00	103.37	126.69	105.66	123	2.3%
Potchefstroom	155.61	173.00	202.18	186.69	209.98	266	4.9%
Pretoria	769.68	769.40	832.75	882.21	954.18	954	17.7%
RAU	306.94	259.00	291.46	310.95	267.46	277	5.1%
Rhodes	211.74	208.20	233.25	210.16	206.64	165	3.1%
Stellenbosch	528.82	520.00	626.85	589.58	633.96	624	11.6%
Transkei	80.95	0.00	16.16	15.17	10.9	14	0.3%
Unisa	315.76	334.00	296.76	333.93	391.57	403	7.5%
Venda	0	0.00	1.12	11.43	13.96	24	0.4%
Vista	58.93	60.30	67.35	51.42	58.76	21	0.4%
Western Cape	133.77	133.00	103.27	157.98	113.59	106	2.0%
Witwatersrand	656.02	685.00	666.19	709.52	632.89	557	10.3%
Zululand	55.88	46.10	74.65	43.37	58.15	61	1.1%
NATIONAL TOTALS	5044.50	4892.86	5384.03	5311.08	5604.28	5390	100.0%

Total output of South African Universities: 1998- 2003

Source: DoE Annual Report 2004

Annexure B: Check list: Books/Chapters for submission to the DoE

	<i>HAVE YOU INCLUDED THE FOLLOWING (either in the original or good quality photocopy format)?</i>	YES/NO
1.	Appendix 1(B or C) – generated from the data entered on the Research Information System (RIS)	
2.	Outside cover/ inside sleeve/ jacket page or other section of book with full name of publication; proof of publication date; publisher’s name and ISBN	
3.	Preface/ Foreword/ Introductory statement or other section of book/ e-mail from the publisher for proof of target audience and reviewing procedure (EVIDENCE of peer review must be provided)	
4.	Complete index/ table of contents	
5.	List of contributors and their affiliation (if not stated elsewhere)	
6.	Two independent (reviewer not attached to UP) assessments of the book by academic peers (refer to template or policy document for format) in English	
7.	The complete book for which subsidy is asked. Length of the book must be a minimum of 60 pages (excl references, bibliography & appendices)	
8.	If the book is published in a language other than English a minimum one page summary in English	
	<i>HAVE YOU CHECKED THAT THE ?</i>	YES/NO
9.	Publication date is 2005*	
10.	Publication represents original research	
11.	Edition is a first print of the FIRST Edition**	
12.	Author(s) claiming for subsidy have written and not edited the book (only)	
13.	Publisher is a reputable & independent (preferably commercial) publishing house	
14.	Publication has been refereed/ reviewed by an (external) editorial board/peers (provide proof- refer to item 3 above)	
15.	Target audience comprises academic PEERS (subject specialists) and NOT undergraduate students (textbooks), contractors (contract research reports) or laymen (coffee table books) (provide proof – refer to item 3 above. Please ensure that it is well described in Appendix 1(B)	

*If 2004, confirm with Division of Research Support that no claim has been submitted previously. If not, attach a motivation in English, eg. A letter from the publisher re late distribution, stating reasons why the publication could not be submitted in 2005

**If not the case, state the % of “new” original research in the rework publication in Appendix 1 (B) generated from the database

Annexure C: Check list: Conference Proceedings

	<i>HAVE YOU INCLUDED THE FOLLOWING (either in the original or good quality photocopy format)?</i>	YES/ NO
1.	Appendix 2 – generated from the data entered on the Research Information System (RIS)	
2.	Outside cover/inside sleeve/jacket page with full name of publication, proof of publication date, publisher's name, ISBN etc	
3.	Preface/Foreword/Introductory statement/e-mail from editor/call for papers document etc providing proof / description of refereeing procedure	
4.	Complete index/table of contents	
5.	List of editors/editorial panel members and their affiliation	
6.	List of contributors and their affiliation (if not stated on the paper)	
7.	The complete paper in the conference proceedings for which subsidy is asked	
8.	If the proceedings is published in a language other than English, an abstract in English	
	<i>HAVE YOU CHECKED THAT THE ?</i>	YES/ NO
9.	Publication date is 2004*	
10.	Publication is NOT just a conference programme or unrefereed pre-conference document (i.e. not published)	
11.	Publication is an occasional publication and NOT part of a regular volume of a research journal	
12.	Refereeing of papers has been done by distinguished subject specialists	
13.	Publisher is a reputable and independent (preferably commercial) publishing house	
14.	The refereeing procedure is well described in Appendix 2 generated from the database (refer to item 1 above)	
15.	The target audience of the proceedings is academic peers in the relevant research field	

*If 2003, confirm with Division of Research Support that no claim has been submitted previously; if not, attach a **motivation** in English, eg. A letter from the publisher re late distribution, stating reasons why the publication could not be submitted in 2004.

Confirmation by RIS Coordinator (NAME):

Date:

Annexure D: A letter from the DRS to the researchers

Dear Researcher

This is just a reminder that it is once again the time of the year when data is captured from every researcher at UP for the Research Information System (RIS). These data serve two very important purposes:

1. They are used to develop the claim to the Department of Education for the **research subsidy** on our publications (including journal articles, papers in conference proceedings, books and chapters in books).
2. The entries on "Highlights from Research Findings" are used for the Faculty Reports in the UP annual research report "**Research 2005**". You may view it at <http://www.research.up.ac.za/2004/>

The data are entered by **Data Capturers** in Departments under the supervision of the Research Information Coordinators of the Faculties/Schools (**RIS Coordinators**) appointed by your Dean. A list of the current incumbents is available from: [RIS Coordinators / Data Capturers](#)

Regards

The Research Support Team

Annexure E: Classification of Education Subject Matter (CESM) Codes

With regard to Books, Chapters in Books and Published Conference Proceedings, submitted to the Department of Education for subsidy purposes, it is necessary to select from the following list, the CESM code to which the research most closely relates. /

Vir Boeke, Hoofstukke in Boeke en Gepubliseerde Kongresverrigtinge voorgelê vir subsidie moet die CESM kode waarmee die navorsing hoofsaaklik verband hou, gekies word uit die volgende lys.

Corporate Information* / Korporatiewe Inligting*

First Order Classification of Education Subject Matter (CESM) Codes

01. Agriculture and Renewable Natural Resources
02. Architecture and Environmental Design
03. Arts, Visual and Performing
04. Business, Commerce and Management Sciences
05. Communication
06. Computer Science
07. Education
08. Engineering and Engineering Technology
09. Health Care and Health Sciences
10. Home Economics
11. Industrial Arts, Trades and Technology
12. Languages, Linguistics and Literature
13. Law
14. Libraries and Museums
15. Life Sciences and Physical Sciences
16. Mathematical Sciences
17. Military Sciences
18. Philosophy, Religion and Theology
19. Physical Education, Health Education and Leisure
20. Psychology
21. Public Administration and Social Services
22. Social Sciences and Social Studies

Annexure F: Brief guidelines for RIS system

Research Information System (RIS)

Brief guidelines for successful submission of books, chapters in books, proceedings, and articles to the Department of Education (DoE)

The RIS templates and checklists are available in both Afrikaans and English at:

<http://www.up.ac.za/services/research/intranet/nis.htm>

Important note: The following guidelines are supplementary to the information provided in the formal documents (Corporate data category) to be found at the above-mentioned web address.

General rules:

- *Proof of affiliation* with the University of Pretoria must be provided. Affiliated authors are defined as academic or research staff, research students, visiting scholars or fellows and retired academics from the claiming institution. If affiliated authors are from another country or from a non-claiming institution, *indicate dual affiliation*. If we do not indicate affiliation of these co-workers with the University of Pretoria, we shall not receive their share of the subsidy. If the affiliation is not on the title page of the publication, it is often in the list of contributors. Make a copy of this page and submit with the publication.
- The *contact address* reflected in the research output, must be the address of the claiming institution (i.e. the University of Pretoria).
- *Highlight* or clearly indicate the relevant information such as the affiliation and contact address.
- Hand in a *hard (physical) copy* of the book, conference proceedings or article in its published form (galley proofs are not acceptable). In the case of articles, high quality photocopies of the title page of the journal, the contents page and the first and last two pages of the article are acceptable.
- Hand in a *fully completed checklist* (as found at the above-mentioned web address and at the end of this document) when submitting books, chapters or proceedings for subsidy.
- Once the RIS data has been captured by the operator in your department, *check the "Individuals Research Output"* to ensure that all your individual data has been captured correctly. The operator can print this page. These reports appear at the end of the Corporate Reports.

- *Data must be captured correctly.* For example, it is important that the sequence in which the authors' names appear, is entered correctly. The names of all the authors must be listed. The title of the article, chapter or book must be correct (as it was published).

Books and Chapters in books

If you want to receive subsidy for the publication of a book or chapter in a book, there are certain requirements:

- It must be *peer-reviewed* and you must provide *proof* of this. Peer-review implies that peers scrutinized (reviewed) the book or chapter before it was accepted for publication. *Supporting evidence* must be provided in the book or from the publishers. Independent peers should be involved in the review process.
- Each physical copy of the book or chapter in a book must be accompanied by two independent assessments by peers of the author/s of the book. These assessments are on the completed book after publication. These peers should not be co-authors or reviewers. The book's contribution as a research output must be assessed. Submit hard copies of the reports. The report of the independent assessors *must contain the following*:
 - * Name of the institution of the author
 - * Name and institutional affiliation of the assessor (this person should not be affiliated to the claiming institution)
 - * The title of the book
 - * The authors of the contribution
 - * The assessment of the book and its contribution as a research output, with reference to the provided criteria for evaluation of books
- The book must disseminate *original research* and new developments
- The *target audience* must be specialists / peers in the relevant field. It should not be a textbook or a popular book intended for the general public.
- The content should not be speculative or subjective (e.g. when the authors are invited to offer their own assessment of what they consider to be relevant).
- The author should not be on the reviewers list
- The book must have an ISBN number
- The *length of the book* must be a minimum of 60 pages, excluding references and appendices. A book may be subsidised to a maximum of 5 units (300 pages).

- It should not be based on funded research (i.e. not a report of funded research)
- It should not be commissioned (i.e. already subsidised)
- It should not be an “in-house” publication
- The book must be published by an independent, reputable, commercial *publisher*
- If the book is published in a *language other than English*, the book should be accompanied by a synopsis of one page in English.
- It should be the first print of the *first edition* of the book. A book may be submitted again if it has been expanded extensively.
- The author must complete the *template and checklist* for the submission of books in *great detail* (if not, the book will not be accepted).
- The book/chapter must be submitted (to the faculty coordinator) with a hard copy of the checklist and printout of Appendix 1 (B) (books) or Appendix 1 (C) (chapters) as generated by the database (2005).

The following types of book publications are *not subsidised*:

- Dissertations and theses
- Textbooks and study guides
- Inaugural speeches
- Reports forming part of contract research
- Works of fiction

Proceedings of a conference, congress or symposium

The requirements for subsidy are:

- The purpose of the proceedings must be to *disseminate original research* and new developments
- Articles accepted for publication in the proceedings must be *peer reviewed*
- The proceedings must have an *ISBN number*
- The *target audience* must be specialists in the relevant field
- A hard copy of the contribution claimed for must be submitted to the DoE, but the proceedings may be published on CD or on a web site.

The proceedings must be submitted (to the faculty coordinator) with a hard copy of the checklist and printout of Appendix 2 as generated by the database (2005).

The following types of contributions appearing in proceedings will not be subsidised:

- Correspondence to the editors
- Abstracts or extended abstracts
- Obituaries
- Book reviews
- News articles
- Advertorials
- Previously published material

Articles in accredited Journals

The requirements for subsidy are:

- a) The article must be published in a journal that appears in one of the following *indices*: the Approved South African Journals or the ISI or the IBSS list
- b) The contributions to the journal must originate from *more than one institution*
- c) If a journal is *published late*, (dated in a previous audit year), the article must be accompanied by a letter from the editor stating the actual date of publication and the reasons for the late publication.

The following types of articles appearing in journals are *not subsidised*:

- a) Correspondence to the editors
- b) Abstracts or extended abstracts
- c) Obituaries
- d) Book reviews
- e) News articles
- f) Advertorials

If you invest time in writing an article, a chapter or a book, please make sure that you and the University of Pretoria will benefit from it by receiving subsidy. These guidelines can also be used during the preparation of a publication.

Compiled by: Prof. Anita van der Merwe
Humanities RIS coordinator

Annexure G: ISI Citation indexes

The ISI® *Index to Social Sciences & Humanities Proceedings* provides comprehensive, multidisciplinary coverage of proceedings papers delivered at prestigious international social sciences and humanities conferences. It delivers complete bibliographic information and author abstracts from source publications that include monographs, series, preprints, and proceedings published in the journal and book literature. ISSHP® covers the disciplines indexed by the [Social Sciences Citation Index](#)
<http://scientific.thomson.com/products/isshp/>

The most current information in the sciences, the social sciences, and the arts and humanities is often revealed at conferences. The dissemination of the proceedings from these conferences is not, however, as efficient as scholars would want. Fortunately, the Institute for Scientific Information® (ISI®) offers solutions to this problem: the *Index to Scientific & Technical Proceedings® (ISTP®)* on CD-ROM and the *Index to Social Sciences & Humanities Proceedings® (ISSHP®)* on CD-ROM. These bibliographic files facilitate access to the published proceedings. This is vitally important because, after all, no search is complete without including the proceedings literature. In fact, these bibliographic files hold approximately 980,000 recently published papers from approximately 19,100 current and past conferences.
<http://scientific.thomson.com/knowtrend/essays/proceedingsliterature/literature/>

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The *Science Citation Index Expanded™* provides access to current and retrospective bibliographic information on author abstracts, and cited references found in approximately 5,900 of the world's leading scholarly science and technical journals covering more than 150 disciplines. The *Science Citation Index Expanded* format is available through the *Web of Science®* and the online version and SciSearch.
<http://scientific.thomson.com/products/scie/>

The *Web of Science* provides seamless access to current and retrospective multidisciplinary information from approximately 8,700 of the most prestigious, high impact research journals in the world. *Web of Science* also provides a unique search method, cited reference searching. With it, users can navigate forward, backward, and through the literature, searching all disciplines and time spans to uncover all the information relevant to their research. Users can also navigate to electronic full-text journal articles.

Launched in January 2005, the [Century of Science](#) initiative makes hundreds of thousands of older, twentieth century scientific journal items available in one place and on one platform for the first time. Approximately 850,000 fully indexed journal articles have been added to *Web of Science*, from 262 scientific journals published in the first half of the twentieth century. This comprehensive collection is fully searchable, with complete bibliographic data, cited reference data and navigation, and direct links to the full text. <http://scientific.thomson.com/products/wos/>